

Hydraulic Actuators

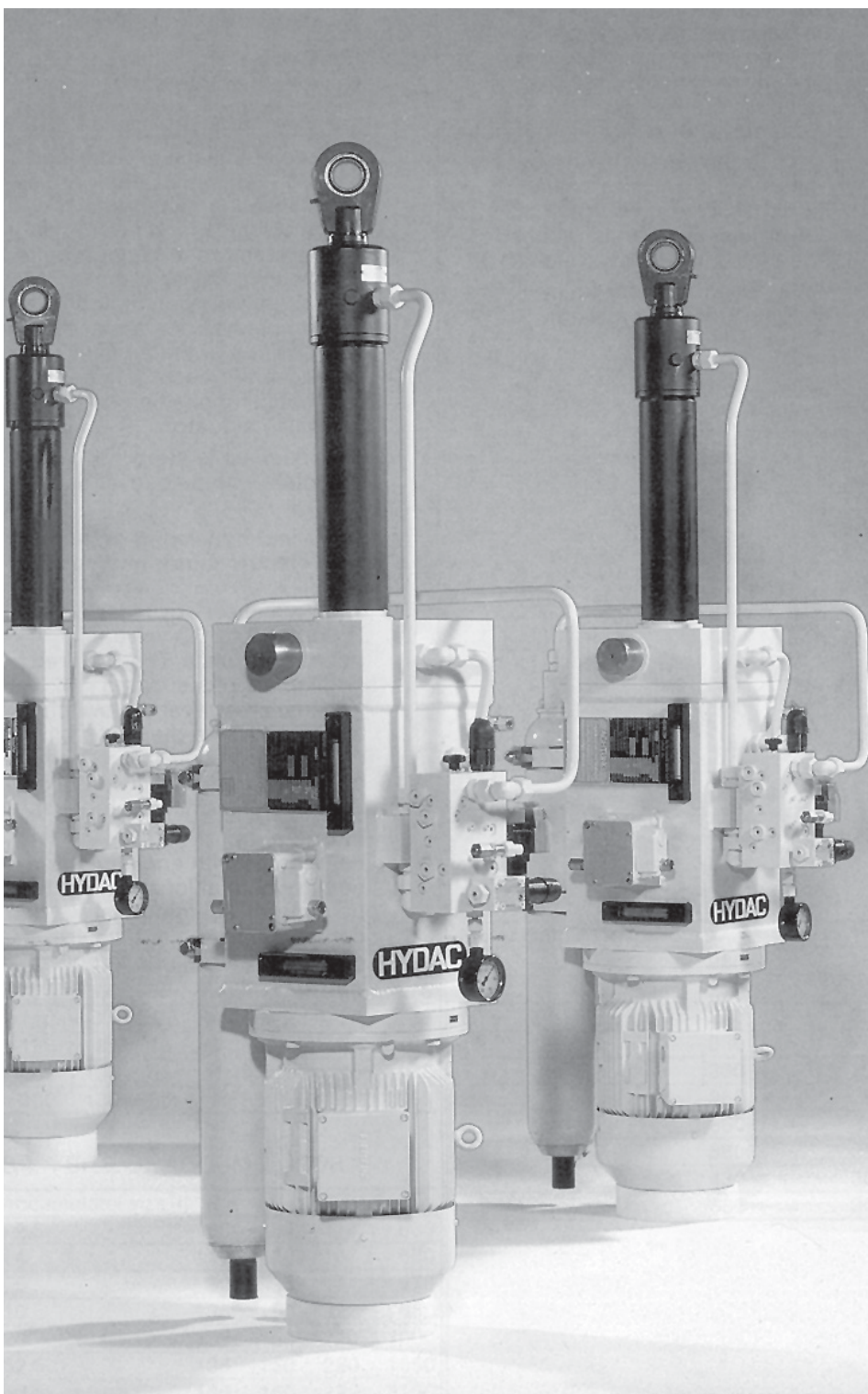
1. CONSTRUCTION OF THE BASIC UNIT

1.1. GENERAL

The hydraulic actuator is designed to carry out linear movements of all kinds for forces from 10 kN to 250 kN.

The actuator combines cylinder, drive and control unit. Due to the special assembly technique numerous models can be made up. The mounting position is optional. The oil reservoir is sealed; a built-in membrane compensates for any volume changes (pendulum volume).

The built-in hydraulic accumulators allow for emergency functions during power cuts.



The actuator is supplied filled with a multi-grade oil as standard.

This oil allows operation at outside temperatures from – 13 °C to 50 °C. Units for other temperatures on request.

The actuator is run off mains electricity, no other supplies are required. A hand pump can be fitted for emergency functions.

The following control units are available for checking undue working temperatures:
(not valid for type "PS")

1. Delay control per pump cycle via a timing relay.
Setting range 1 – 10 minutes.
Preferably for a low cycle frequency = 10 cycles per hour.
 2. Contact thermometer with built-in temperature gauge on the locking screw of the reservoir.
The maximum working temperature is + 70 °C.
Preferably for 10 cycles per hour.
- On site the stroke has to be controlled by means of limit switches. When the upper or lower final position is reached the motor must be switched off.
- Paint finish:
standard 2-components lacquer RAL 6011 (green).

The basic unit consists of three parts which are interconnected by means of screws.

Part 1:

Cylinder with bearing part

The cylinder has a shackle toggle joint on the rod side. A model with a spigot is also available. On the reservoir side of the actuator 3 options are possible:

- a) 2 fixed trunnions
- b) 2 removable trunnions with grease nipple to DIN 3404
- c) 1 flange

The dimensions of the attachment are shown in table 3. The cylinder is available with and without damping.

Part 2:

Reservoir with membrane and valve connection plate

The reservoir is available in two sizes (9 l contents with approx. 1 l compensating membrane and 20 l contents with approx. 4 l compensating membrane).
For surge volumes larger than 1 or 4 l the membrane is not required. In this case the oil space of the reservoir is connected to the atmosphere via an air filter.
The position of the air filter must be chosen in accordance with the mounting position of the hydraulic actuator.

The reservoir is supplied complete with fluid level gauge.

Part 3:

Drive unit consisting of pump with electric motor and control panel

The necessary cylinder control is screwed to the valve connection plate. The required additional units such as accumulator, pressure switch etc. are fitted to the reservoir. All standard control units are explained in the following text. Other control units on request.

Please note:

For models with accumulator the country of final location must be stated (regarding test certificates). If no details are given, the unit will be supplied with TUV-certificate.

2. AVAILABLE MODELS

1. Type "SG"

Safety actuator with counter weights for retraction of the piston rod

2. Type "SE"

Safety actuator with accumulator for emergency functions (Retraction of piston rod)

3. Type "SA"

Safety actuator with accumulator for emergency functions. (Extending of piston rod)

4. Type "LR"

Actuator with reversible pump.

The movement direction of the piston rod is determined by a reversal of rotation of the hydraulic pump.

For end position functions the actuator can be supplied with a hydraulic accumulator.

5. Type "GF"

Actuator with directional valve. The movement direction of the piston rod is determined by a directional valve.

6. Type "HFS"

Actuator with directional valve and pilot-operated check valve for leak-free positioning of the piston rod.

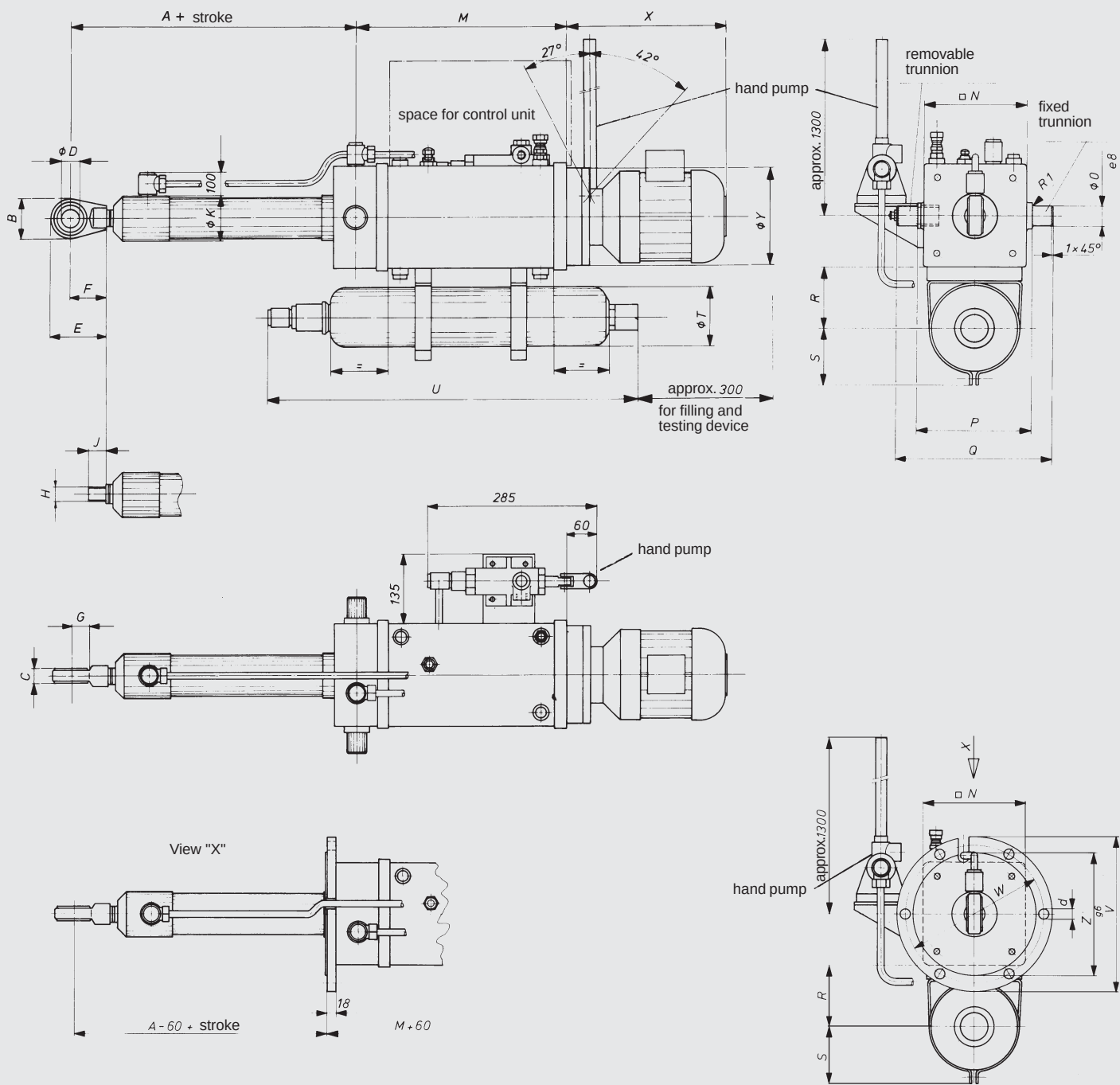
7. Type "HFSE"

Actuator with hydraulic accumulator for end position functions.

8. Type "PS "

Actuator with proportional control.

3. BASIC UNIT WITHOUT CONTROL UNIT BUT WITH ACCUMULATOR AND HAND PUMP



3.1. SIZE OF DRIVE

Type	A	B	C	D	E	F	G	H	J	K
1 + 2	183 ± 1	56	23	25-0.01	80	50	25	M 16 x 1.5	16	63
3 + 4	203 ± 1	64	28	30-0.01	94	60	30	M 22 x 1.5	22	78
5 + 6	223 ± 1	78	30	35-0.012	112	70	38	M 28 x 1.5	28	88
7 + 8	267 ± 2	94	35	40-0.012	135	85	45	M 35 x 1.5	35	108
9 + 10	297.5 ± 2	116	40	50-0.012	168	105	55	M 45 x 1.5	45	138
11 + 12	338.5 ± 2	130	50	60-0.015	200	130	65	M 58 x 1.5	58	163

3.2. SIZE OF RESERVOIR

Reservoir [l]	M	N	O	P	Q
Size 1	9 l	410	210	40	225 305
Size 2	20 l	480	270	60	275 375

3.3. FLANGE SIZE

Type	v	w	z	d
1 ÷ 6	300	270	240	11
7 ÷ 12	396	358	320	14

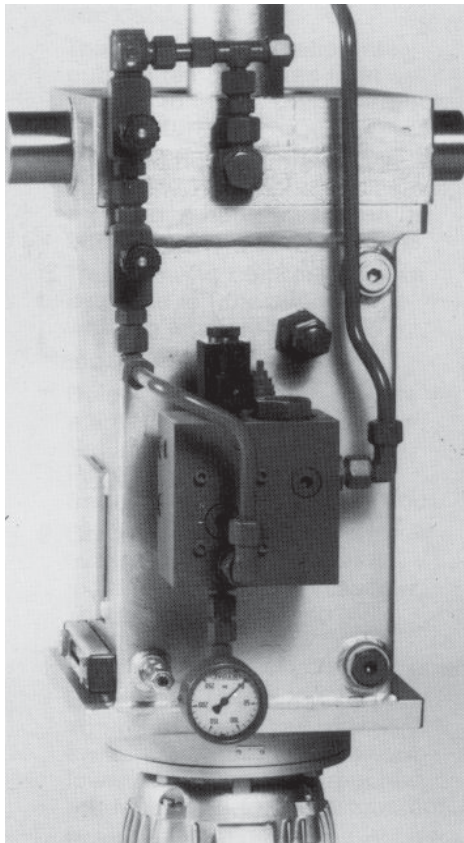
3.4. SIZE OF ACCUMULATOR

Accumulator size [l]	R	S	T	U
2.5	90	95	114	630
4	110	120	167	500
5	90	95	114	970
10	135	150	222	680
20	135	150	220	1000
32	135	150	220	1550
50	135	150	220	2100

3.5. SIZE OF MOTOR

Motor Output [kW]	X	Y
0.37	280	160
0.55	270	200
0.75	270	200
1.1	330	200
1.5	330	200
2.2	360	250
3	360	250
4	380	250
5.5	430	300
7.5	480	300

4. TYPE SG



4.1. FUNCTIONAL DESCRIPTION

Simple one-way safety actuator with leak-free load holding in all positions. The extension is by means of a hydraulic pump which is switched off in the upper end position.

The seat valve (item 11) is continuously energised. In case of power cuts the pilot-operated check valve (item 12) is opened and the piston rod retracts via a counter weight (user's – on the adjustment part). The retraction speed depends on the torque of the counter weight.

4.2. TYPE CODE (also ordering example)

SG 5 - HP - 420 32 230/400 V - 50 Hz G 24 Z

Hydraulic Actuator, Type _____
see selection table 4.4.

Hand Pump _____

HP = with hand pump for emergency function
without code = without hand pump

Length of stroke in mm _____

420
> 500 on request

Extension Speed in mm/s _____

32

Motor Voltage _____

230/400 V - 50 Hz ≤ 4 kW
400/690 V - 50 Hz ≥ 5.5 kW
other voltages on request

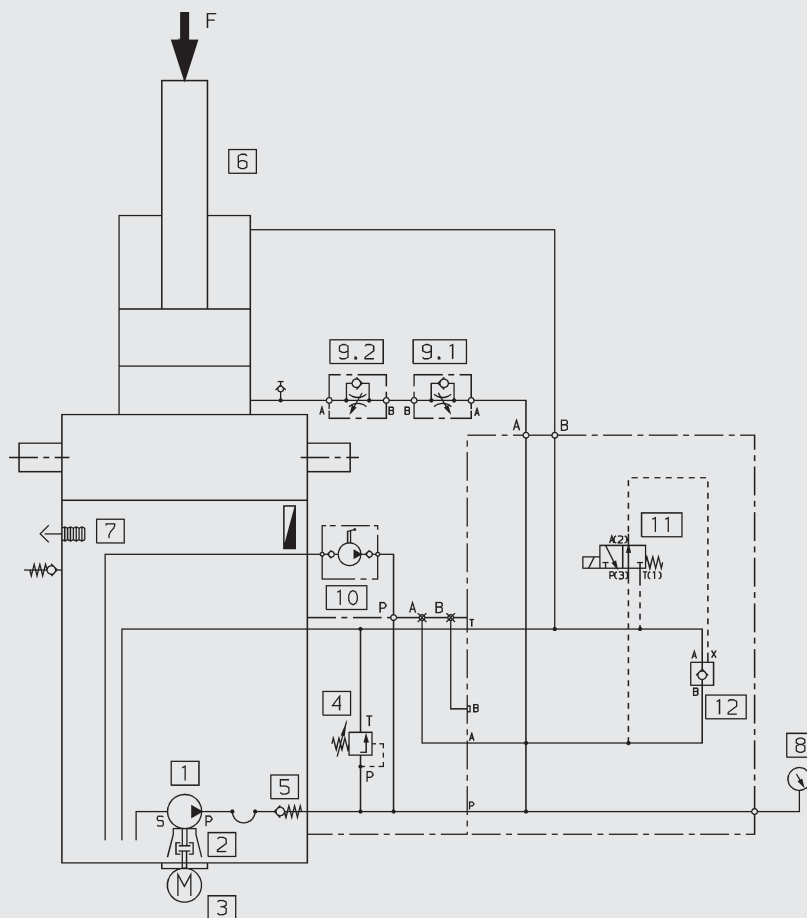
Solenoid Voltage _____

G 24 V = 24 V DC
W 230 V - 50 Hz = 230 V - 50 Hz AC
other voltages on request

Solenoid Connection _____

Z = for DC-current cubic plug to DIN 43650
for AC-current large cubic plug with built-in rectifier

4.3. CIRCUIT DIAGRAM



1. Pump
2. Coupling
3. Motor
4. Pressure Relief Valve
5. Check Valve
6. Cylinder

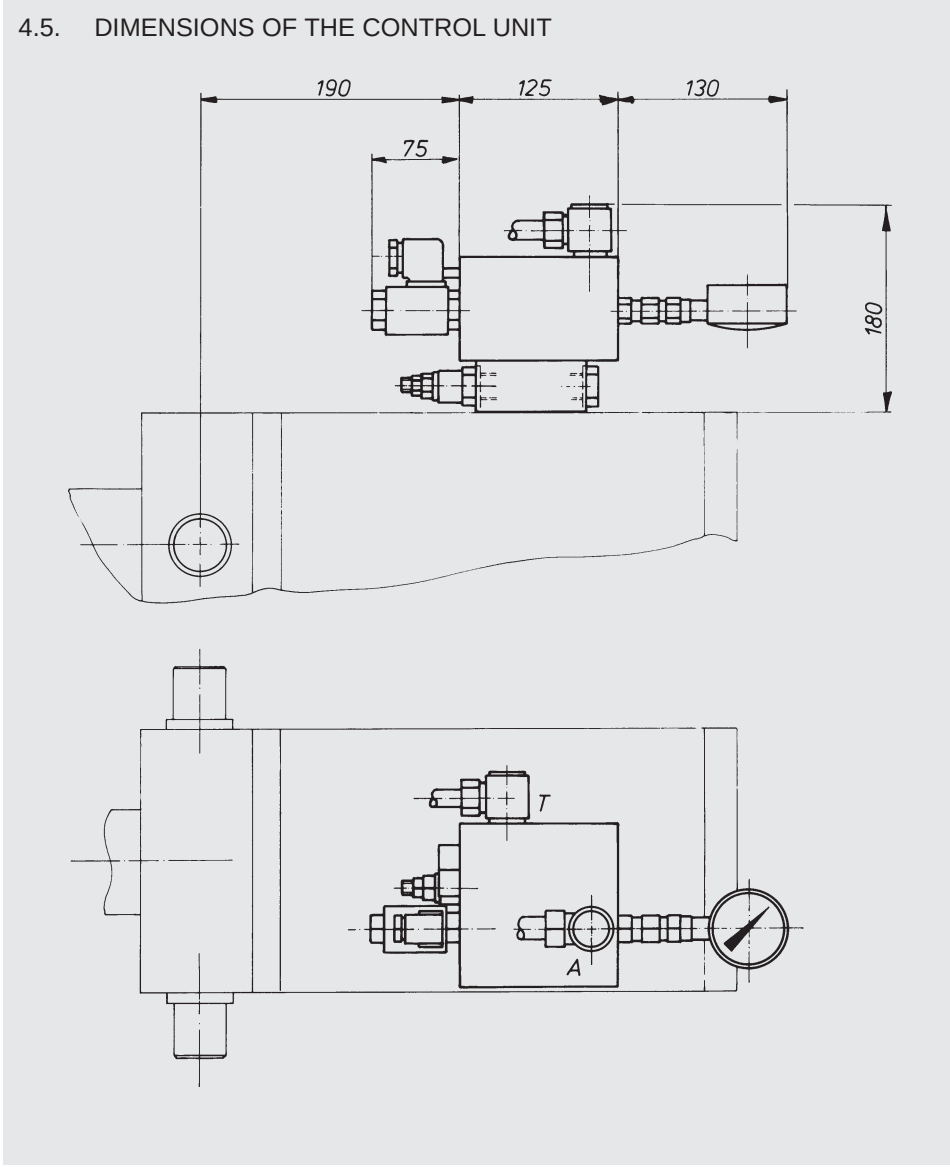
7. Compensating Membrane
8. Gauge
9. Speed Control Valve
10. Hand Pump (optional)
11. Seat Valve
12. Pilot-operated Check Valve

4.4. SELECTION TABLE

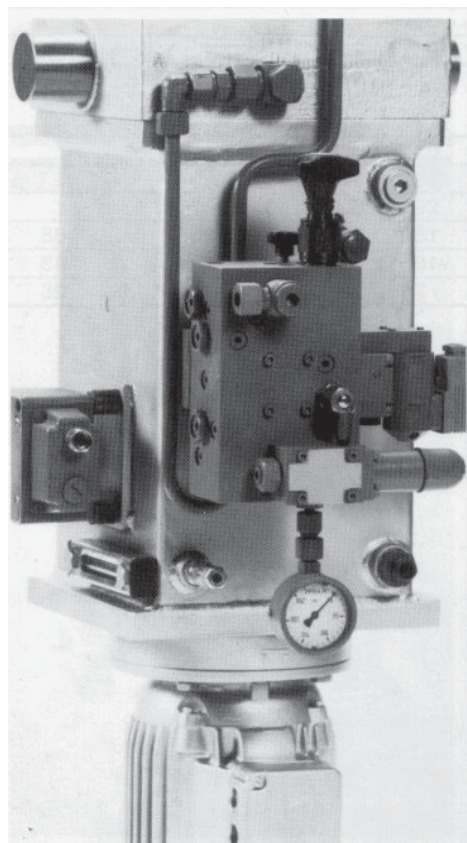
			Motor Output [kW]														
			0.37	0.37	0.37	0.37	0.75	1.1	1.1	1.5	1.5	2.2	2.2	3	4	5.5	7.5
Type	Piston/ Piston Rod Ø	Piston Force [kN]	Piston Speed v [mm/sec] Extending														
SG 1	40/28	23	4	8	10	13	22	30	40	47	52	65	78	98			
SG 3	50/36	35	2.5	5	6	9	14	19	25	30	33	42	50	63	90		
SG 5	63/45	55			4	5.5	9	12	16	19	21	26	32	40	57		
SG 7	80/56	95				3.5	5.5	7.5	10	12	13	16	20	25	35	50	68
SG 9	100/70	145					3.5	5	6	7.5	8.5	10	12.5	16	23	32	43
SG 11	125/90	230						3	4	5	5.5	7	8	10	15	20	28

Oil reservoir size 1 Oil reservoir size 2

4.5. DIMENSIONS OF THE CONTROL UNIT



5. TYPE SE



5.1. FUNCTIONAL DESCRIPTION

After the pump is switched on the hydraulic accumulator is filled first until the pre-set opening pressure of the pressure sequence valve (item 11) is reached. The sequence valve opens and the pump feeds into the piston space of the cylinder. The piston rod extends.

When the maximum pressure on the pressure switch is reached the pump switches off. The actuator is ready for a closing function (emergency function). Should the system pressure drop due to leakages, the pump is switched on again when the minimum setting of the pressure switch is reached. The pump operates until the maximum pressure is reached again.

The electric solenoid of the seat valve (item 12) is continuously energised. In case of power failures it is de-energised.

The hydraulic accumulator discharges into the cylinder rod space. The piston rod retracts.

5.2. TYPE CODE

(also ordering example)

SE 4 - HP - 450 14 230/400 V - 50 Hz G 24 N Z 4 TUV

Hydraulic Actuator, Type
see selection table 5.4.

Hand Pump

HP = with hand pump
for emergency function
without code = without hand pump

Length of stroke in mm

450
> 500 on request

Extension Speed in mm/s

14

Motor Voltage

230/400 V - 50 Hz ≤ 4 kW
400/690 V - 50 Hz ≥ 5.5 kW
other voltages on request

Solenoid Voltage

G 24 V = 24 V DC
W230 V - 50 Hz = 230V - 50 Hz AC
other voltages on request

N = Hand Emergency

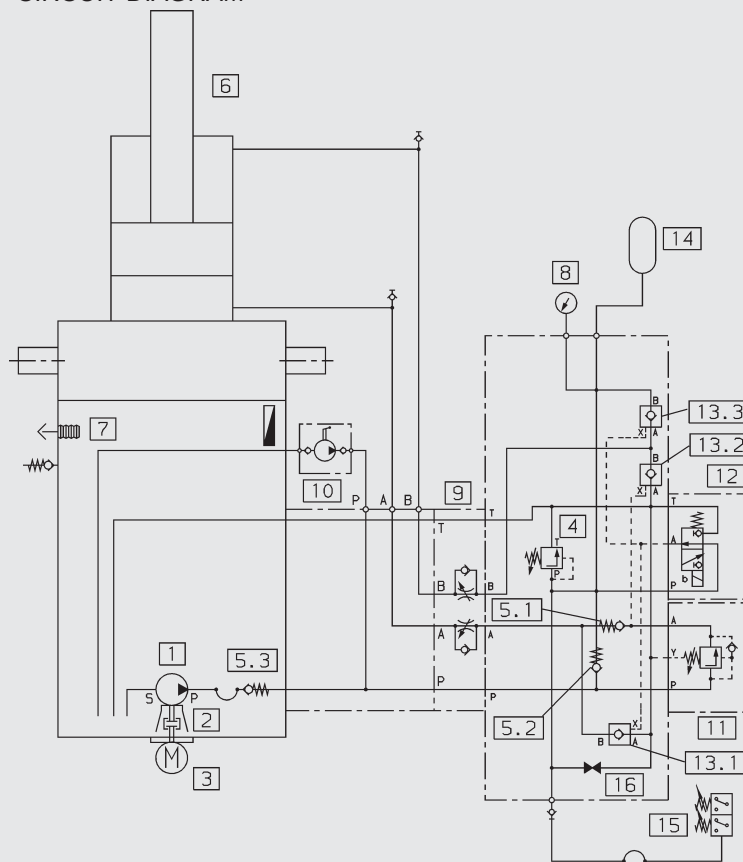
Solenoid Connection

Z 4 = cubic plug to DIN 43650

Accumulator Test Procedure

Organisation for testing bladder accumulators (i.e. TUV)
or country of destination

5.3. CIRCUIT DIAGRAM



1. Pump
2. Coupling
3. Motor
4. Pressure Relief Valve
5. Check Valve
6. Cylinder
7. Compensating Membrane
8. Gauge

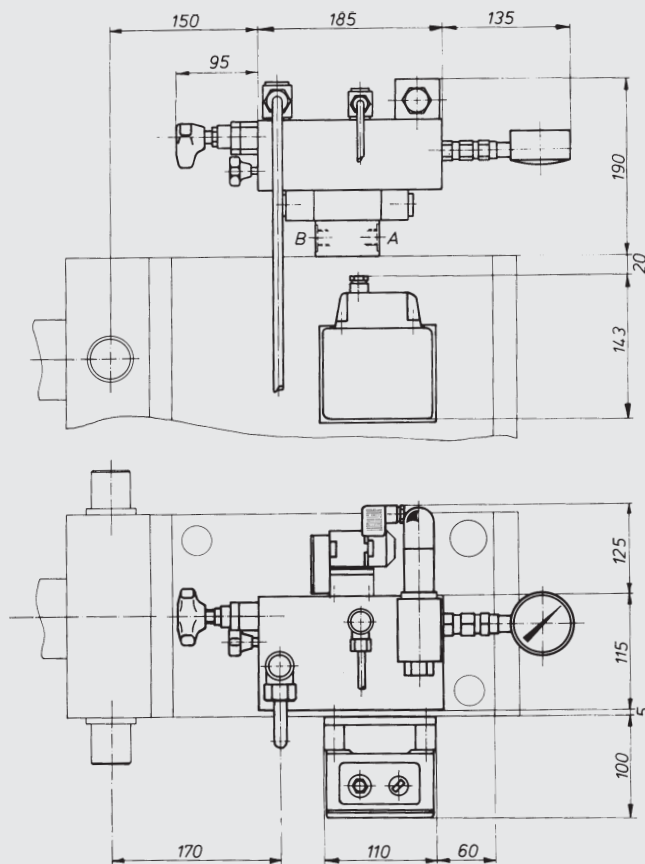
9. Speed Control Valve
10. Hand Pump (optional)
11. Pressure Sequence Valve
12. Seat Valve
13. Pilot-operated Check Valve
14. Hydraulic Accumulator
15. Pressure Switch
16. Stop Valve

5.4. SELECTION TABLE

				Motor Output [kW]														
				0.37	0.37	0.37	0.37	0.75	1.1	1.1	1.5	1.5	2.2	2.2	3	4	5.5	7.5
Type	Piston/ Piston Rod Ø	Piston Force [kN] Ext.	Retr.	Piston Speed v [mm/sec] Extending														
SE 1	40/28	25	10	4	7.5	9.5	13	21	30	39	46	51	64	78	98			
SE 2	40/22	25	13	4	7.5	9.5	13	21	30	39	46	51	64	78	98			
SE 3	50/36	39	14	2.5	5	6	8	14	19	25	30	33	41	50	63	89		
SE 4	50/28	39	21	2.5	5	6	8	14	19	25	30	33	41	50	63	89		
SE 5	63/45	62	23		3	4	5	8	12	16	19	21	26	31	39	56		
SE 6	63/36	62	32		3	4	5	8	12	16	19	21	26	31	39	56		
SE 7	80/56	100	39			2	3	5	7	10	12	13	16	19	24	35	50	67
SE 8	80/45	100	53			2	3	5	7	10	12	13	16	19	24	35	50	67
SE 9	100/70	157	62				2	3	5	6	7	8	10	12	16	22	32	43
SE 10	100/56	157	83				2	3	5	6	7	8	10	12	16	22	32	43
SE 11	125/90	245	91					2	3	4	4.5	5	6	8	10	14	20	28
SE 12	125/70	245	130					2	3	4	4.5	5	6	8	10	14	20	28

Oil reservoir size 1 Oil reservoir size 2 (Accumulator table 5.6. has to be taken into account)

5.5. DIMENSIONS OF THE CONTROL UNIT

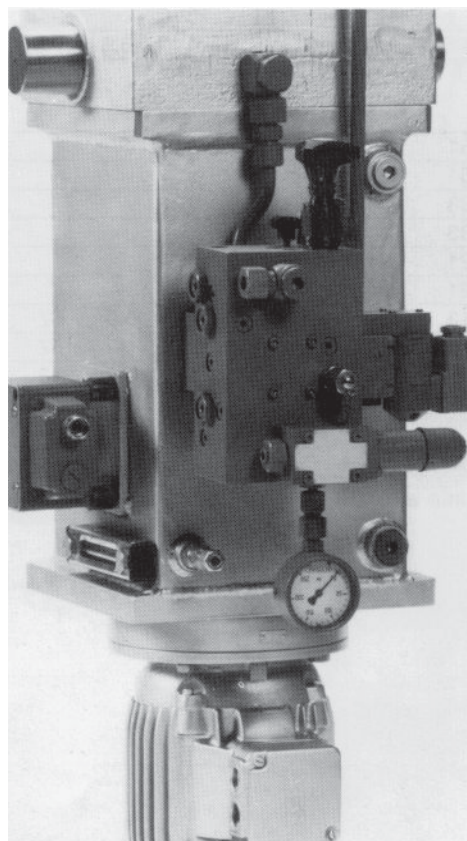


5.6. ACCUMULATOR TABLE

Type	Cylinder Stroke from - to [mm]								
	1- 100	101- 150	151- 200	201- 250	251- 300	301- 350	351- 400	401- 450	451- 500
Accumulator size [l]									
SE 1	1	2.5	2.5	2.5	4	4	4	4	5
SE 2	1	1	2.5	2.5	2.5	2.5	4	4	4
SE 3	2.5	4	4	5	10	10	10	10	20
SE 4	4	5	10	10	10	20	20	20	20
SE 5	4	5	10	10	20	20	20	20	20
SE 6	4	4	5	10	10	10	10	20	20
SE 7	4	5	10	10	20	20	20	20	20
SE 8	4	4	5	10	10	10	10	20	20
SE 9	5	10	20	20	20	20	32	32	32
SE 10	4	10	10	20	20	20	20	20	32
SE 11	10	20	20	32	32	32	32	50	50
SE 12	10	10	20	20	20	32	32	32	32

Oil reservoir size 1 Oil reservoir size 2

6. TYPE SA



6.1. FUNCTIONAL DESCRIPTION

Safety actuator with hydraulic accumulator. This is the same model as type SE but the extension of the piston rod is by means of the hydraulic accumulator and the retraction by means of the pump.

6.2. TYPE CODE (also ordering example)

SA 9 - HP - 390 12 230/400 V - 50 Hz G 24 N Z 4 TUV

Hydraulic Actuator, Type
see selection table 6.4.

Hand Pump

HP = with hand pump
for emergency function
without code = without hand pump

Length of stroke in mm

390
> 500 on request

Extension Speed in mm/s

12

Motor Voltage

230/400 V - 50 Hz ≤ 4 kW
400/690 V - 50 Hz ≥ 5.5 kW
other voltages on request

Solenoid Voltage

G 24 V = 24 V DC
W230 V - 50 Hz = 230 V - 50 Hz AC
other voltages on request

N = Hand Emergency

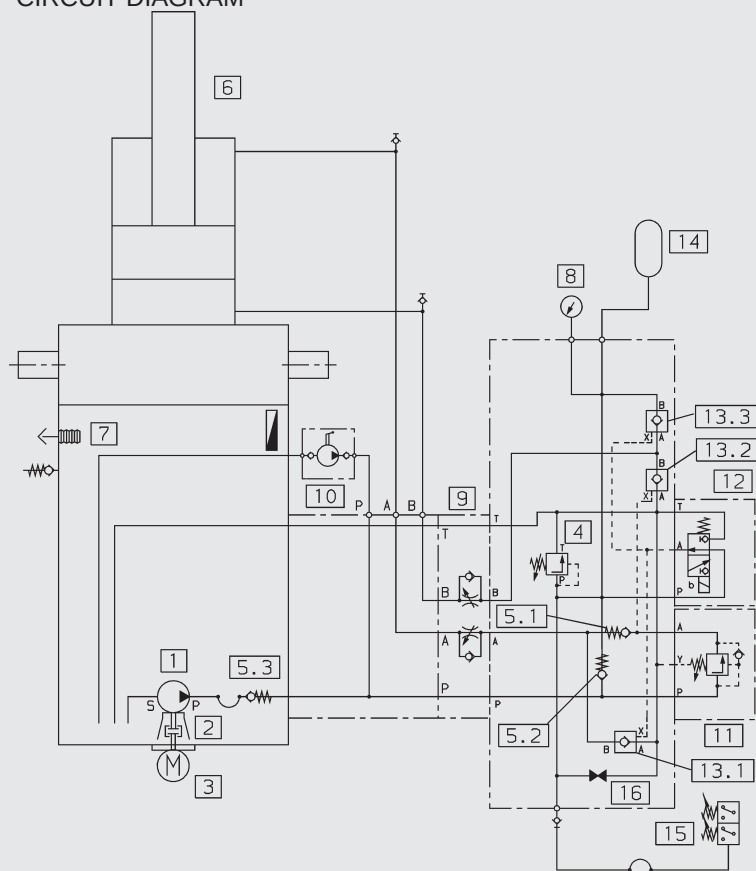
Solenoid Connection

Z 4 = cubic plug to DIN 43650

Accumulator Test Procedure

Organisation for testing bladder accumulators (i.e. TUV)
or country of destination

6.3. CIRCUIT DIAGRAM



1. Pump
2. Coupling
3. Motor
4. Pressure Relief Valve
5. Check Valve
6. Cylinder
7. Compensating Membrane
8. Gauge

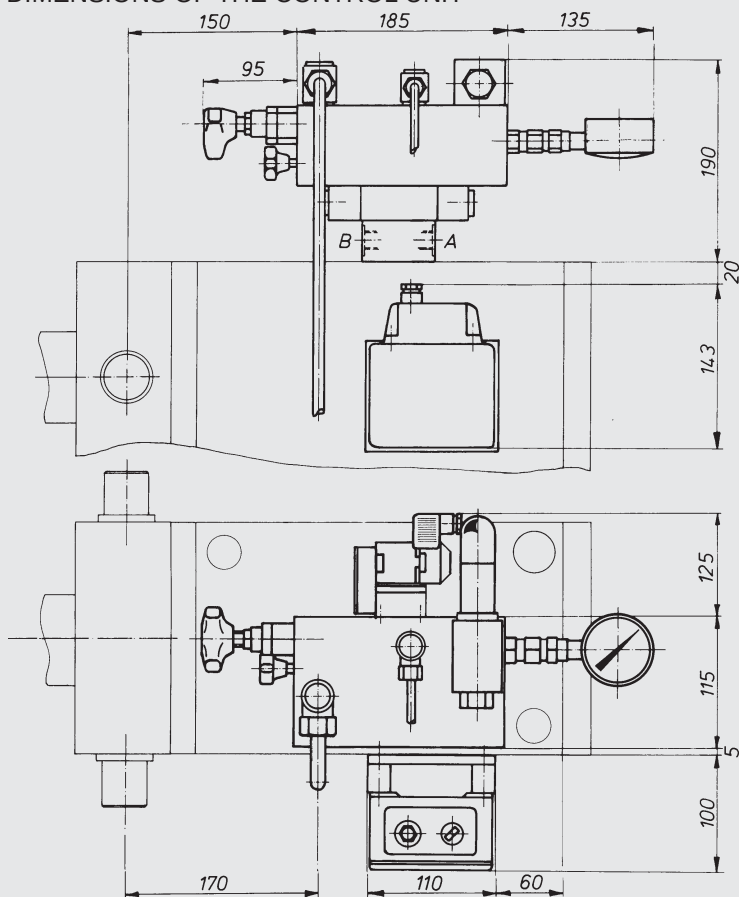
9. Speed Control Valve
10. Hand Pump (optional)
11. Pressure Sequence Valve
12. Seat Valve
13. Pilot-operated Check Valve
14. Hydraulic Accumulator
15. Pressure Switch
16. Stop Valve

6.4. SELECTION TABLE

				Motor Output [kW]														
				0.37	0.37	0.37	0.37	0.75	1.1	1.1	1.5	1.5	2.2	2.2	3	4	5.5	7.5
Type	Piston/ Piston Rod Ø	Piston Force [kN] Ext.	Retr.	Piston Speed v [mm/sec] Extending														
SA 1	40/28	19	13	8	15	19	26	42	58	78	92	100	126					
SA 2	40/22	19	17	6	11	14	19	31	43	57	67	74	92	111	140			
SA 3	50/36	30	19	5.5	10	13	17.5	29	40	53	62	69	86	103	130			
SA 4	50/28	30	27	4	7	9	12	20	28	36	44	48	60	72	92	130		
SA 5	63/45	48	30	3.5	6.5	8	11	17	24	33	38	42	53	64	81	115		
SA 6	63/36	48	42	2.5	4.5	6	8	13	18	24	28	31	39	47	58	83		
SA 7	80/56	78	51	2	4	5	6.5	10	15	20	23	25	32	38	48	68	98	132
SA 8	80/45	78	68		3	3.5	5	8	11	14	17	19	24	28	36	51	73	99
SA 9	100/70	121	80		2.5	3	4	7	9	12	15	16	20	24	31	44	63	85
SA 10	100/56	121	108			2	3	5	7	9	11	12	15	18	23	33	47	63
SA 11	125/90	190	118			2	3	4.5	6	8	10	11	14	17	20	30	42	57
SA 12	125/70	190	168				2	3	4.5	6	7	8	10	12	15	21	30	40

Oil reservoir size 1 Oil reservoir size 2 (Accumulator table 6.6. has to be taken into account)

6.5. DIMENSIONS OF THE CONTROL UNIT

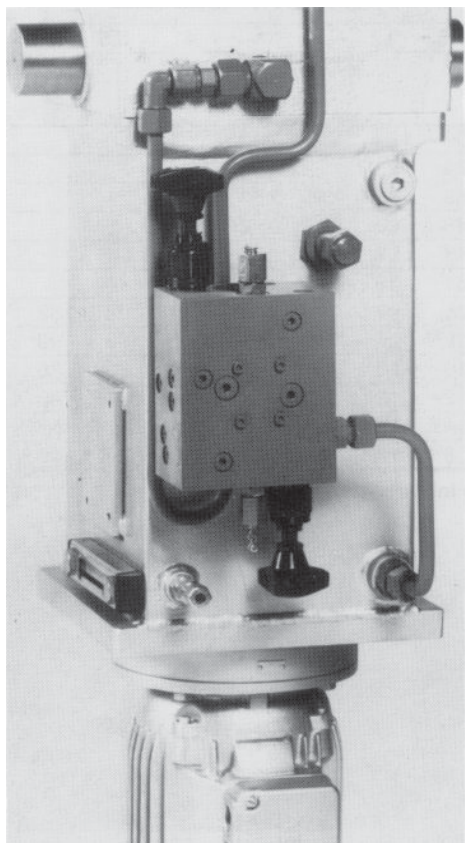


6.6. ACCUMULATOR TABLE

		Cylinder Stroke from - to [mm]								
		1- 100	101- 150	151- 200	201- 250	251- 300	301- 350	351- 400	401- 450	451- 500
Type	Accumulator size [l]									
SA 1	2.5	2.5	4	4	4	5	5	10	10	
SA 2	2.5	2.5	4	4	4	5	5	10	10	
SA 3	2.5	4	4	5	10	10	10	10	10	
SA 4	2.5	4	4	5	10	10	10	10	10	
SA 5	4	5	10	10	10	20	20	20	20	
SA 6	4	5	10	10	10	20	20	20	20	
SA 7	5	10	20	20	20	20	32	32	32	
SA 8	5	10	20	20	20	20	32	32	32	
SA 9	10	20	20	20	32	32	32	32	50	
SA 10	10	20	20	20	32	32	32	32	50	
SA 11	20	20	32	32	50	50	50			
SA 12	20	20	32	32	50	50	50			

Oil reservoir size 1 Oil reservoir size 2

7. TYPE LR



7.1. FUNCTIONAL DESCRIPTION

On this actuator the extending and retracting movement of the piston rod are determined by a reversal of rotation of the electric motor. The electrical lines for a directional valve are not required. The piston rod is leakage-free held in all positions.

The actuator can also be supplied with an additional hydraulic accumulator with pressure switch and pressure relief valve for end position functions.

7.2. TYPE CODE (also ordering example)

LR 2 - S - HP - 270 47/67 230/400 V - 50 Hz

Hydraulic Actuator, Type _____
see selection table 7.4.

Accumulator for end position function _____

S = with accumulator
without code = without accumulator

Hand pump _____

HP = with hand pump for emergency function
without code = without hand pump

Length of stroke in mm _____

270
> 500 on request

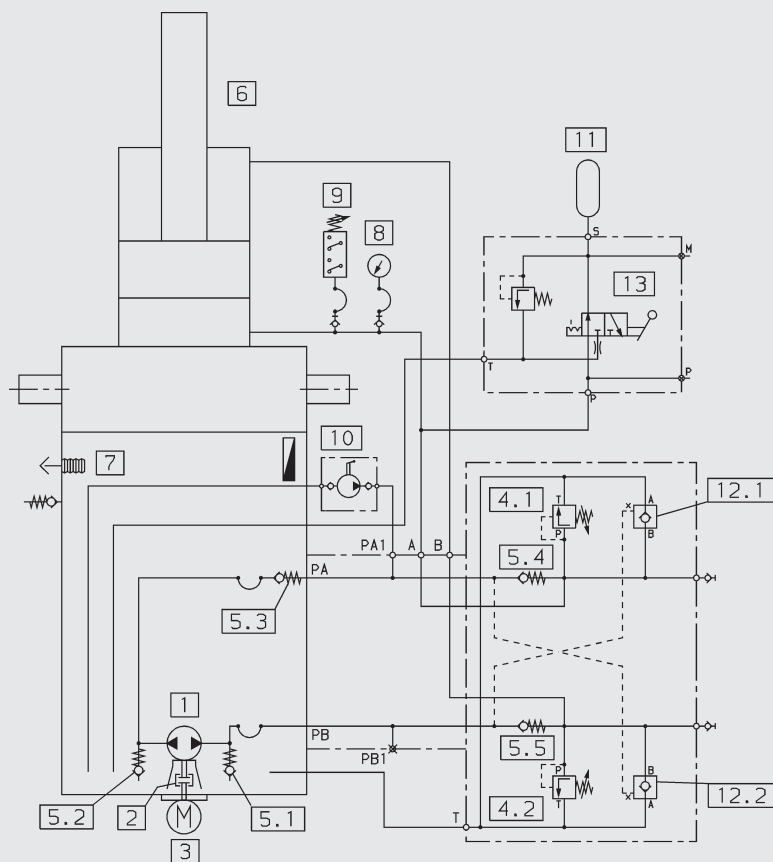
Extension and Retraction Speed in mm/s _____

47/67

Motor Voltage _____

230/400 V - 50 Hz ≤ 4 kW
400/690 V - 50 Hz ≥ 5.5 kW
other voltages on request

7.3. CIRCUIT DIAGRAM



1. Pump
2. Coupling
3. Motor
4. Pressure Relief Valve
5. Check Valve
(5.3. in combination with item 10 only)
6. Cylinder

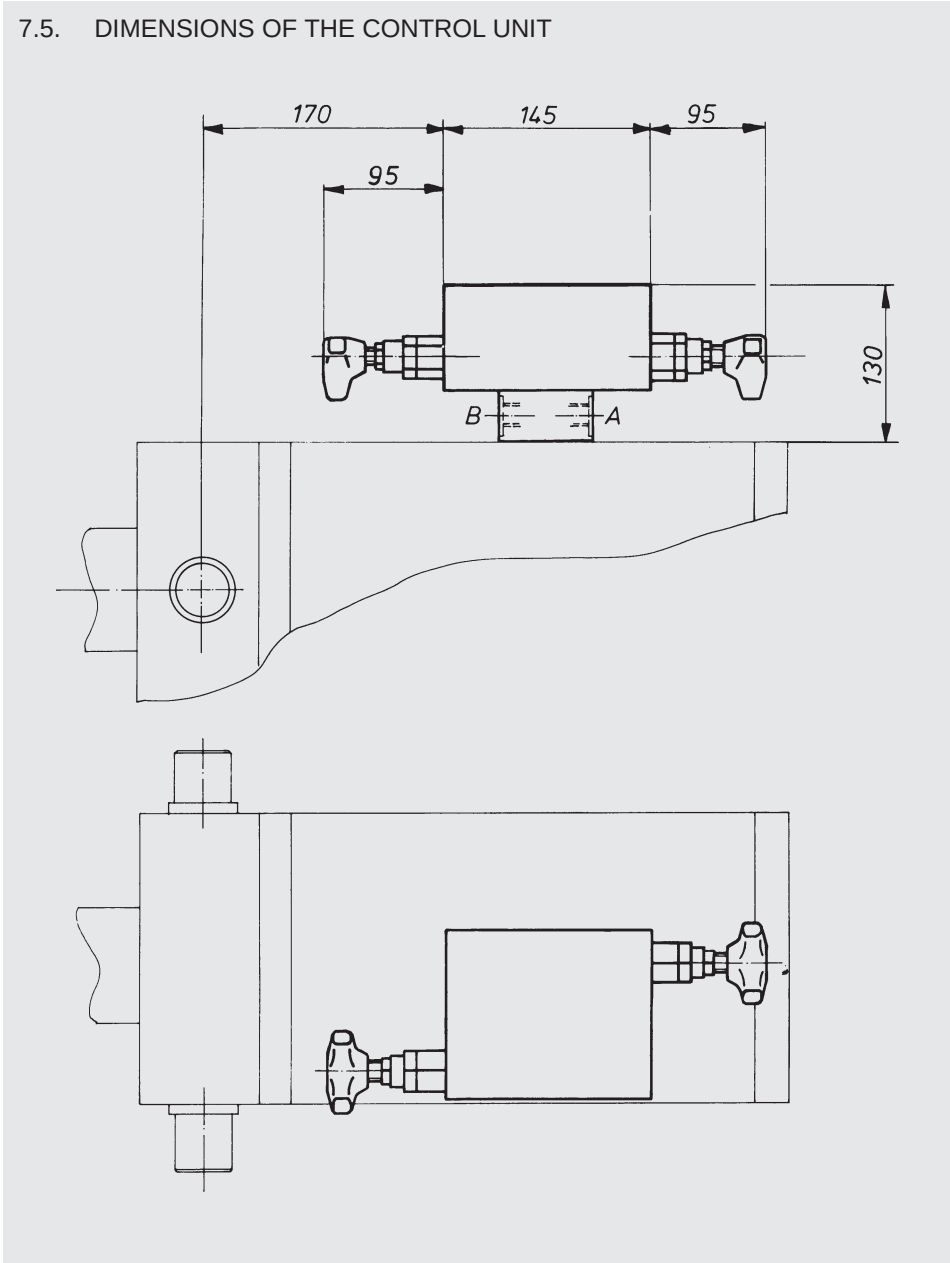
7. Compensating Membrane
8. Gauge
9. Pressure Switch (optional)
10. Hand Pump (optional)
11. Accumulator (optional)
12. Pilot-operated Check Valve
13. Accumulator Safety Block
(necessary in combination with item 11)

7.4. SELECTION TABLE

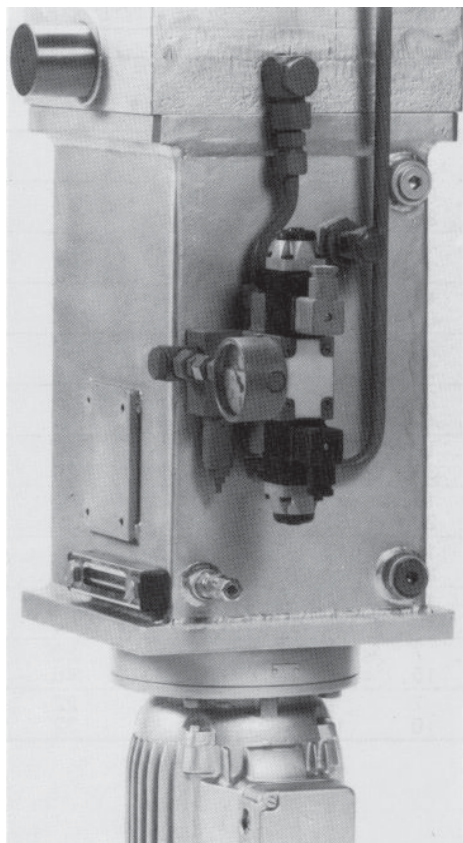
			Motor Output [kW]									
			0.55 0.75 1.1 1.1 1.5 1.5 2.2 3 4 5.5									
Type	Piston/ Piston Rod Ø	Piston Force [kN]	Piston Speed v [mm/sec]									
LR 1	40/28	Extr. Retr. 18 9	22 42	30 59	39 78	47 92	57 112	68 133	76 150	116 228		
LR 2	40/22	Extr. Retr. 18 13	22 31	30 43	39 57	47 67	57 82	68 98	76 110	116 167		
LR 3	50/36	Extr. Retr. 29 14	14 28	19 40	25 53	30 62	37 76	44 90	49 101	75 154		
LR 4	50/28	Extr. Retr. 29 20	14 20	19 28	25 37	30 44	37 53	44 64	49 72	75 108		
LR 5	63/45	Extr. Retr. 46 23	9 18	12 25	16 33	19 39	23 47	28 56	31 63	47 95	62 126	
LR 6	63/36	Extr. Retr. 46 31	9 13	12 18	16 24	19 28	23 34	28 41	31 46	47 70	62 92	
LR 7	80/56	Extr. Retr. 75 38	5.5 11	7.5 15	10 20	12 23	14 28	17 33	19 38	29 57	39 75	54 106
LR 8	80/45	Extr. Retr. 75 51	5.5 8	7.5 11	10 14	12 17	14 21	17 25	19 28	29 43	39 56	54 79
LR 9	100/70	Extr. Retr. 117 60	3.5 7	5 10	6.5 12.5	7.5 15	9 18	11 22	13 24	19 37	24 48	34 68
LR 10	100/56	Extr. Retr. 117 80	3.5 5	5 7	6.5 9	7.5 11	9 14	11 16	13 18	19 27	24 36	34 50
LR 11	125/90	Extr. Retr. 184 88	2 4.5	3 6.5	4 8.5	5 10	6 12	7 15	8 17	12 25	16 33	22 46
LR 12	125/70	Extr. Retr. 184 126	2 3	3 4.5	4 6	5 7	6 9	7 10	8 12	12 18	16 23	22 32

Oil reservoir size 1 Oil reservoir size 2

7.5. DIMENSIONS OF THE CONTROL UNIT



8. TYPE GF



8.1. FUNCTIONAL DESCRIPTION

Simple actuator with directional valve for controlling the movement direction of the piston rod.

The pump sucks the oil from the reservoir and feeds it into the system. The maximum system pressure is set on the pressure relief valve (item 4).

The centre position on the directional valve guarantees a nearly pressure-less circulation of the hydraulic fluid from the pump into the tank. If the directional valve is moved to the right-hand position the oil reaches the piston space of the cylinder – the piston rod extends. In order to retract the piston rod the left-hand position of the directional valve is operated.

8.2. TYPE CODE for models GF, HFS, HFSE (also ordering example)

GF 5 - HP - 350 19/38 230/400 V - 50 Hz G 24 N Z 4

Hydraulic Actuator, Type

GF see selection table 8.4.

HFS see selection table 8.4.

HFSE see selection table 8.4.

Hand Pump

HP = with hand pump

without code = without hand pump

Length of stroke in mm

350

> 500 on request

Extension Retraction Speed in mm/s

19/38

Motor Voltage

230/400 V - 50 Hz ≤ 4 kW

400/690 V - 50 Hz ≥ 5.5 kW

other voltages on request

Solenoid Voltage

G 24 V = 24 V DC

W230 V - 50 Hz = 230 V - 50 Hz AC

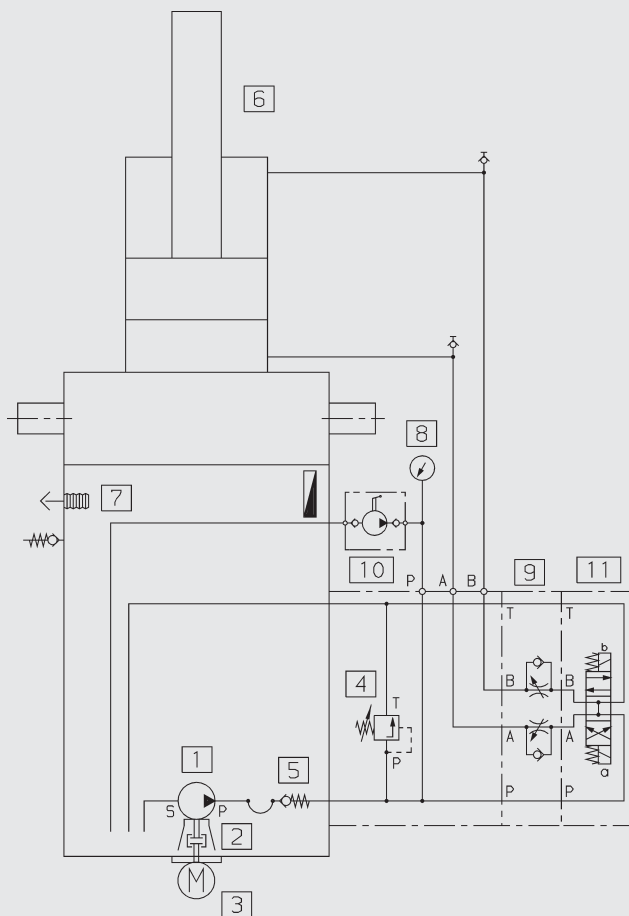
other voltages on request

N = Hand Emergency

Solenoid Connection

Z 4 = cubic plug to DIN 43650

8.3. CIRCUIT DIAGRAM



1. Pump
2. Coupling
3. Motor
4. Pressure Relief Valve
5. Check Valve
6. Cylinder

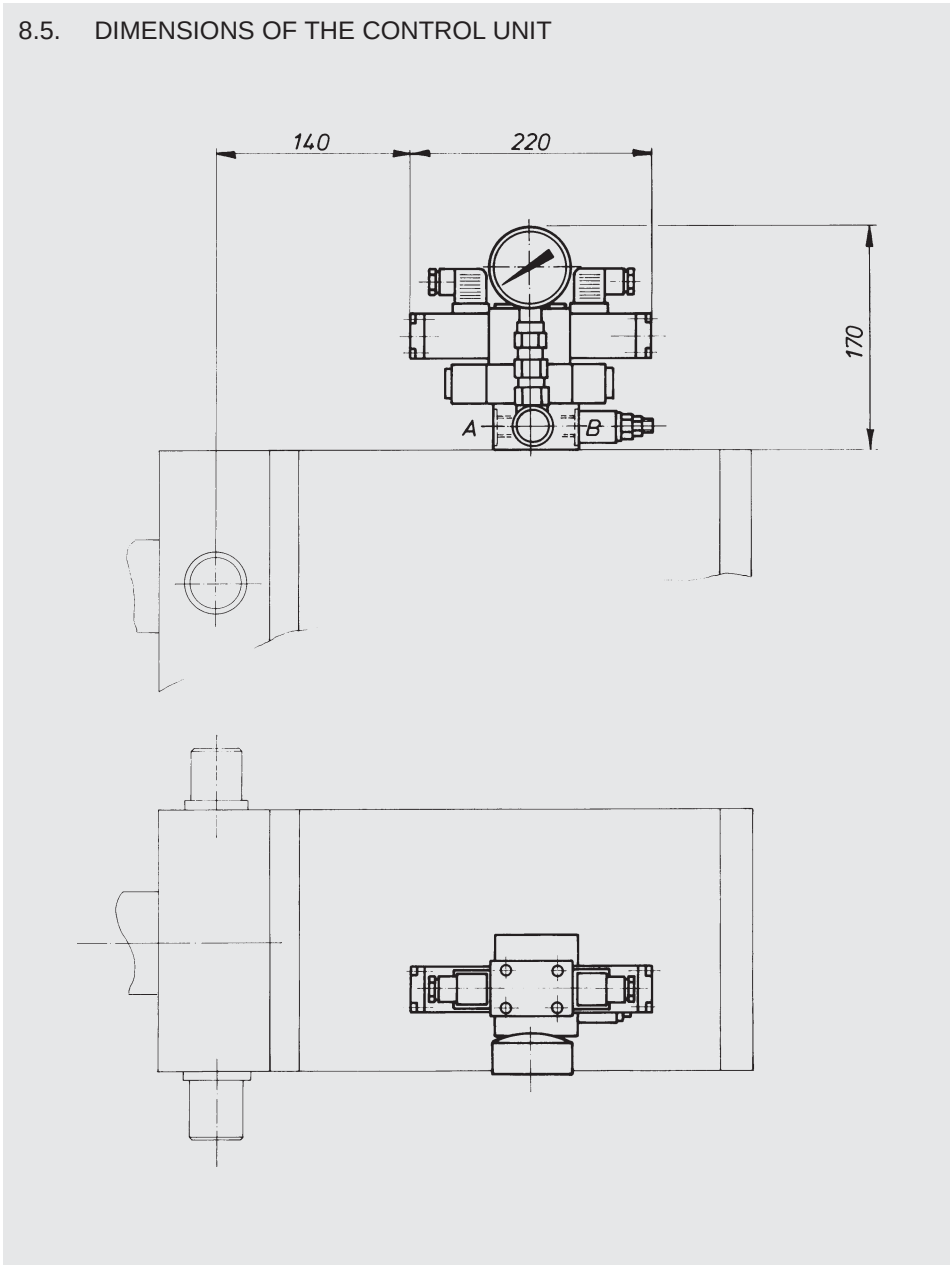
7. Compensating Membrane
8. Gauge
9. Speed Control Valve
10. Hand Pump (optional)
11. Directional Valve

8.4. SELECTION TABLE for models GF, HFS, HFSE

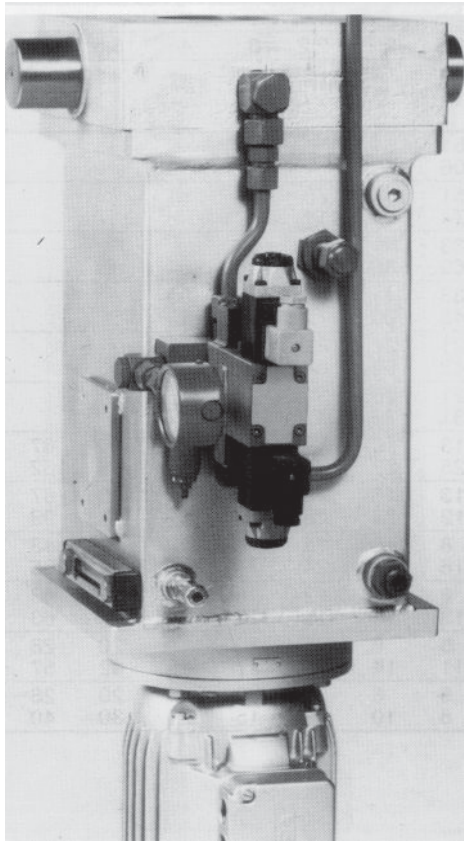
					Motor Output [kW]														
					0.37	0.37	0.37	0.37	0.75	1.1	1.1	1.5	1.5	2.2	2.2	3	4	5.5	7.5
Type		Piston/ Piston Rod Ø		Piston Force [kN]	Piston Speed v [mm/sec]														
GF/HFS/HFSE	1	40/28	Extr. Retr.	24 12	4 8	7.5 15	9.5 19	13 26	21 42	30 58	39 78	46 92	51 106	64 126					
GF/HFS/HFSE	2	40/22	Extr. Retr.	24 16	4 6	7.5 11	9.5 14	13 19	21 31	30 43	39 57	46 67	51 74	64 92	78 111	98 140			
GF/HFS/HFSE	3	50/36	Extr. Retr.	37 18	2.5 5.5	5 10	6 13	8 17	14 29	19 40	25 53	30 62	33 69	41 85	50 103	63 130			
GF/HFS/HFSE	4	50/28	Extr. Retr.	37 25	2.5 4	5 7	6 9	8 12	14 20	19 28	25 36	30 44	33 48	41 60	50 72	63 92	89 130		
GF/HFS/HFSE	5	63/45	Extr. Retr.	59 29		3 6.5	4 8	5 11	8 17	12 24	16 33	19 38	21 42	26 53	31 64	39 81	56 115		
GF/HFS/HFSE	6	63/36	Extr. Retr.	59 40		3 4.5	4 6	5 8	8 13	12 18	16 24	19 28	21 31	26 39	31 47	39 58	56 83		
GF/HFS/HFSE	7	80/56	Extr. Retr.	95 48			2 5	3 6.3	5 10	7 15	10 20	12 23	13 25	16 32	19 38	24 48	35 68	50 98	67 132
GF/HFS/HFSE	8	80/45	Extr. Retr.	95 65			2 3.5	3 5	5 8	7 11	10 14	12 17	13 19	16 24	19 28	24 36	35 51	50 73	67 99
GF/HFS/HFSE	9	100/70	Extr. Retr.	150 76				2 4	3 7	5 9	6 12	7 15	8 16	10 20	12 24	16 31	22 44	32 63	43 85
GF/HFS/HFSE	10	100/56	Extr. Retr.	150 102				2 3	3 5	5 7	6 9	7 11	8 12	10 15	12 18	16 23	22 33	32 47	43 63
GF/HFS/HFSE	11	125/90	Extr. Retr.	233 112					2 4.5	3 6	4 8	4.5 10	5 11	6 14	8 17	10 20	14 30	20 42	28 57
GF/HFS/HFSE	12	125/70	Extr. Retr.	233 160					2 3	3 4.5	4 6	4.5 7	5 8	6 10	8 12	10 15	14 21	20 30	28 40

Oil reservoir size 1 Oil reservoir size 2

8.5. DIMENSIONS OF THE CONTROL UNIT



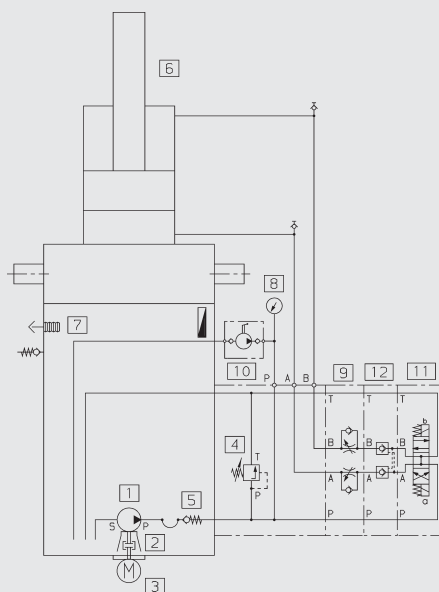
9. TYPE HFS



- 9.1. FUNCTIONAL DESCRIPTION
Model like type GF but with additional pilot-operated check valve.
The piston rod is leakage-free held in all positions.

- 9.2. TYPE CODE
see point 8.2.

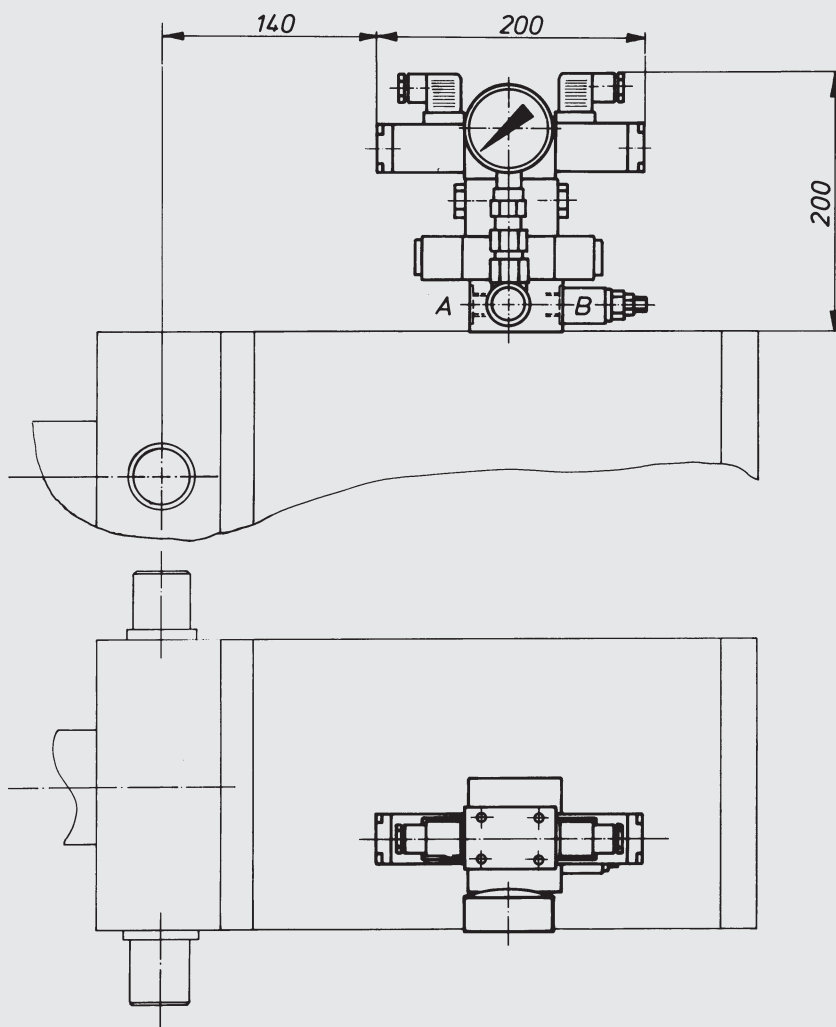
9.3. CIRCUIT DIAGRAM



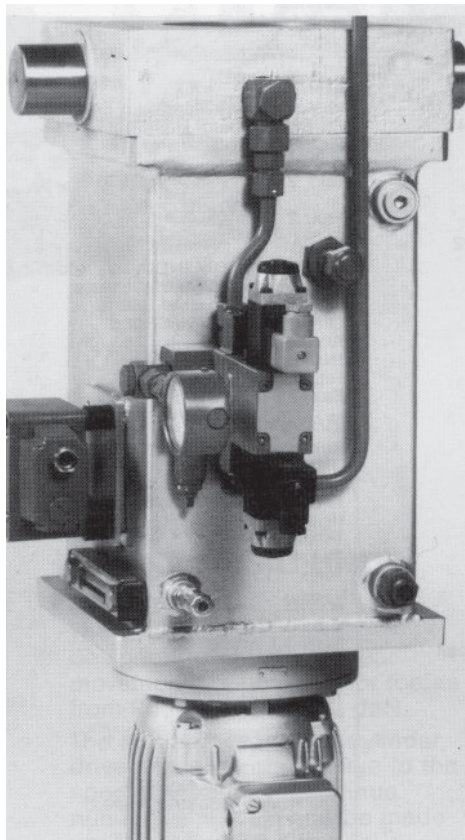
1. Pump
2. Coupling
3. Motor
4. Pressure Relief Valve
5. Check Valve
6. Cylinder
7. Compensating Membrane
8. Gauge
9. Speed Control Valve
10. Hand Pump (optional)
11. Directional Valve
12. Pilot-operated Check Valve

- 9.4. SELECTION TABLE
see point 8.4.

9.5. DIMENSIONS OF THE CONTROL UNIT



10. TYPE HFSE



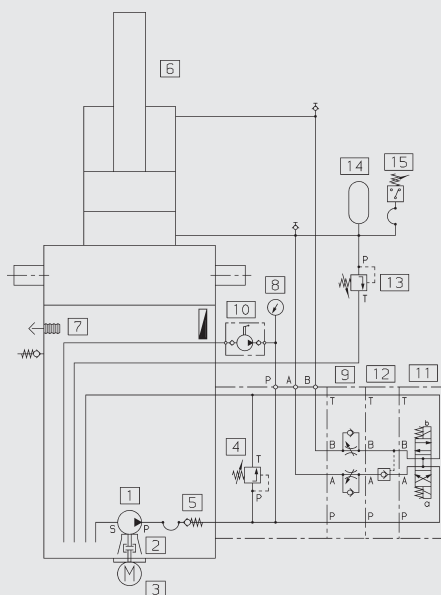
10.1. FUNCTIONAL DESCRIPTION

Simple actuator with directional valve for reversing the movement direction and with hydraulic accumulator for one-sided end position function.

10.2. TYPE CODE

see point 8.2.

10.3. CIRCUIT DIAGRAM

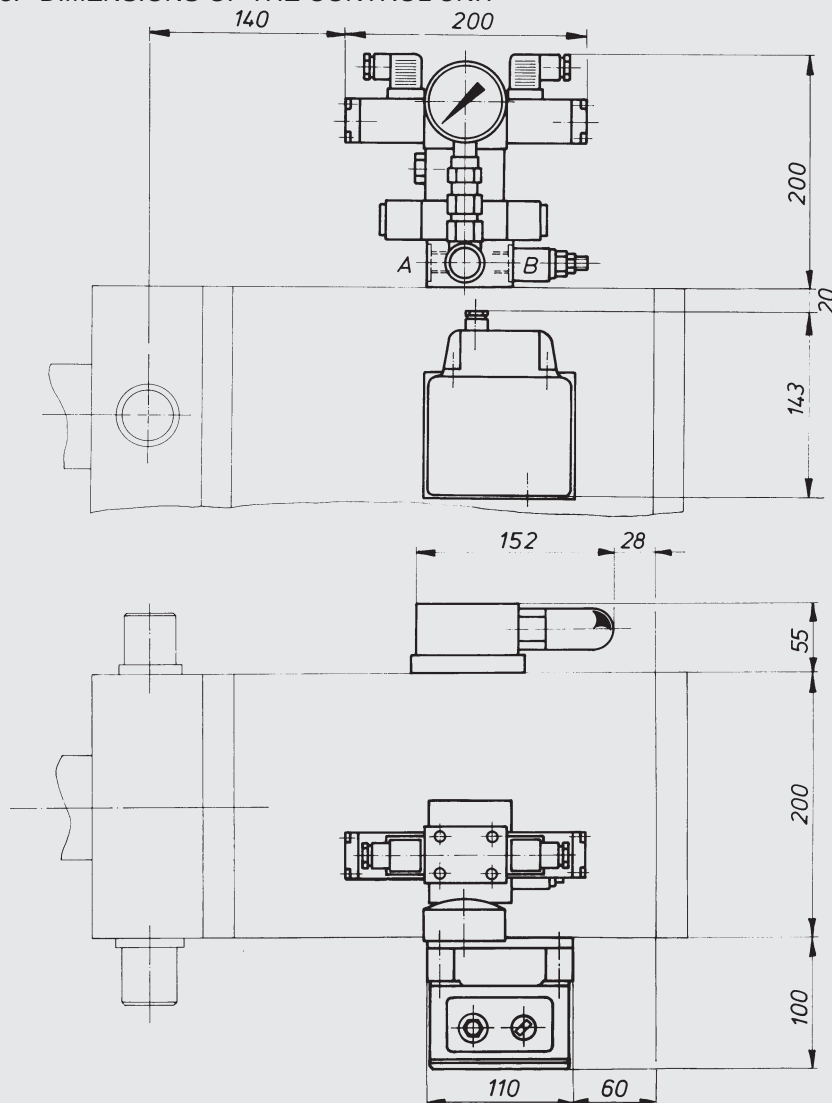


1. Pump
2. Coupling
3. Motor
4. Pressure Relief Valve
5. Check Valve
6. Cylinder
7. Compensating Membrane
8. Gauge
9. Speed Control Valve
10. Hand Pump (optional)
11. Directional Valve
12. Pilot-operated Check Valve
13. Pressure Relief Valve
14. Membrane Accumulator
15. Pressure Switch

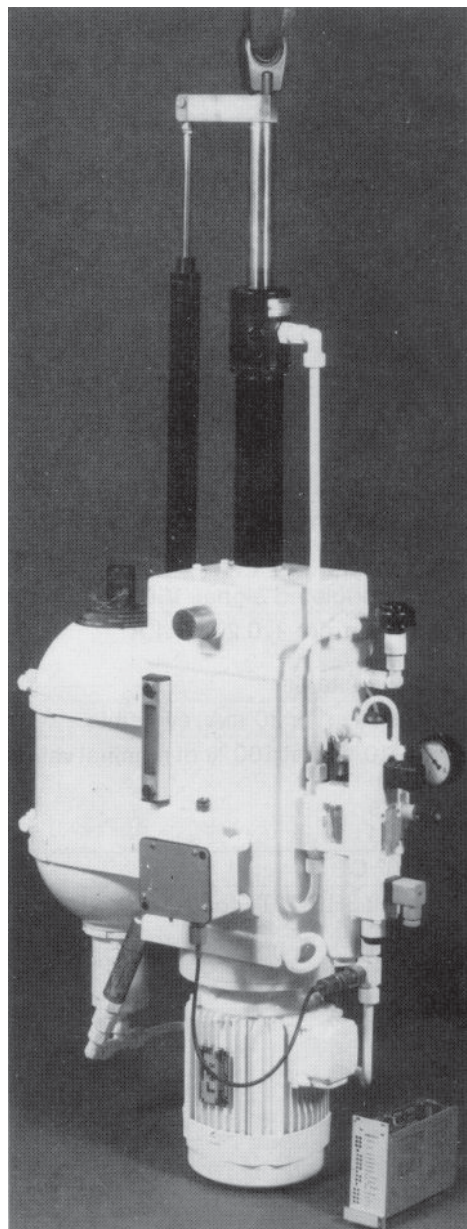
10.4. SELECTION TABLE

see point 8.4.

10.5. DIMENSIONS OF THE CONTROL UNIT



11. ACTUATOR WITH PROPORTIONAL CONTROL SYSTEM



11.1. FUNCTIONAL DESCRIPTION

Actuator with Proportional Control System. By using a proportional valve (item 13) a cylinder can be moved to any desired position, the feedback signal of the path transducer guarantees most accurate positioning.

11.2. TYPE CODE (also ordering example)

PSE 3 - W - HP - 390 50 230/400 V - 50 Hz G 24 N Z 4 TUV

Hydraulic Actuator, Type

see selection table

PS = Prop. Control System

PSE = with accu. emergency
func.: cylinder travel back

PSA = with accu. emergency
func.: cylinder travel out

Path Transducer

W = with Path Transducer

without W = without Path Transducer

Hand Pump

HP = with hand pump

for emergency function

without code = without hand pump

Length of stroke in mm

390

> 500 on request

Retraction Speed in mm/s

50

Motor Voltage

230/400 V - 50 Hz ≤ 4 kW

400/690 V - 50 Hz ≥ 5.5 kW

other voltages on request

Solenoid Voltage

G 24 V = 24 V DC

W230 V - 50 Hz = 230 V - 50 Hz AC

other voltages on request

N = Hand Emergency

Solenoid Connection

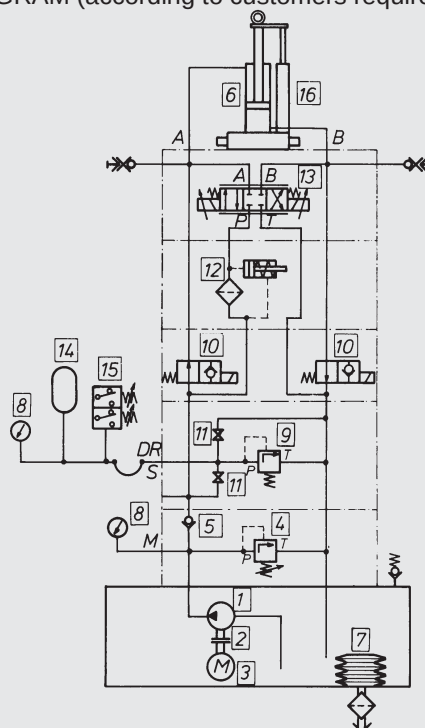
Z 4 = cubic plug to DIN 43650

Accumulator Test Procedure

Organisation for testing bladder accumulators (i.e. TUV) or country of destination

11.3. CIRCUIT DIAGRAM (according to customers requirements)

(Example)



1. Pump
2. Coupling
3. Motor
4. Pressure Relief Valve
5. Check Valve
6. Cylinder
7. Compensating Membrane
8. Gauge

9. Pressure Relief Valve
10. Seat Valve
11. Shut-off Valve
12. Pressure Filter
13. Proportional Valve
14. Bladder Accumulator
15. Twin Pressure Switch
16. Path Transducer (optional)

11.4. SELECTION TABLE

				Motor Output [kW]							
				0.75	1.1	1.5	2.2	3	4	5.5	7.5
Type		Piston/ Piston Rod Ø	Piston Force [kN] Ext. Retr.	Piston Speed v [mm/sec] Extending *)							
PS/PSE/PSA 1		40/28	18 9	21	39	51	78	98			
PS/PSE/PSA 3		50/36	30 15	14	25	33	50	63	89		
PS/PSE/PSA 5		63/45	46 22	8	16	21	31	39	56		
PS/PSE/PSA 7		80/56	75 38	5	10	13	19	24	35	50	67
PS/PSE/PSA 9		100/70	117 60	3	6	8	12	16	22	32	43
PS/PSE/PSA 11		125/90	184 88	2	4	5	8	10	14	20	28

*) Piston speed is calculated on the basis of pump discharge, by integrating a hydraulic accumulator speed can be considerably increased.
Confirm required speed.

 Oil reservoir size 1 Oil reservoir size 2

11.5. POSITION CONTROL SYSTEM WITH CONTROL AMPLIFIER UBS 2111
The control amplifier has different input possibilities:

- input by potentiometer
- input by pre-set nominal values
- input by NC-computer

The amplifier has a ramp former, which allows the acceleration and deceleration of the cylinder to be adjusted.

A path transducer firmly connected with the piston rod of the actuator gives a signal corresponding to the actual position to the amplifier, which compares the signal with a nominal value and calculates the difference. The corresponding proportional solenoid will be energized until the difference becomes zero.

Technical specifications:

Supply voltage:	Full bridge supply 24 V ± 10 % Battery supply 20 ... 36 V Three phase current 22 ... 32 V
Input power:	Approx. 40 VA max. at full control
Outputs:	Controlled current 0 ... 1.6 A Pulse width modulated signal, 160 Hz
Maximum current:	Fundamental current + 0.2 ... 1.1 A maximum 1.6 A individually adjustable
Differential inlet:	0 ... ± 10 V or 0 ... ± 20 mA reversible
Ramp time changes:	Approx. 1 ... 10 sec at 100 % of nominal value; 0.20 ... 2.00 s 30 ms ... 0.3 s 20 ms ... 0.2 s
Permissible ambient temperature:	- 10 °C to 70 °C
Dimensions:	19" slide-in unit 3HE-10TE for 19" unit carriers to DIN 41494 and IEC 297
Connections:	Plug connector, 64-pole, to DIN 41612 Type of construction: C

12. 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.