H&L HRE ram- All but Parma.

1) Please set the following conditions prior to testing.
   a) Empty tool station under the ram.
   b) Tool mode on the front panel.
   c) E-stop the machine and install the high pressure gauge in the PHD test port and the low pressure gauge in the PND test port. These ports are on the far side of the hydraulic manifold block that is accessed by opening the turret access door on the far side of the machine.
   d) Close all tool doors.
   e) Release the E-stop and restart the hydraulics by pressing the clear P.B.
   f) You can reopen the far side turret access door now to observe the gauges.

2) Check pressures and charging cycles at idle.
   a) Low pressure should be cycling between 80 and 70 Bar, 4-10 times per minute. If the cycle is above or below the previous values the cause should be investigated and remedied before continuing. Below 4/min is usually the fine position orifices being blocked (you will also have little or no high pressure charging cycle at hard stop). Above 10/min can be a number of things. Usually it's the low pressure accumulator having lost some or most of its charge. I have found a bad/lose low pressure check valve, high pressure sequence valve, and a low pressure safety valve not properly seated causing a high charging cycle. The machine will operate at up to 30/min.
   b) High pressure should be cycling between 285 and 270 Bar, 1 to 4 times a minute. If the cycling is above 4 times a minute then check the accumulator, it is usually the cause. I have also found the high pressure check valve to be bad/lose (under accumulator).

3) Check the accumulator pressure for the high and low pressure circuits.
   a) Observing the gauges while the e-stop is pressed, watch the point where the needle drops quickly after moving slowly (sit and drop). This gives you the approximate pressure on the accumulator. The pressure is typically 5 to 10 Bar higher than the drop point.

4) Check the steering unit mechanics, high pressure sequence valve, and the check valve between the high and low pressure circuits.

   a) Place an empty station under the ram.

   b) E-stop the machine. Turn the knob on the steering unit stepper motor. It should only turn about +/- 20 degrees. If it turns all the ways around, then the travel limit clip between the motor and the steering unit has broken. This causes the ram to alarm out when it's trying to reference.

   c) Release the E-stop and start the hydraulics. Turn off CB10 and CB11 in the disconnect box. You will get a PCU alarm, ignore it. Turn the knob on the steering unit stepper motor. The ram should move smoothly up and down. When you release the knob, the ram should stop moving. If it continues moving after you release it, then the steering unit is bad- usually contamination.

   d) Turn the knob so the ram moves all the way down till it hits the lower limit (hard stop). The high pressure charging cycle should jump to 35-45 times per minute. Plugged fine position offices or low high pressure flow can cause low or no charge cycle at hard stop. Make sure the pressure cycles between 285 and 270 bar. If the pressure drops to 140 Bar and the low pressure needle pegs, then the check valve between the high and low pressure circuits is bad. The high pressure oil is bypassing to the low pressure side and is being limited by the low pressure safety valve. If the pressure drops and never cycles and the low pressure is 80-70 Bar, than there is probably a flow issue on the high pressure side. When the machine shifts to high tonnage, the low pressure is isolated from the fine position orifices (path to tank) and its charging cycle will almost come to a stop.

   e) Testing the stepping motor coils and cabling- Turn off CB10 and CB11 in the disconnect box. Using a multimeter on the ohms scale, measure the coil resistance. On the PCU20 plug X1, between pins 1 & 2 and 3 & 4. On the PCU20A plug X3, between pins 5 & 6 and pins 7 & 8. You should get slightly less than 1 ohm. As well, measure from each pin to LVR/ground. You should not measure any resistance.

5) High pressure circuit fault. The 185 Bar high pressure switch is off for too long. Verify via the high pressure gauge that it is telling the truth. The switch can be jumped out for trouble shooting and emergency operation- as long as the high pressure is above 155 Bar.

   a) Check that the high pressure charges from 0 to 285 Bar in about 2 seconds. Press clear after releasing the E-stop and hold the high pressure hose coming off the hydraulic tank. When the high pressure loads, you will feel the hose flex. It will relax when it reaches 285 Bar. If it takes longer than 5 seconds, you will get a high pressure alarm.

b) A bad high pressure hose in the tank can cause this- indicated by caramel colored oil and often flecks of black rubber on the filter. As well a high pressure pump with low flow can cause this.

c) A plugged orifice in the high pressure charging circuit poppet.

d) A cautionary note- if the high pressure charging solenoid is bad or contaminated, it is possible for the circuit to hold pressure, even for days. So please verify via the high pressure gauge that the system pressures are at 0 before removing anything from the manifold block.

e) Check the plug on the high pressure charging solenoid, looking for a loose or broken wire. Check for burn marks on the solenoids spade connectors- if evident, clean them off and replace the plug.

6) Low pressure circuit fault.

   a) Same as the high pressure circuit fault except the low pressure switch faults out at 55 Bar.

7) Machine stalling on > 5 tons hits.

   a) Read 4) d) above, high pressure dropping to about 140 Bar.

   b) High tonnage sequence valve.

8) Random heavy hits on stamping, numbering, and forming.

   a) Initial set up is near the low to high tonnage shift point. Oil temperature changes, variations in material tensile strength and thickness, and small variations in stroke length can cause the ram to shift into high tonnage. When the ram shifts into high tonnage, the hit is usually heavy.

9) Random PCU errors that come and go.

   a) Clean the Elgo sensor and magnetic strip.

   b) Disable contour following via PCU screen (Kbit10.0=1). Only available on later versions of Fan2000.

   c) Elgo sensor.

d) Steering unit.

e) PCU.

f) Fine position orifices. See 4) d) above.

HYDAC INTERNATIONAL

Universal Charging and Testing Unit FPU-1

For Bladder, Piston and Diaphragm Accumulators

1. DESCRIPTION

1.1. FUNCTION

The charging and testing unit FPU-1 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 to a commercial nitrogen bottle via a flexible charging hose. 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 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 adaptors. Bladder accumulators, however, require an adaptor (A3 supplied as standard, see model code on page 2).

The FPU-1 must only be used for its intended purpose.

1.2. INTERVALS BETWEEN CHECKING

On the whole, nitrogen losses on HYDAC hydraulic accumulators are very low. However, a regular check of the gas pre-charge pressure is recommended to prevent the piston from hitting the cover plate or the bladder or diaphragm from becoming too deformed, if there is a drop in the pressure p_0.

The pre-charge pressure p_0 as shown on the label or the accumulator body, must be reset after every new installation or repair and then checked at least once during the following week. If no nitrogen loss is detected, a further check should be made after approx. 4 months. If after this period no change in the pressure is found, a yearly check should be sufficient.

1.3. CONSTRUCTION

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

- Valve body
- Spindle
- Check valve
- Release valve
- Gauge
- Charging hose
- A3 adaptor for bladder accumulators

1.4. ACCESSORIES

- **Gas safety valve with intermediate piece**
  TUV set and lead sealed, it must be fitted between the hydraulic accumulator and the nitrogen bottle by means of the intermediate piece, if the gas pressure in the commercially available nitrogen bottle is higher than the max. permissible operating pressure of the hydraulic accumulator.
- **Pressure reducer**
  for setting the required pre-charge pressure between nitrogen bottle and accumulator.
- **Protective case**
  for storing the charging and testing unit and adaptors.

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

2. TECHNICAL SPECIFICATIONS

2.1. MODEL CODE
(also order example)

FPU-1 250 F 2.5 G2 A1 K

Universal charging and testing unit — FPU-1

Gauge indication range — 250

0 -	10 bar	0 -	145 psi	10
0 -	25 bar	0 -	363 psi	25
0 -	100 bar	0 -	1450 psi	100
0 -	250 bar	0 -	3626 psi	250
0 -	400 bar	0 -	5714 psi	400

Charging hose — F

F = for 200 bar nitrogen bottle with connection W24.32x1/14 (DIN 477, Part 1)
FM = for 300 bar nitrogen bottle with connection M30x1.5 (DIN 477, Part 5 to April 2002)
FW = for 300 bar nitrogen bottle with connection W30x2 (DIN 477, Part 5 from April 2002)

Length of charging hose — 2.5

2.5 m	2.5
4.0 m	4

Special lengths on request

Adaptor G for nitrogen bottles — G2
See table under point 10 (page 15)

Adaptor A — A1 (A3 is supplied as standard)

A1	=	M16x1.5
A2	=	5/8 - 18 UNF
A3	=	7/8 - 14 UNF
A4	=	7/8 - 14 UNF
A5	=	M8x1
A6	=	G 3/4 A
A7	=	G 1/4
A8	=	G 3/4
A9	=	Vg 8
A10	=	7/8 - 14 UNF
A11	=	M16x2
D4	=	5/8 - 18 UNF

(Part no. 366374)
other adaptors on request

Protective case — K

Accessories (Please give full details when ordering.)
Gas safety valve with intermediate piece (see point 5.3.).
Pressure reducer (see point 5.1.).
Adaptor for connector D (see point 4.1.).
Wrench 14x15 (Part no. 1011065).
Allen key SW6 (Part no. 1005164).
Valve tool for gas valve (Part no. 616886).
Torque wrench (Part no. 3136470)

2.2. WEIGHT

Standard model without case:
approx. 1.4 kg

Standard model with case:
approx. 3.0 kg

2.3. FPU-1 STANDARD MODELS

2.3.1 **Model without case**

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

2.3.2 **Model with case**

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

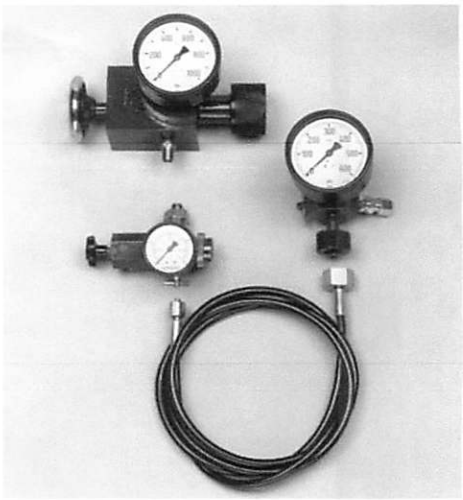
2.3.3 **Model without case with G adaptor**

Model code	Part no.
FPU-1-250F2.5G2A3	2120252
FPU-1-250F2.5G3A3	2115555
FPU-1-250F2.5G4A3	2124611
FPU-1-250F2.5G9A3	2114312
FPU-1-250F4G3A3	2123839
FPU-1-250F4G6A3	2117532
FPU-1-250F4G10A3	2119789
FPU-1-400F2.5G2A3	2115823
FPU-1-400F2.5G3A3	2121557
FPU-1-400F2.5G8A3	2115693

2.3.4 **Model with case and G adaptor**

Model code	Part no.
FPU-1-010F2.5G2A3K	2116766
FPU-1-010F2.5G3A3K	2127228
FPU-1-010F2.5G4A3K	2125524
FPU-1-010F2.5G6A3K	2115661
FPU-1-010F2.5G7A3K	2117851
FPU-1-010F2.5G8A3K	2117303
FPU-1-010F2.5G9A3K	2114482
FPU-1-010F2.5G10A3K	3008015
FPU-1-010F4G7A3K	2124450
FPU-1-025F2.5G2A3K	2114401
FPU-1-025F2.5G3A3K	2121210
FPU-1-025F2.5G4A3K	2115247
FPU-1-025F2.5G5A3K	3013724
FPU-1-025F2.5G8A3K	2119888
FPU-1-025F2.5G9A3K	2123949
FPU-1-025F2.5G10A3K	2119564
FPU-1-025F4G9A3K	2119680
FPU-1-100F2.5G2A3K	2122515
FPU-1-100F2.5G4A3K	2122089
FPU-1-100F2.5G6A3K	3003846
FPU-1-100F2.5G9A3K	2119883
FPU-1-100F4G3A3K	2120359
FPU-1-250F2.5G2A3K	2114309
FPU-1-250F2.5G3A3K	2114308
FPU-1-250F2.5G4A3K	2103046
FPU-1-250F2.5G5A3K	2117038
FPU-1-250F2.5G6A3K	2115420
FPU-1-250F2.5G7A3K	2120010
FPU-1-250F2.5G8A3K	2115216
FPU-1-250F2.5G9A3K	2115833
FPU-1-250F4G2A3K	2116743
FPU-1-250F4G3A3K	2116779
FPU-1-250F4G4A3K	2128944
FPU-1-250F4G8A3K	2124860
FPU-1-250F4G9A3K	2116004
FPU-1-250F4G10A3K	2125750
FPU-1-400F2.5G2A3K	2114605
FPU-1-400F2.5G3A3K	2115692
FPU-1-400F2.5G4A3K	2128360
FPU-1-400F2.5G5A3K	2124387
FPU-1-400F2.5G6A3K	2121984
FPU-1-400F2.5G8A3K	2116005
FPU-1-400F2.5G9A3K	2115757
FPU-1-400F4G2A3K	2122119
FPU-1-400F4G3A3K	2115656
FPU-1-400F4G7A3K	2124504
FPU-1-400F4G8A3K	2119759
FPU-1-400F4G9A3K	2126309
FPU-1-400F4G10A3K	2116642

2.4. SPECIAL MODELS



For higher pressures, the following special models are available:

- FPS 600
  for bladder accumulators up to 600 bar max. pre-charge pressure (see technical information 293715).
- FPK 600
  for piston, diaphragm and SB800-1.5 accumulators up to 600 bar max. pre-charge pressure (see technical information 297248).
- FPH 800
  for high pressure bladder accumulators up to 800 bar max. pre-charge pressure (see technical information 242948).

3. OPERATING INSTRUCTIONS

3.1. TAKING ACCOUNT OF THE TEMPERATURE EFFECT

In order that the recommended pre-charge pressures are maintained even at relatively high operating temperatures, the pre-charge pressure $p_{0\ charge}$ for charging and testing a cold accumulator must be selected as follows:

$$p_{0\ charge} = p_0 \frac{\text{Pre-charge temp.} + 273}{\text{Operating temp.} + 273}$$

Pre-charge temperature [°C]
Operating temperature [°C]

3.2. PREPARATION

Prior to each testing, topping-up or re-charging of nitrogen, the accumulator must be isolated from the pressurised system by means of a shut-off valve and the fluid released.

Unscrew the protective caps S and H (only on bladder accumulators). Remove the O-ring O on bladder accumulators.

Slightly loosen the internal hexagon screw P on piston and diaphragm accumulators by means of an Allen key SW 6, DIN 911 (approx. ½ turn).

Place FPU-1 onto the accumulator and screw connector D by hand onto accumulator gas valve. At the same time, ensure that the release B of the FPU-1 is closed. Turn charging unit to a position where the gauge can be easily read.

3.3. TESTING

On bladder accumulators

(FPU-1 with A3 or other suitable adaptor) open valve by turning spindle A clockwise.

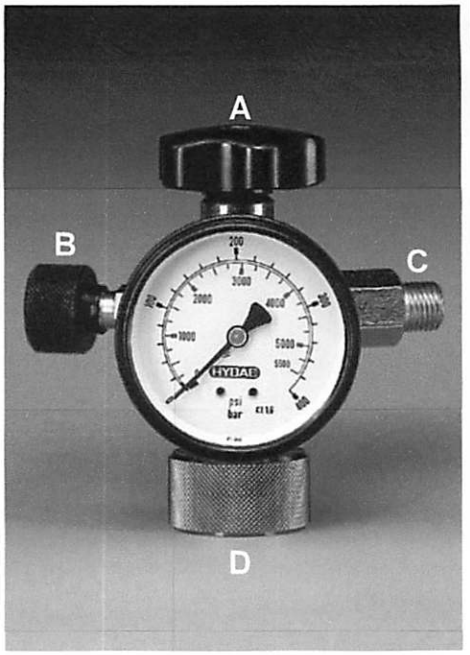
On piston and diaphragm accumulators (FPU-1)

open valve V by turning the internal hexagon screw anti-clockwise with spindle A.

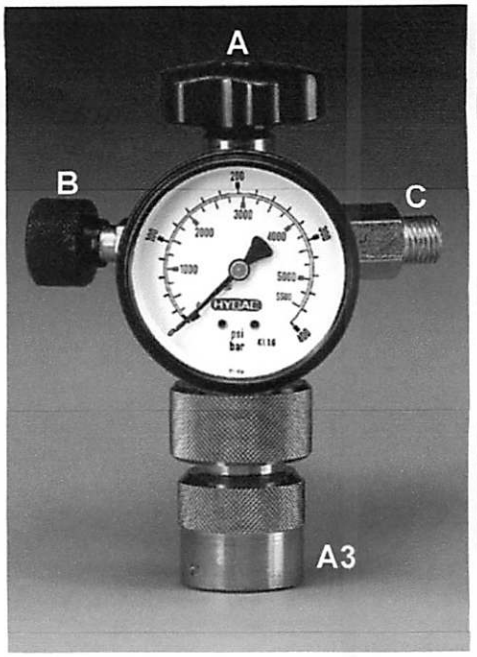
When the needle of the gauge begins to move, give the spindle another complete turn.
The gauge now shows the charging pressure in the accumulator. The check valve C prevents any escape of nitrogen.

3.4. REDUCING THE PRE-CHARGE PRESSURE

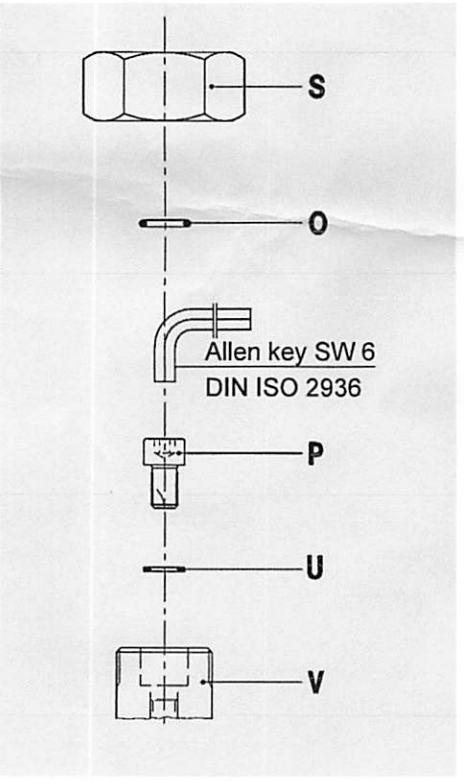
Carefully open release B.
The nitrogen escapes into the atmosphere.



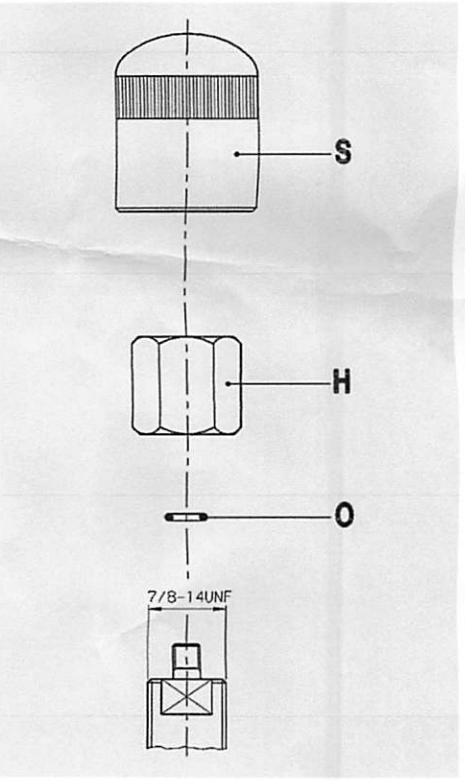
Charging and testing unit FPU-1 for piston and diaphragm accumulators



Charging and testing unit for bladder accumulators with adaptor A3



Gas valve for piston and diaphragm accumulators



Gas valve for bladder accumulators

3.5. INCREASING PRE-CHARGE PRESSURE

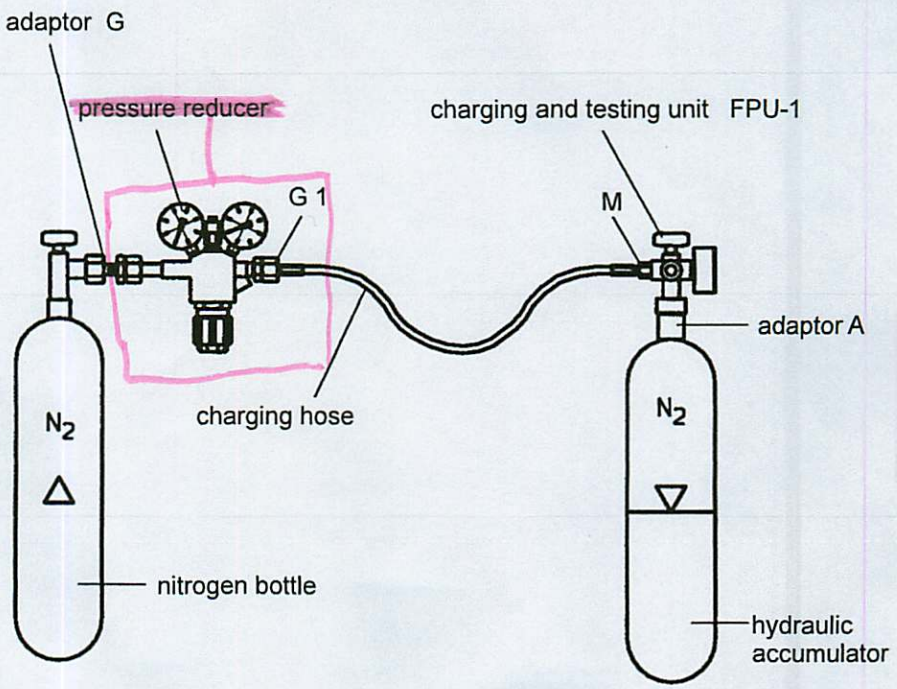
Only use nitrogen for charging accumulators
Never use oxygen!

Danger of explosion!

If the gas pressure in the nitrogen bottle is higher than the max. operating pressure of the accumulator, a gas pressure reducer must be fitted.

- Connect the flexible charging hose to the pressure reducer on the nitrogen bottle by means of the connector G1.
  For nitrogen bottles from other countries the appropriate adaptor is required (see page 15). Connect connector M of the charging hose to the check valve C of the charging and testing unit FPU-1. Open the shut-off valve on the nitrogen bottle, and slowly release nitrogen into the accumulator. Wait until approximately 1 bar has been reached before opening the shut-off valve of the nitrogen bottle further to enable faster charging.
- Interrupt the charging process from time to time and check the pre-charge pressure reached. Repeat this process until the required gas pre-charge pressure is achieved. After temperature equalisation has taken place, re-check the pre-charge pressure and adjust if necessary. If the pressure is too high, it can be lowered via the pressure release B of the FPU-1.
- If the required gas pre-charge pressure has been reached, turn the spindle anticlockwise to close the gas valve on bladder accumulators. On piston or diaphragm accumulators close the internal hexagon screw P by turning the spindle clockwise. Discharge the charging and testing unit FPU-1 via the pressure release and remove it by loosening the connector. On bladder accumulators, unscrew the adaptor and replace the O-ring O. On piston and diaphragm accumulators, tighten the internal hexagon screw P with Allen key [20 Nm].
- Check for leakages on the accumulator gas valve using a leak detector spray.
- Screw on cap nut H (only on bladder accumulators) and valve protection cap S onto the gas valve of the accumulator and

3.6. FPU-1 WITH ACCESSORIES



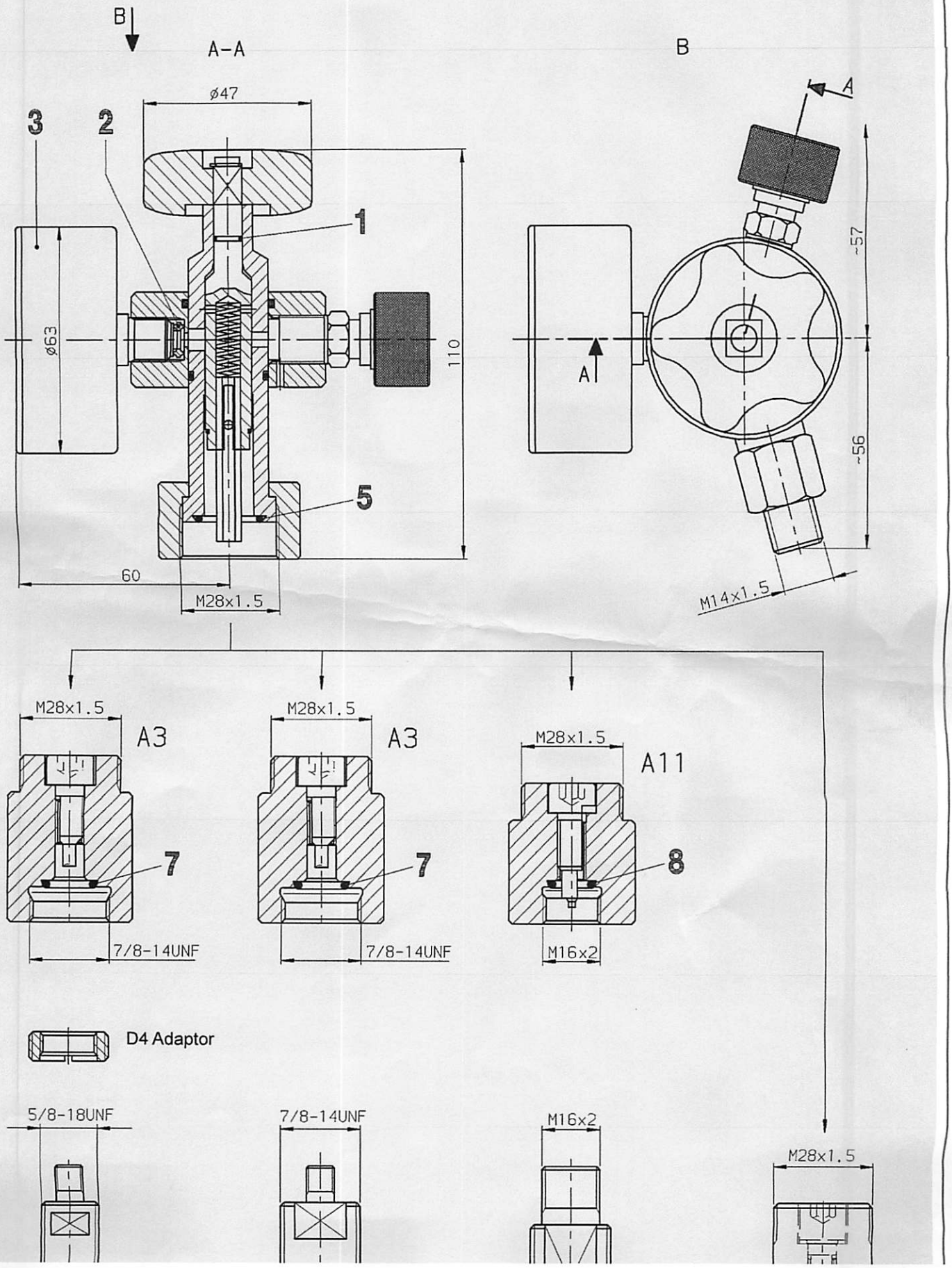
3.7. WARNING

- Nitrogen and operating fluid can escape when filling or testing the accumulator due to a faulty, i.e. leaking, bladder, diaphragm or piston seals.

  Caution!
  Risk to health in the case of aggressive fluids!
  (special charging and testing unit available on request)
- The check valve C must not be removed. The valve has a safety function for the whole charging and testing unit.
- During charging, by a compressor or nitrogen charging system connected upstream, continuous operation can lead to unacceptable increases in temperature.
- Rest periods must therefore be incorporated into the charging procedure and the FPU-1 must be allowed to cool down.

4. DIMENSIONS

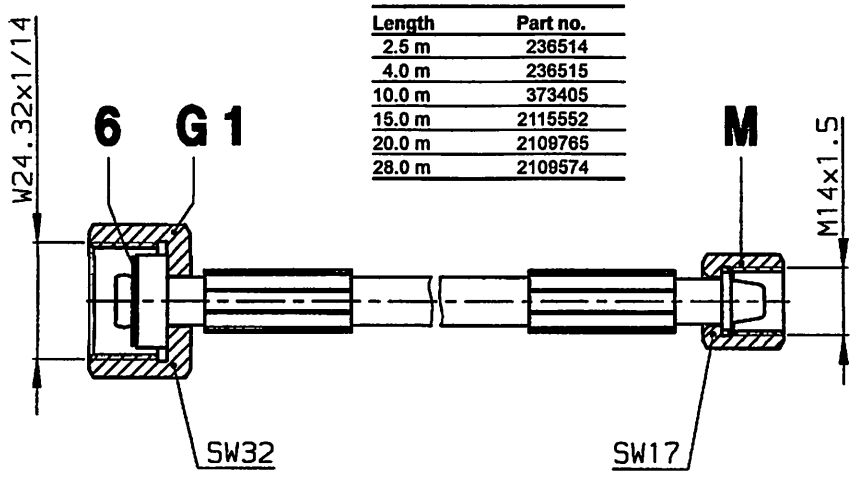
4.1. CHARGING AND TESTING UNIT FPU-1 WITH ADAPTOR FOR HYDAC ACCUMULATORS



Charging hoses are suitable for the respective published maximum permissible operating pressures and 10,000 charging processes.

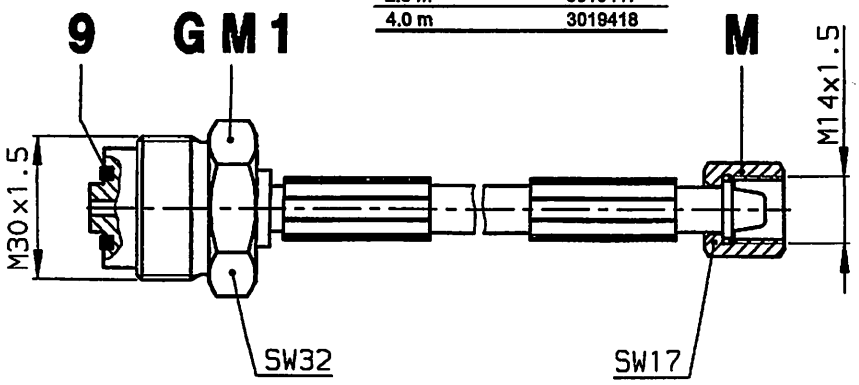
(HYDAC charging hoses comply with the EC machine directive and with DIN EN 982 and DIN EN 853 to 857).

4.2. CHARGING HOSE F
(200 bar nitrogen bottle - connection to DIN 477, part 1)



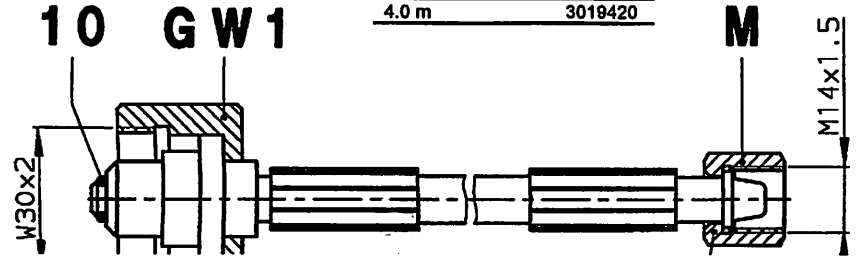
Length	Part no.
2.5 m	236514
4.0 m	236515
10.0 m	373405
15.0 m	2115552
20.0 m	2109765
28.0 m	2109574

4.3. CHARGING HOSE FM
(300 bar nitrogen bottle - connection to DIN 477, part 5 to April 2002)



Length	Part no.
2.5 m	3019417
4.0 m	3019418

4.4. CHARGING HOSE FW
(300 bar nitrogen bottle - connection to DIN 477, Part 5 from April 2002)

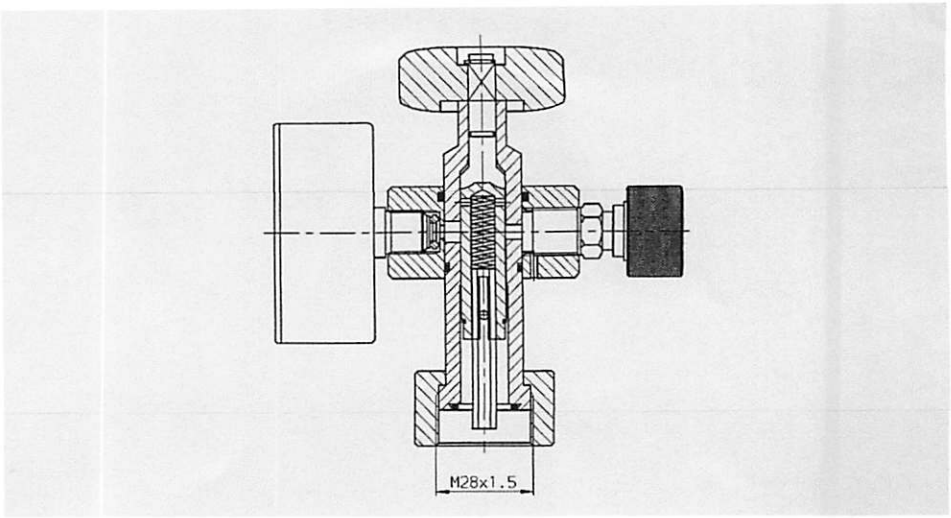


Length	Part no.
2.5 m	3019419
4.0 m	3019420

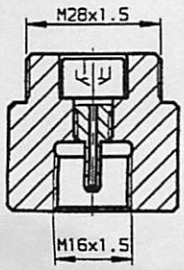
4.5. ADAPTORS A1 TO A12

The universality of the FPU-1 is guaranteed because as well as HYDAC piston and diaphragm accumulators, bladder accumulators can also be charged and tested using the A3 adaptor.

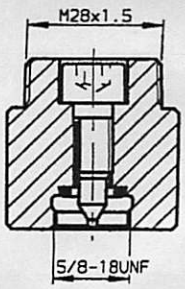
By using additional adaptors other makes of accumulator can also be charged and tested.



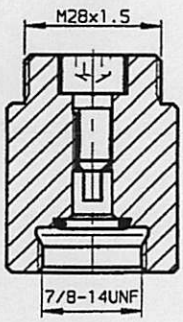
A1 (Part no. 361619)



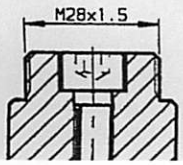
A2 (Part no. 361605)



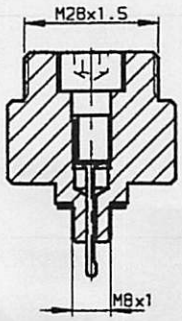
A3 (Part no. 291533)



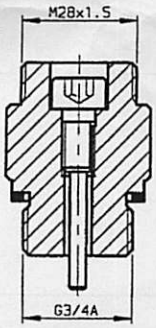
A4 (Part no. 291536)



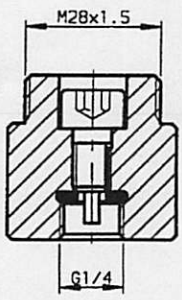
A5 (Part no. 291531)



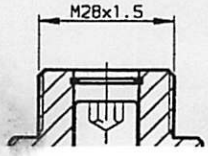
A6 (Part no. 2108819)



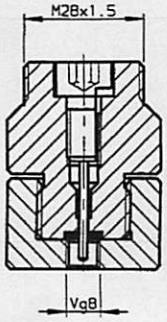
A7 (Part no. 2110629)



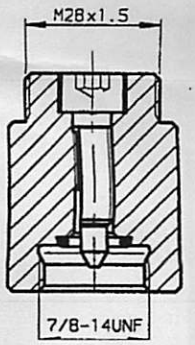
A8 (Part no. 2124524)



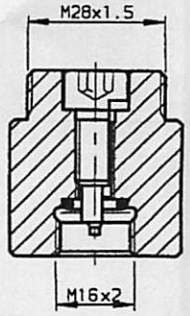
A9 (Part no. 2128638)



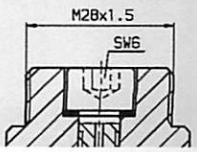
A10 (Part no. 2128849)



A11 (Part no. 3018210)

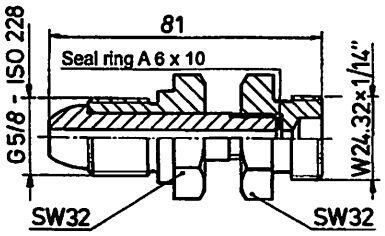


A12 (Part no. 3203185)

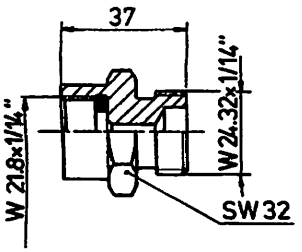


4.6. ADAPTORS
G2 TO G12

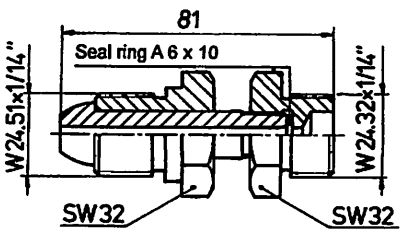
G 2 (Part no. 236376)



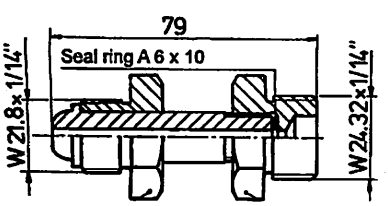
G 3 (Part no. 2103421)



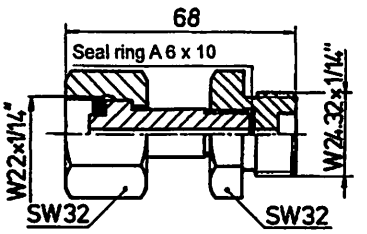
G 4 (Part no. 236374)



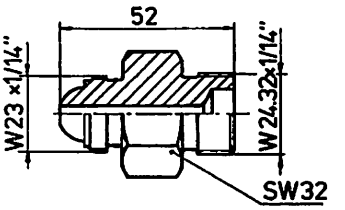
G 5 (Part no. 236373)



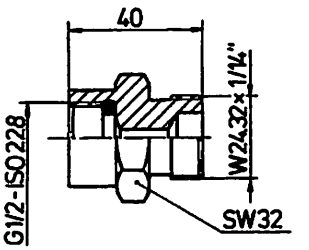
G 6 (Part no. 2103423)



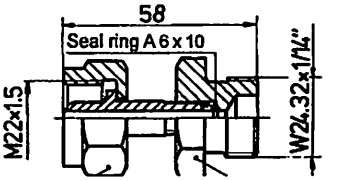
G 7 (Part no. 236377)



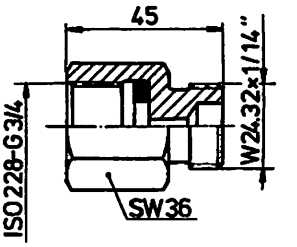
G 8 (Part no. 2103425)



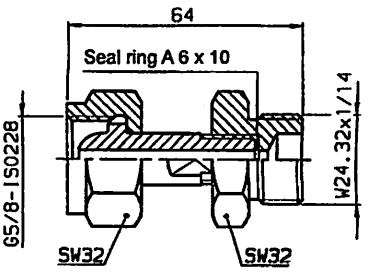
G 9 (Part no. 241168)



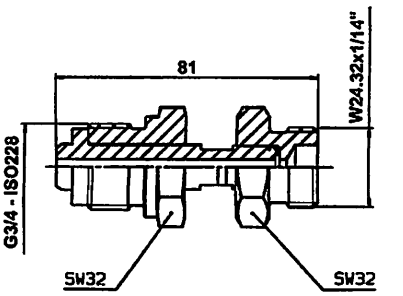
G 10 (Part no. 2103427)



G 11 (Part no. 3018678)

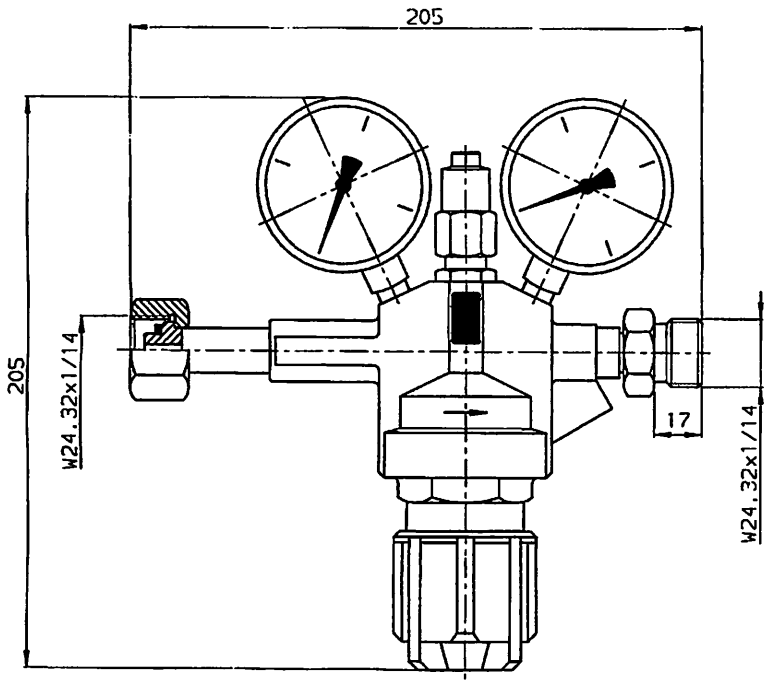


G 12 (Part no. 3195556)



5. ACCESSORIES

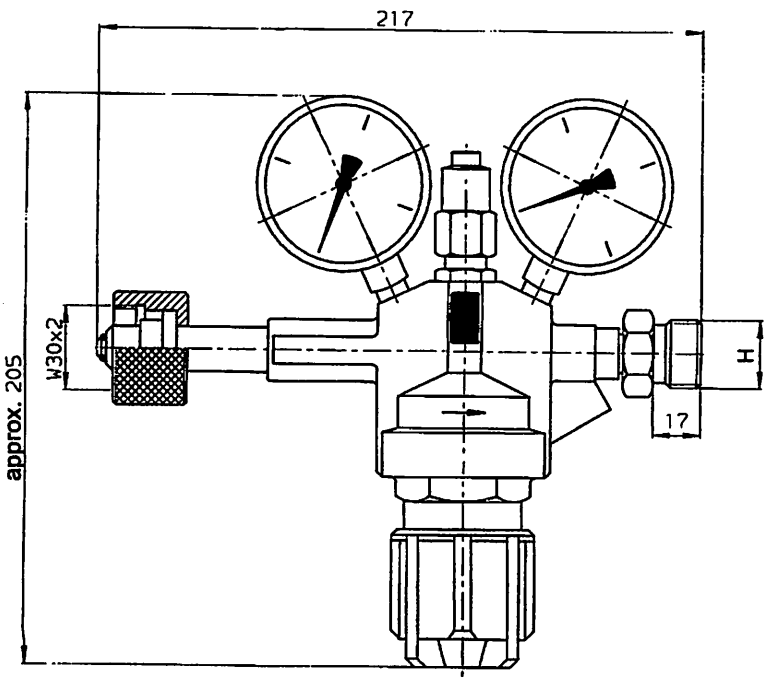
5.1. PRESSURE REDUCER FOR 200 BAR NITROGEN BOTTLES
(Connection W24.32x1/14 - DIN 477, Part 1)



Bottle pressure [bar]	Reduces pressure to between [bar]	Part no.
200	0- 20	635409
200	0-100	635411
200	0-200	635412

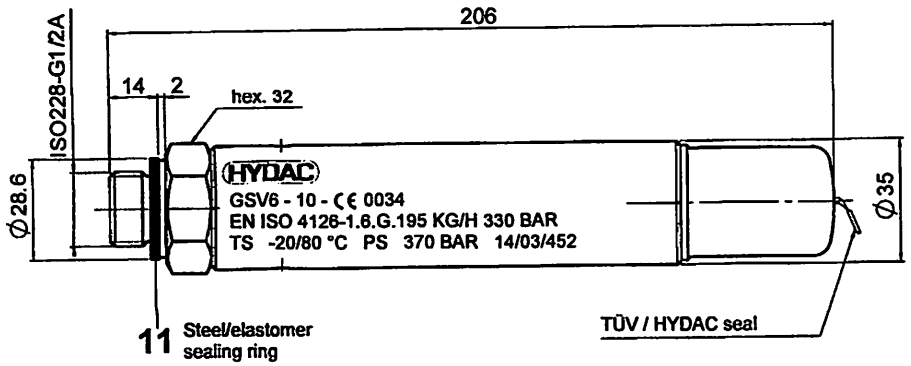
Weight: 2.3 kg

5.2. PRESSURE REDUCER FOR 300 BAR NITROGEN BOTTLES
(Connection W30x2 - DIN 477, Part 5 from April 2002)



Bottle pressure [bar]	Reduces pressure to between [bar]	Connection H	Part no.

5.3. GAS SAFETY VALVE GSV6



5.3.1 Model code
(also ordering example)

GSV6 - 10 - CE0034.ENISO4126-1.6.G. 195. 330

Gas safety valve

Component code

Flow rate Q in kg/h
(see table, point 5.3.2)

Pressure setting p in bar
(see table, point 5.3.2)

5.3.2 Types of GSV6

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

5.3.3 **Type of construction**
Direct-acting gas safety valve
nominal width 6 mm

5.3.4 **Design**
PED 97/23/EC,
EN ISO41236-1, EN 13445-6
Others on request

5.3.5 **Module category**
IV to PED 97/23/EC
Module B + D (EC prototype test)
module G (EC individual test)
on request

5.3.6 **Materials**
stainless steel,
closing element with flexible seat seal

5.3.7 **Operating pressure range**
30 to 370 bar

5.3.8 **Temperature range**
-20 to +80 °C

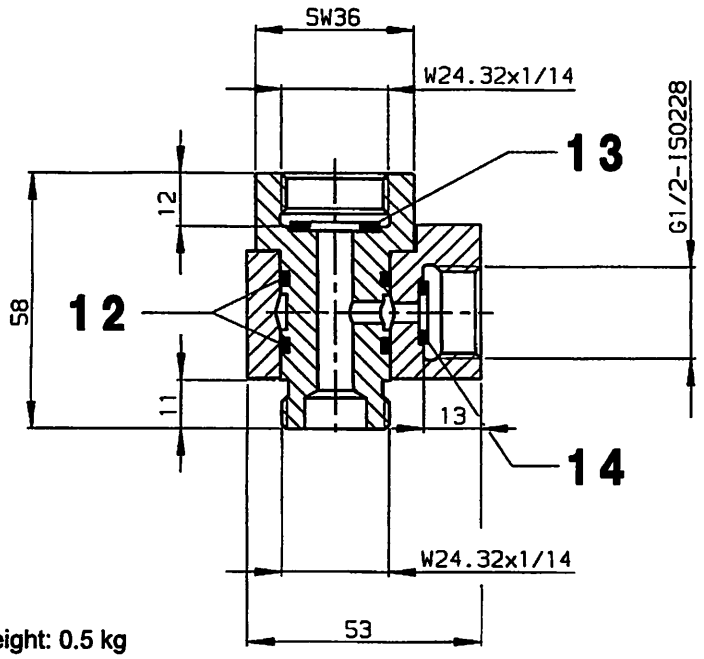
5.3.9 **Operating fluid**
Nitrogen (N_2)

5.3.10 **Mounting position**
optional

5.3.11 **Weight**
1.1 kg

5.4. INTERMEDIATE PIECE GSV6-10-CE

Intermediate piece for fitting the gas safety valve GSV6 between the 200 bar nitrogen bottle and the charging and testing unit FPU-1 (Part no. 242558)

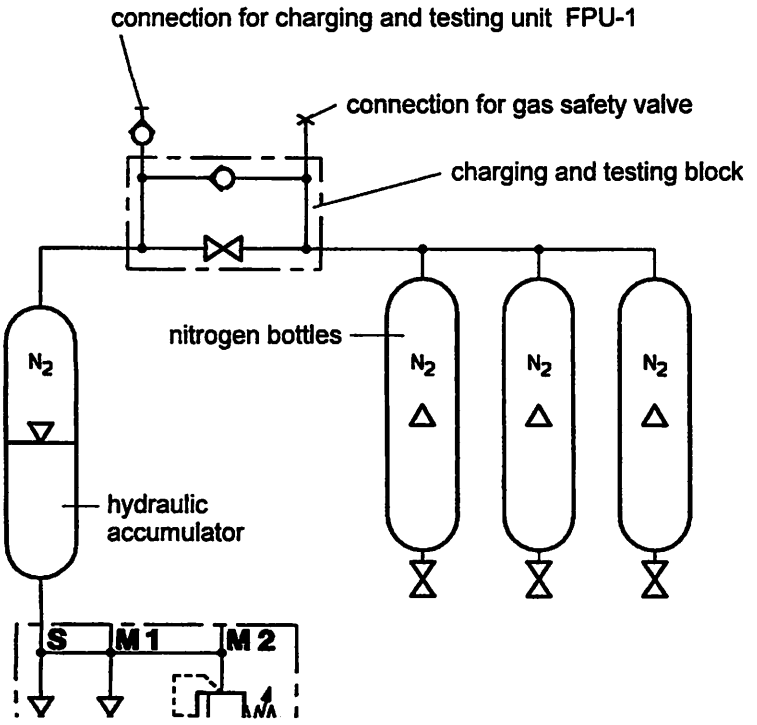


Weight: 0.5 kg

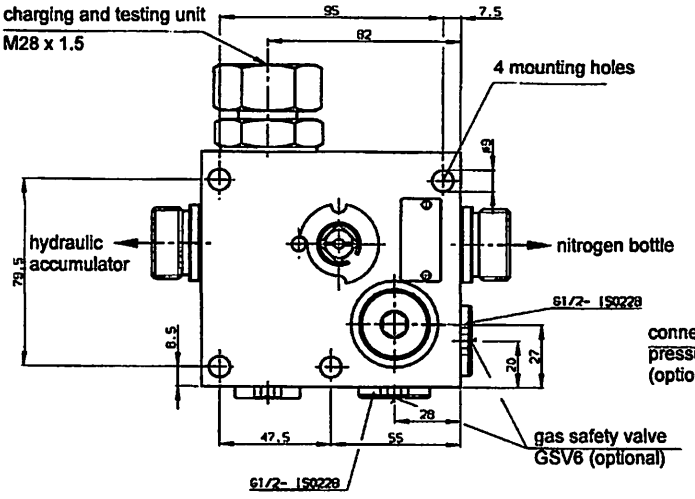
6. CHARGING AND TESTING BLOCK F + P

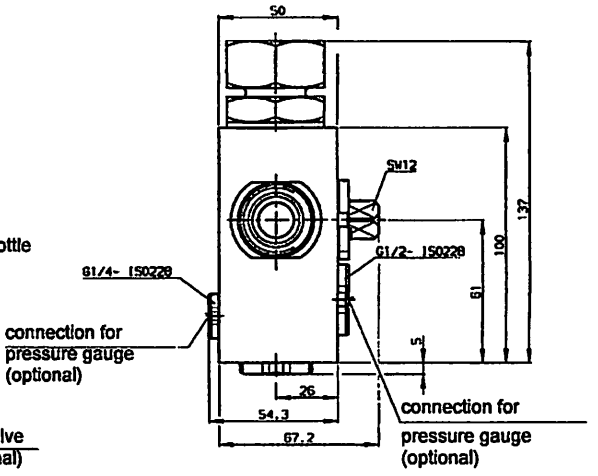
The HYDAC charging and testing block F+P is used to charge and test back-up type hydraulic accumulators. It has connections for the charging and testing unit FPU-1 and for pressure gauges. As a safety function, a gas safety valve GSV6 can be fitted. In addition it allows the back-up nitrogen bottles to be shut off from the hydraulic accumulator.

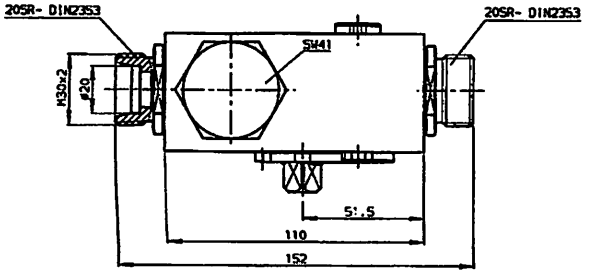
6.1. BACK-UP TYPE HYDRAULIC ACCUMULATOR WITH CHARGING AND TESTING BLOCK

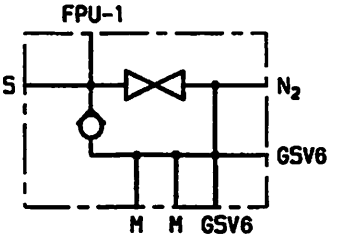


6.2. CHARGING AND TESTING BLOCK DN 16





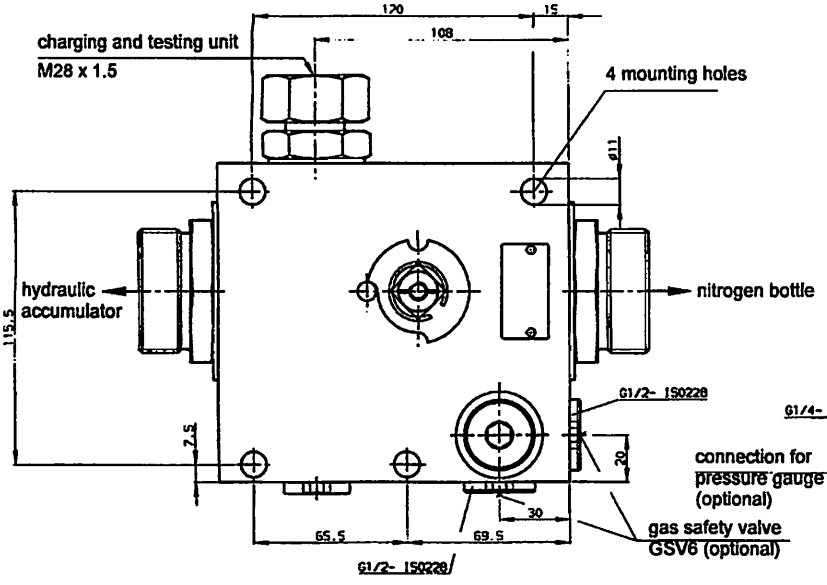


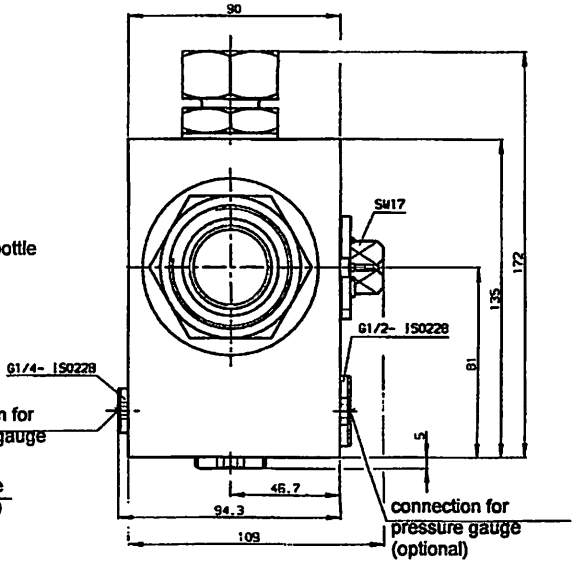


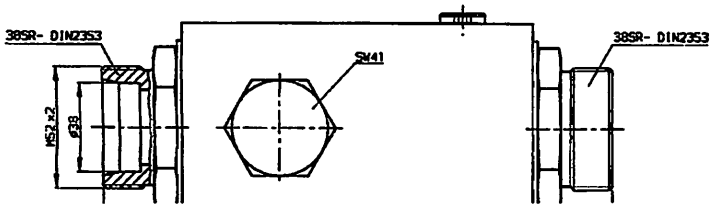
F+P-16-20SR-6112-02X (Part no. 850233)
(max. operating pressure 400 bar)

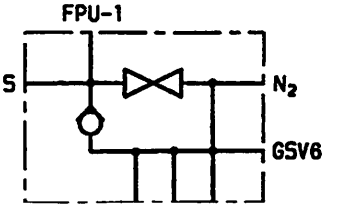
Weight: 4.3 kg

6.3. CHARGING AND TESTING BLOCK DN 32









7. SPARE PARTS

CHARGING AND TESTING UNIT FPU-1

Item	Quantity	Designation		Part no.
1	1	O-ring 6x1		601 032
2	1	Seal ring		612 730
3	1	Pressure gauge	0 - 10 bar	635 139
			0 - 25 bar	635 140
			0 - 100 bar	635 141
			0 - 250 bar	635 142
			0 - 400 bar	635 143
5	1	O-ring 15x2		601 049
6	1	Seal ring		601 456
7	1	O-ring 11x2		601 043
8	1	O-ring 9x2		601 040
9	1	O-ring 11x2.5		603 681
10	1	O-ring 5.7x1.9		6004009
		Seal kit FPU-1		2117669

ADAPTOR A

	Seal kit Adaptor A1 - A12		3269153

GAS SAFETY VALVE GSV6-10-CE

Item	Quantity	Designation		Part no.
11		Seal ring	21.54x28.58x2.47	6018877

When mounting onto the HYDAC charging and testing block, O-ring 18x2.5 (Part no. 601 057) must be fitted.

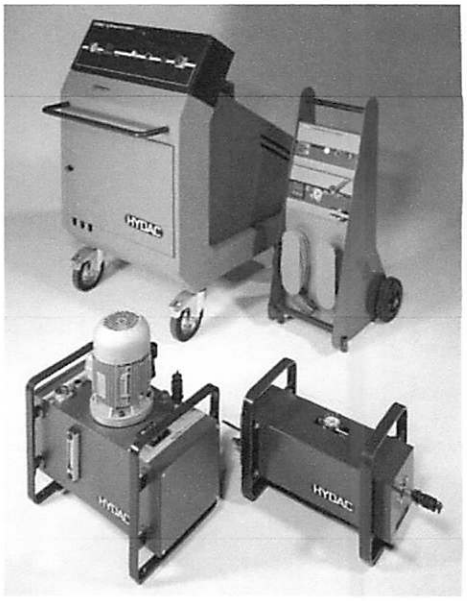
INTERMEDIATE PIECE GSV6-10-CE

Item	Quantity	Designation		Part no.
12	2	O-ring	20x2.5	601 058
13	1	Seal ring	20x11.5x2	614 706
14	1	Seal ring	14x8.5x2	612 735
		Seal kit intermediate piece		2117287

CHARGING AND TESTING BLOCK

	Seal kit F+P DN 16	2115776
	Seal kit F+P DN 32	2112088

8. NITROGEN CHARGING UNIT



HYDAC nitrogen charging units facilitate fast and cost-effective filling or testing of the required gas pre-charge pressure in bladder, diaphragm or piston accumulators. They guarantee optimum use of commercially available nitrogen bottles up to a residual pressure of 20 bar and a maximum accumulator pressure of 350 bar. Portable, mobile and stationary types of N_2 Server are available. For further details and technical specifications, see HYDAC brochure "Nitrogen Charging Unit N_2 Server", no.: E 2.201.

9. NOTE

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

10. SCHEDULE OF COUNTRIES

Adaptor G for nitrogen bottles from different 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
Albania										●		
Algeria			●									
Argentina		●										
Australia												●
Austria	●											
Bahamas		●										
Bahrain			●									
Bangladesh		●										
Barbados		●										
Belgium	●											
Bolivia								●				
Botswana		●										
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			●									
Mozambique			●									
Netherlands	●											
New Zealand		●										
Nigeria			●									
Norway	●											
Oman			●									
Pakistan		●										
Paraguay								●				
Peru								●				
Philippines		●										
Poland	●											
Portugal		●										
Puerto Rico				●								
Qatar			●									
Romania			●									
Russia										●		
Saudi Arabia			●									
Singapore		●										
South Africa		●										
Spain		●	●									
Sri Lanka		●										
Sudan		●										
Surinam		●										
Swaziland		●										
Sweden	●											
Switzerland	●											
Syria			●									
Taiwan									●			
Tanzania		●										
Thailand		●										
Trinidad/Tobago										●		
Tunisia			●									
Turkey		●										