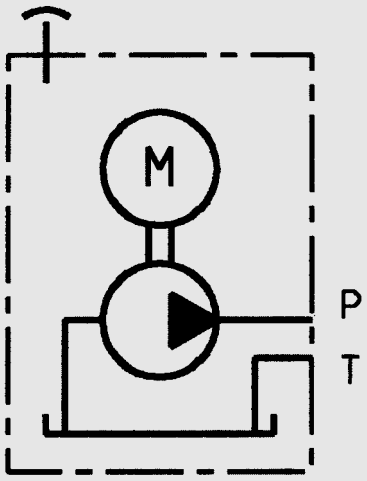
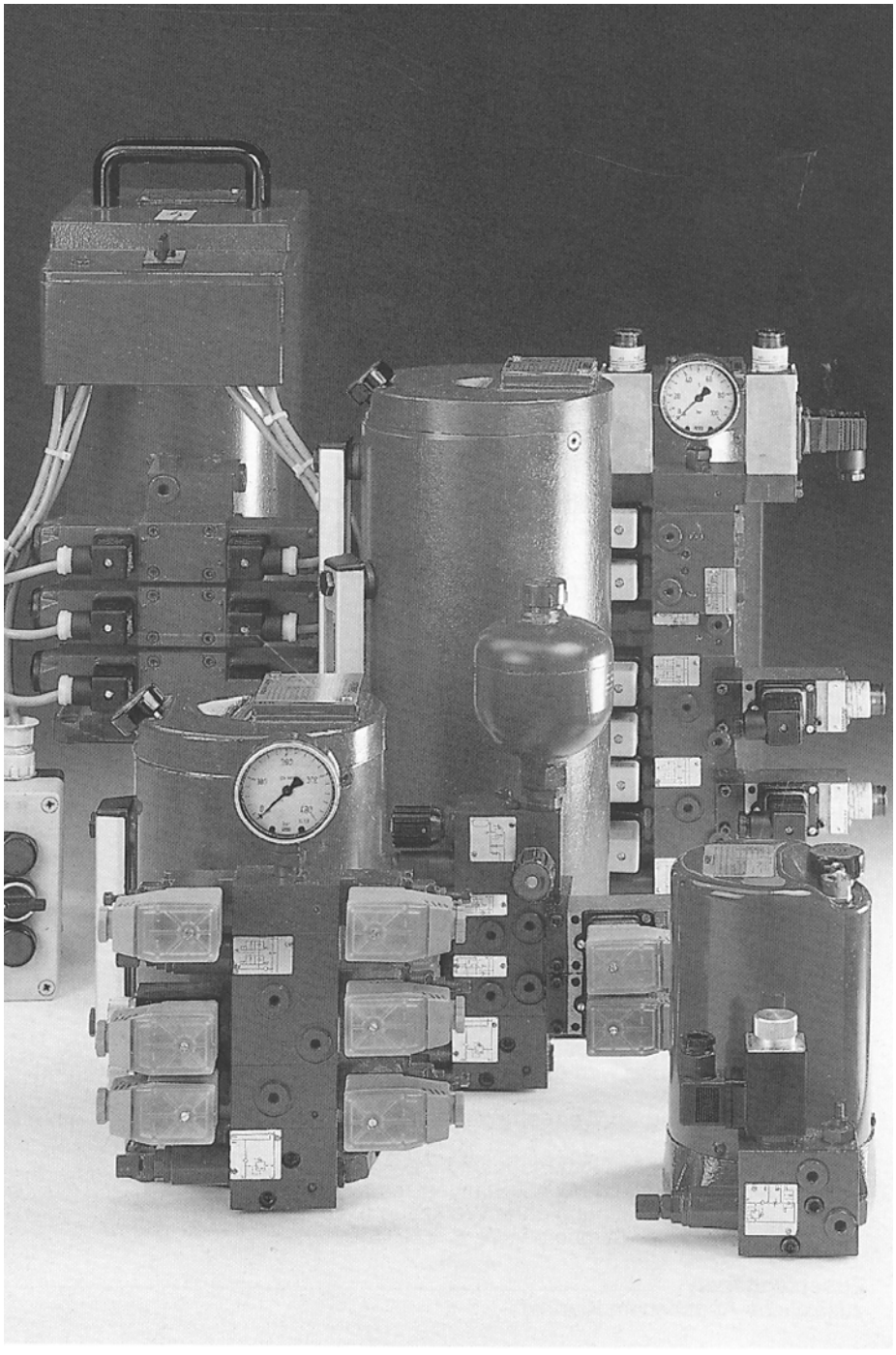
HYDAC INTERNATIONAL

High Pressure Power Unit HP



up to 500 bar
up to 5.25 l/min

suitable for:
short-term operation S 2
intermittent operation S 3



1. DESCRIPTION

1.1. GENERAL

HYDAC high pressure power units, type HP, are high performance hydraulic units of compact construction.
They are used to supply oil to hydraulic systems. The flow of the operating fluid is controlled by an extensive range of build-on controls.
The special design and the use of a noise-damping cast-iron housing result in a particularly low noise level.

1.2. FUNCTION

Three valve-controlled radial piston pump elements are operated, independent of the direction of rotation, by a cam, which is driven by an oil-immersed motor.

The HP power unit owes its special stability to the steel oil tank.

The four fixing holes in the foot bracket make for cost-saving, simple installation. The terminal box in the cover plate (HP 1 and HP 2) simplifies the electrical installation.

HP type units must only be used for short-term or intermittent operation because of their compact design, and the high specific performance due to the thermal load.

The switch-on time, dependent on the output and the operating and ambient conditions, must be selected to ensure that the max. permissible operating temperature (oil temperature in the unit) of 80 5C is not exceeded.
A temperature switch can be supplied for independent monitoring of the operating temperature.

1.3. APPLICATIONS

HP type units are particularly suitable for:

- tensioning, clamping, releasing, indexing on machine tools, presses and jigs
- operating lifting and swivel devices
- dock levellers and vehicle lifts
- auxiliary and off-line drives
- hydraulic tools as a drive unit
- pressure controls
- industrial and mobile braking systems
- cutting and shearing operations
- weight compensation
- valve drives

Not suitable for long-term operation!

Note!

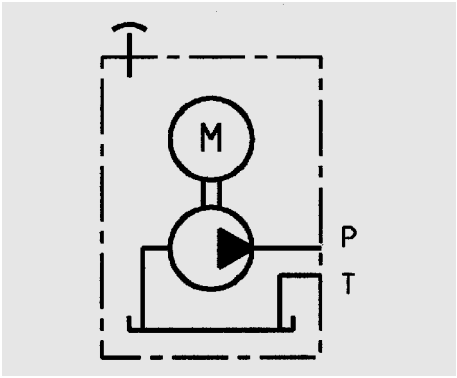
- do not use unit in applications for which it is not intended
- unit produces high pressure
- do not exceed max. permissible pressure
- tank can become hot during operation - risk of injury

2. TECHNICAL SPECIFICATIONS

2.1. GENERAL

2.1.1. Designation and symbol

Electro-hydraulic power unit



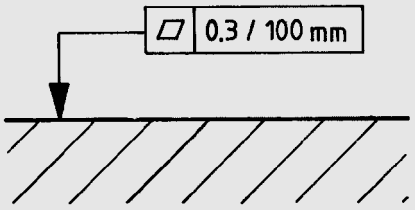
2.1.2. Type of construction

Valve-controlled hydraulic pump, radial piston type, with a constant displacement volume, driven by an oil-immersed electric motor.

2.1.3. Type of mounting

Mounting holes on the foot bracket for 4 screws
M 6 ... HP 0
M 8 ... HP 1, HP 2

Required surface finish of the mounting area:



or use flexible mounting elements.
Also see point 2.1.15.

2.1.4. Weights (dry units)

HP 0 . . . . 7.2 kg
HP 1 . . . . 16.5 kg
HP 1 H . . . . 18.3 kg
HP 2 . . . . 21.5 kg
HP 2 H. . . . 25.7 kg

2.1.5. Ambient temperature

- 20 °C to + 40 °C

2.1.6. Direction of rotation (motor)

Optional

2.1.7. Mounting position

Vertical, air breather and terminal box on the top.

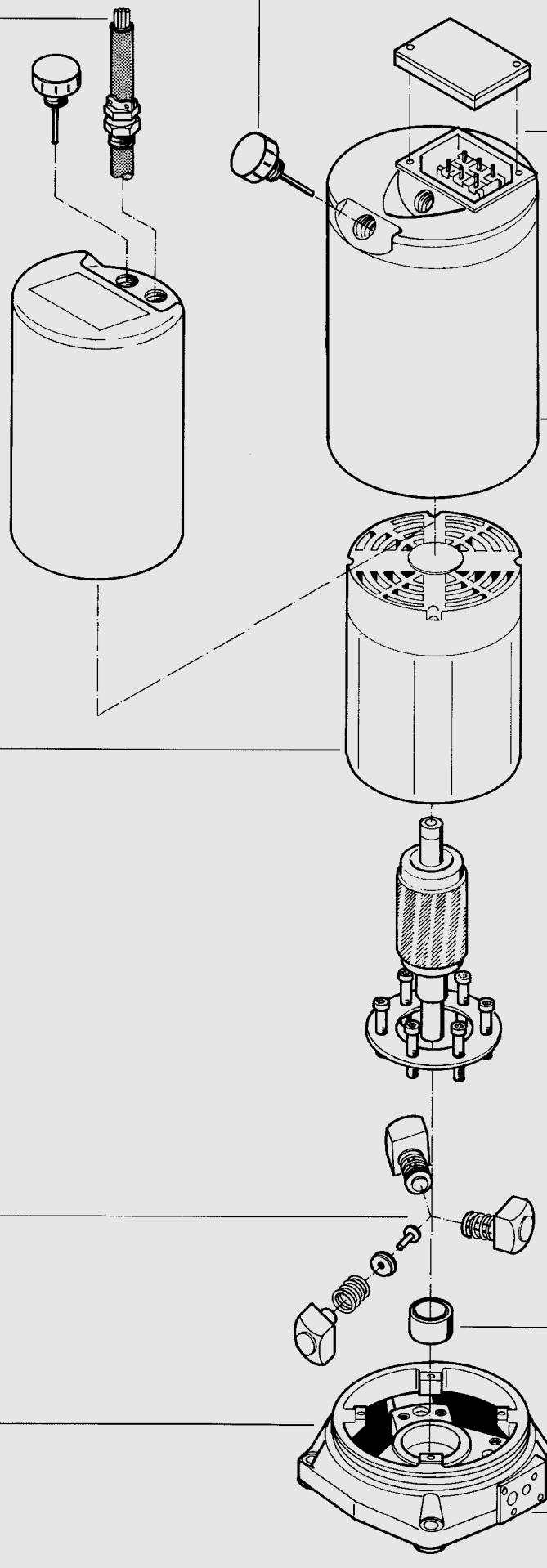
CONSTRUCTION OF THE HP POWER UNIT

HP 0
with approx. 3 m
flying leads, incl.
tension-free PG
gland

Air breather
with dipstick
optionally BF 4 -10 µm

HP 1, HP 2
built-in terminal box
with terminal strip
for motor and
temperature switch

Tank
inherently stable
various tank sizes
steel



Oil-immersed motor
squirrel-cage motor
low-noise
oil-cooled

Triple cylinder radial piston pump
valve-controlled
independent of direction of rotation
for high pressure
narrow flow rate gradation

Pump bearing
friction bearing
low-noise

Unit flange
spherical cast iron
inherently stable
noise-damping
through bores for simple mounting

Connection flange
for build-on controls

2.1.8. **Model code**
(also order example)

Power unit														Addit. units		Build-on control				Suppl. details
HP	1	H	F	Z5L	-	0.82	-	05	-	X	1	TS	T	+	. . . . .	+	. . . .	+	G24	-	Z4	-	N	+	. . . . .

High pressure power unit

Size
For selection criteria see point 2.1.9. and 2.1.11.
0
1
2

Tank size
no details ... standard tank
H ... tall tank
for usable volume see point 2.1.11.

Fluid level gauge
no details ... no fluid level gauge
F ... FSA
0 ... FSK, N/C contact
00 ... FSK, 2 off, at different heights (HP 1, HP 2)
(see point 2.1.11. and 2.1.12.)

Electrical connection for FSK
no details ... small connector (standard)
Z5L ... large connector with light

Flow rate code
see point 2.1.9.

Motor code
see point 2.1.10.

Modification number

Air breather
no details ... standard air breather
1 ... BF4, filtration rating 10 µm (see point 2.1.13.)

Temperature switch
no details ... no temperature switch
TS ... temperature switch, actuating temperature 80 °C ±2.5 K (see point 2.1.14.)

Carrying handle
no details ... no carrying handle
T ... carrying handle (see point 4.)

Additional units
(see point 3.1.)
no details ... no additional units

Build-on control
(see point 5.)

Nominal voltage for actuating solenoid
(only for build-on control)
G 24 ... 24 V DC
W 230 ... 230 V 50/60 Hz AC
other voltages on request

Electrical connection for actuating solenoid
no details ... socket to DIN 43650 without connector
Z4 ... connector to DIN 43650-AF2-PG11
Z5L ... large connector with light
For AC voltage the connector is supplied with a bridge rectifier insert.

Emergency manual override on directional seat valves
(see point 6.2.)
no details ... no emergency manual override
N ... pin type operation
NG ... thumb pressure operation for symbols V, W, Y, YR, only

Supplementary details
Please quote supplementary details in full

2.1.9. **Flow rate code table**

	Flow rate code		Three phase (3~) motor Nom. press.	Motor output P (kW)		Single phase motor (1~) Nom. press.	Motor output P (kW)	
	50 Hz	60 Hz	(bar)	50 Hz	60 Hz	(bar)	50 Hz	60 Hz
HP 0	**0.30**	0.36	**500**	0.28	0.33	**500**	0.24	0.28
	0.52	0.62	**390**	0.28	0.33	**330**	0.24	0.28
	0.82	0.95	**240**	0.28	0.33	**210**	0.24	0.28
	1.05	–	**230**	0.33	–	**200**	0.28	–
	1.25	1.50	**160**	0.28	0.33	**135**	0.24	0.28
	1.65	–	**150**	0.33	–	**125**	0.28	–
	1.70	1.95	**120**	0.28	0.33	**100**	0.24	0.28
	2.50	–	**100**	0.33	–	**80**	0.28	–
	3.35	–	**75**	0.33	–	**60**	0.28	–
HP 1	**0.49**	0.60	**500**	0.7	0.8	**500**	0.6	0.7
	0.82	1.00	**500**	0.7	0.8	**450**	0.6	0.7
	1.00	1.20	**500**	1.05	1.2	**500**	0.9	1.05
	1.25	1.50	**380**	0.7	0.8	**300**	0.6	0.7
	1.70	–	**420**	1.05	–	**350**	0.9	–
	1.95	2.40	**250**	0.7	0.8	**190**	0.6	0.7
	2.55	–	**270**	1.05	–	**220**	0.9	–
	2.60	3.15	**180**	0.7	0.8	**130**	0.6	0.7
	4.00	–	**170**	1.05	–	**140**	0.9	–
	5.25	–	**120**	1.05	–	**100**	0.9	–
HP 2	**0.49**	0.60	**500**	0.95	1.1	**500**	0.95	1.1
	0.82	1.00	**500**	0.95	1.1	**500**	0.95	1.1
	1.00	1.20	**500**	1.60	1.85	**500**	1.40	1.6
	1.25	1.50	**450**	0.95	1.1	**450**	0.95	1.1
	1.70	–	**500**	1.60	–	**500**	1.40	–
	1.95	2.40	**350**	0.95	1.1	**300**	0.95	1.1
	2.55	–	**450**	1.60	–	**340**	1.40	–
	2.60	3.15	**250**	0.95	1.1	**230**	0.95	1.1
	4.00	–	**300**	1.60	–	**220**	1.40	–
	5.25	–	**200**	1.60	–	**150**	1.40	–

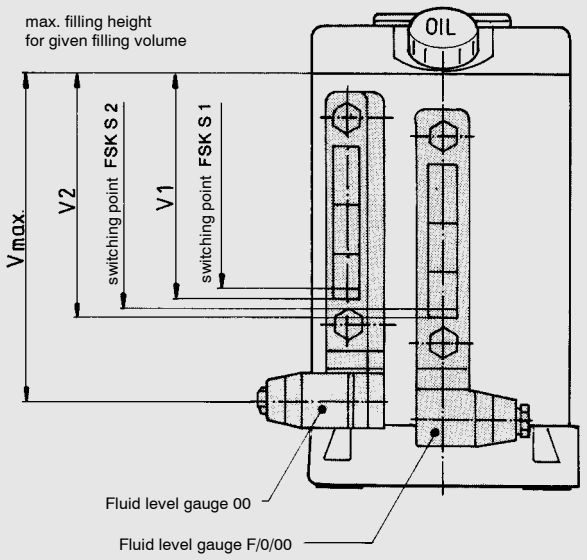
Note! The nominal pressure of the build-on control must be taken into account.
The flow rate code is approximately equivalent to the flow rate (l/min) at nominal rpm.
At nominal pressure the flow rate is 0.8 to 0.92 x flow rate code.
Model recommended due to its particularly low noise level.

2.1.10. **Motor code table**

	HP 0	**HP1/HP2**
05...3-phase	400 V - 50 Hz	230/400 V - 50 Hz
06...3-phase	415 V - 50 Hz	240/415 V - 50 Hz
08...3-phase	500 V - 50 Hz	290/500 V - 50 Hz
09...3-phase	660 V - 50 Hz	380/660 V - 50 Hz
34...3-phase	400 V - 60 Hz	230/400 V - 60 Hz
36...3-phase	460 V - 60 Hz	266/460 V - 60 Hz

	HP 0 / HP 1 / HP 2
61...single phase	230 V - 50 Hz
62...single phase	240 V - 50 Hz
80...single phase	115 V - 60 Hz

2.1.11. **Oil volume (l)**



Approximate values, component-related deviations are possible.

	Filling volume (l)	Usable volume (l) V_{max}	V_1	V_2
HP 0	1.1	0.7	-	-
HP 1	2.4	1.6	1.15	1.3
HP 1 H	4.0	3.2	2.75	2.9
HP 2	4.0	2.8	2.0	2.2
HP 2 H	7.0	5.8	4.6	4.7

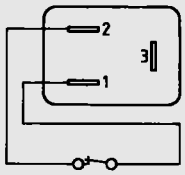
S1: early warning point
(on model 00 = 2 x FSK)
S2: min. switching point

2.1.12. **Fluid level gauge**

FSA ...
visual fluid level gauge
FSK ...
visual fluid level gauge
with additional electrical contact before the minimum fluid level is reached

Electrical function FSK

0 = N/C contact



Contact load: max. 8 W
Switching voltage:
max. 50 V AC/DC
Switching current: max. 0.2 A
Terminal 3 not connected
Electrical connection:
small connector (standard)
Z5L ... large connector with light (24-50 V AC/DC)

2.1.13. **Air breather BF4**

Filtration rating 10 µm,
without dipstick,
for use in highly contaminated environments.

2.1.14. **Temperature switch TS**

To protect the unit from overheating.
Actuating temperature:
80 °C ±2.5 K
Switch-back hysteresis:
approx. 10 K - 30 K
Nominal voltage:
AC max. 250 V
DC max. 60 V
Current capacity with AC:
1.6 A at cos φ = 0.6
2.5 A at cos φ = 1.0
DC:
60 V = 1.0 A
42 V = 1.2 A
6/12/24 V = 1.5 A
Type of contact: N/C
Connection: terminal in terminal box (HP1 and HP2), flying leads, approx. 400 mm long (HP0)

2.1.15. **Noise generation**

Due to their design, HP power units are extremely quiet. The noise generation is determined mainly by the installation site and the type of mounting. We recommend that the unit is mounted on vibration mounts and that pressure hoses are used.
Noise levels:
44-70 dBA for those units in table 2.1.9. which are designated as being especially low-noise.
Max. 80 dBA for all other units.

2.2. HYDRAULIC DETAILS

2.2.1. **Nominal pressure**

p_N = 500 bar max.
see point 2.1.9.
When using build-on controls, the nominal pressure of these units must be taken into account.

2.2.2. **Flow rate**

Q = 0.30 to 5.25 l/min
see point 2.1.9.

2.2.3. **Operating fluid**

Hydraulic oil to DIN 51524 part 2

2.2.4. **Fluid temperature range**

Min. - 20 °C
Max. + 80 °C

2.2.5. **Viscosity range**

Min. 10 mm^2/s
Max. 380 mm^2/s
Optimum viscosity range 12 to 200 mm^2/s.
Max. initial viscosity 800 mm^2/s

2.2.6. **Filtration**

Max. permissible contamination level of the operating fluid

- **At operating pressure up to 350 bar**
  to NAS 1638, class 10.
  We recommend a filter with a minimum retention rate of $b_{20} \geq 100$.
- **At operating pressure up to 500 bar**
  to NAS 1638, class 9.
  We recommend a filter with a minimum retention rate of $b_{10} \geq 100$.

The fitting of filters and regular replacement of elements guarantees correct functioning, reduces wear and tear and increases the service life.
Only filtered oil must be used!
Filtration and filling can be carried out simply and quickly in one operation using a filtration unit, the OF type for example. If the unit is used in a highly contaminated environment, the use of an air breather, type BF 4, is recommended.

2.3. ELECTRICAL DETAILS

2.3.1. **Type of construction**

Three-phase squirrel-cage motor or single phase motor (supplied with continuous operation condenser), oil-cooled.

2.3.2. **Nominal voltage**

3 ~ 230 / 400 V - 50 Hz
Standard model
other voltages available on request (see point 2.1.10.)

2.3.3. **Type of operation**

Short-term operation S 2
Intermittent operation S 3
to VDE 0530
The switch-on time, dependent on the output, the operating and ambient conditions, must be selected to ensure that the maximum permissible operating temperature (that of the oil in the unit) of 80 °C is not exceeded.
If necessary, fit a temperature switch (see point 2.1.14.)

2.3.4. **Safety type**

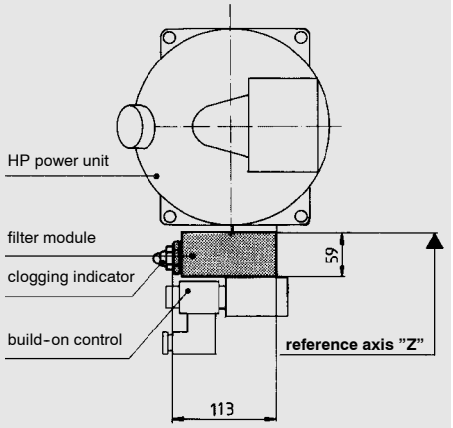
DIN 40050 - IP 54 for a completely assembled unit with correct electrical connection.

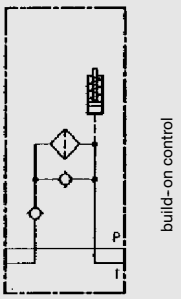
2.3.5. **Type of connection**

HP 1 / HP 2 ...
Terminal box with terminal strip
HP 0 ...
approx. 3 m long flying leads

3. ADDITIONAL UNITS

3.1. RETURN LINE FILTER MODULE





Return line filter module between HP power unit and build-on control including check valve (prevents the tank from emptying when the filter element is changed).

Model code

F T R 20 B . X

Filter module
Filter in the T line
Bypass valve RV
no details . . . no bypass
R . . with bypass valve
p_o = 4.5 bar
Filtration rating
20 . . . 20 mm (standard)
10 . . . 10 mm
5 . . . 5 mm
Clogging indicator

B	visual indicator
C	electrical indicator
D 24	comb. vis./elec. indicator
D 24	(15 - 30 V DC/AC)
D 48	(30 - 60 V DC/AC)
D 110	(100 - 130 V DC/AC)
D 230	(150 - 230 V DC/AC)

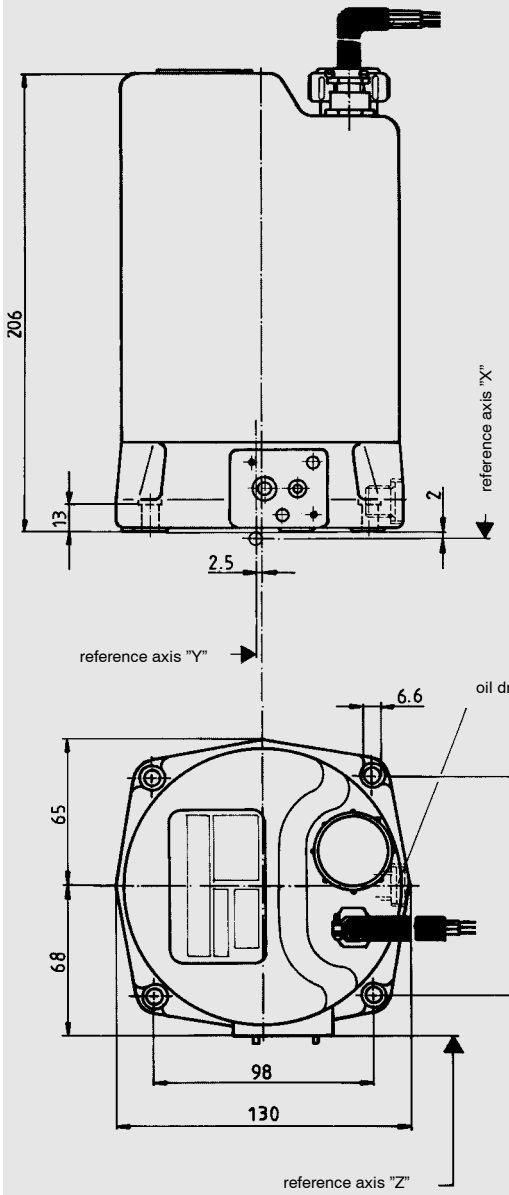
For further details, see the Clogging Indicators for Filters brochure, no. E 7.050
Modification number

4. DIMENSIONS

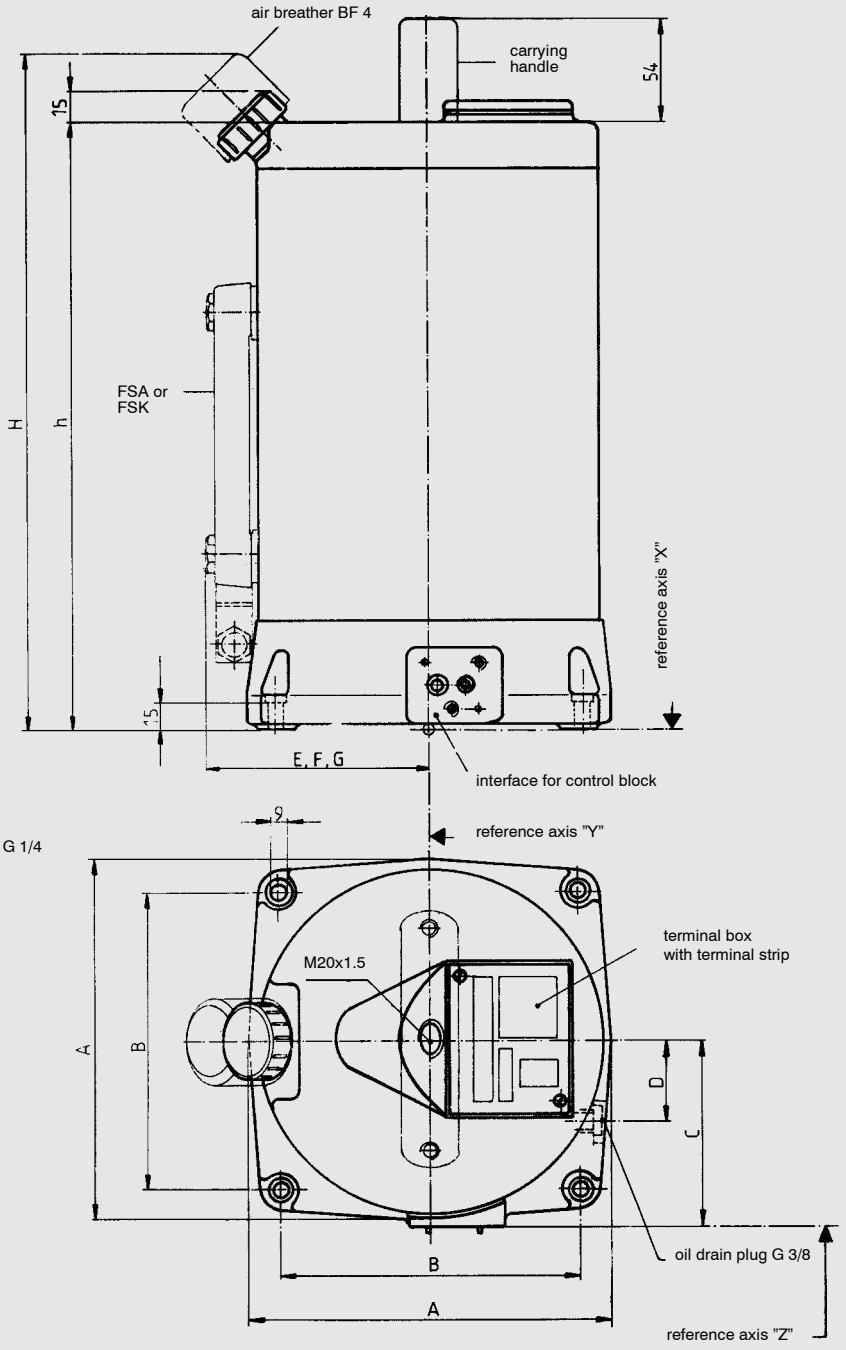
Power unit

The axes X, Y and Z are reference axes for calculating the installation dimensions when adding modules as per point 5. (Build-on controls).

HP 0



HP 1/HP 2



Type	A	B	C	D	E	F	G	H	h
HP 1	164	125	85	40	107	115	143	315	281
HP 2	190	156	98	50	117	125	153	350	316
HP 1 H	164	125	85	40	107	115	143	424	390
HP 2 H	190	156	98	50	117	125	153	484	450

E...clearance for FSA
F... clearance for FSK, small connector
G...clearance for FSK, Z5L - large connector with lamp

All measurements in mm. For dimensions of build-on controls, see point 5.

5. BUILD-ON CONTROLS

5.1. OVERVIEW

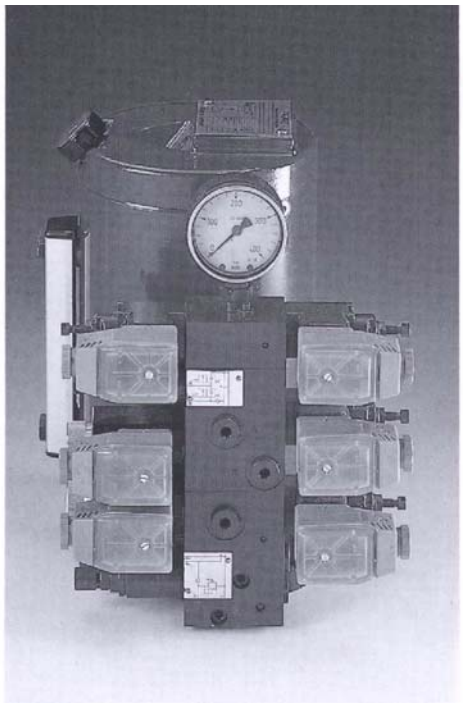
Build-on controls and high pressure power units, type HP, combine to make a unit ready for installation.
The build-on controls can be arranged to suit individual applications.
Three types of build-on control systems are available.

Build-on modules

(see point 5.2.)

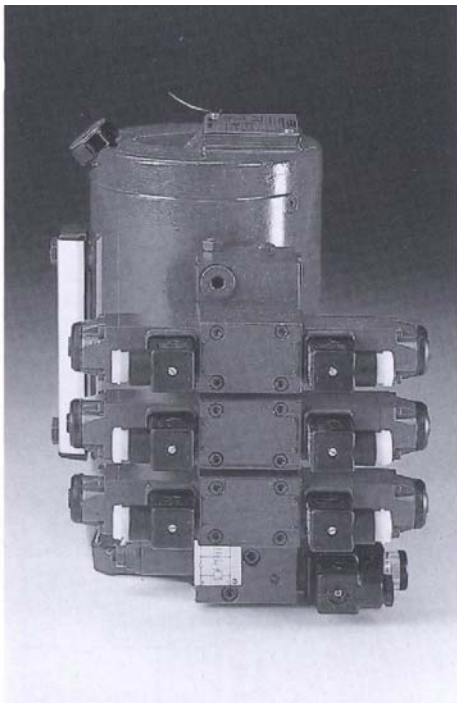
Build-on control module
Build-on modules are flanged directly onto the connection flange of the HP unit. They consist of various different types of valves as well as all connections necessary for operation.

Modular valve stacking system
(see brochure no. E5.304.)



Valve stacking system L
Modules with directional seat valves, pressure and check valves as well as pressure switches can be combined on a base module in any order, depending on the control task.
It is always finished off with an end module.
For model codes and dimensions, see brochure no. E5.304.
”Valve stacking system L”.

Valve stacking modules for valves with A6 interface to DIN 24340 (see point 5.3.)



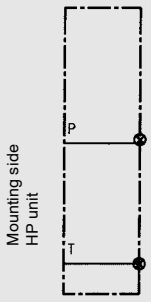
Valve stacking modules CL
Up to six horizontal stacking modules can be mounted onto a base module. A vertical stacking system consisting of directional valves or sandwich plate valves with A6 interface to DIN 24340 is fitted onto the valve stacking modules. It is always finished off with an end module.

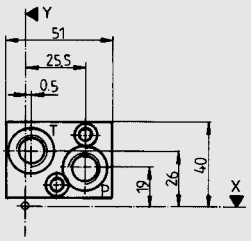
Note:
Build-on module controls and modules of control types L and CL cannot be combined.

Special controls:
For control tasks which cannot be solved with standard controls, special control blocks can be fitted to the unit according to customers’ specifications.

Designation and symbol | **Dimensions** | **Model code**

Connecting module Inline mounting





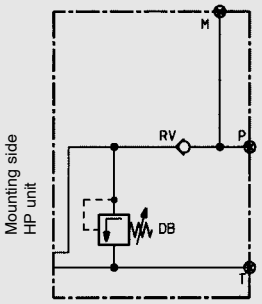
Installation dimension Z: 25 max.

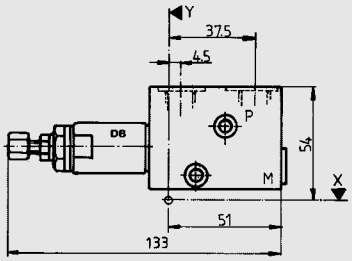
G 1/4

Type

P_N = 500 bar

Base module





Installation dimension Z: 30 max.

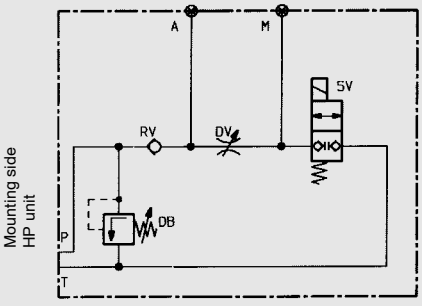
GRD 350 M

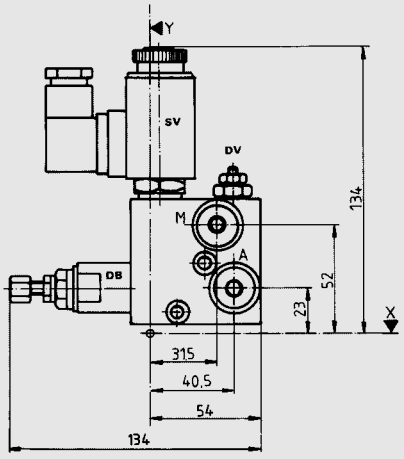
Type
GD no check valve RV
GRD with check valve RV

Pressure relief valve DB
Pressure range
and type of adjustment
see point 6.4.

P_N = 500 bar

Lift/lower module





Installation dimension Z: 43 max.

G...
SW 3 Z 200 M + W...

Type

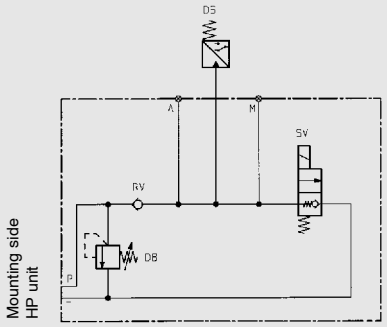
Directional
seat valve SV
possible symbols
V, W, Y, Z
see point 6.5.

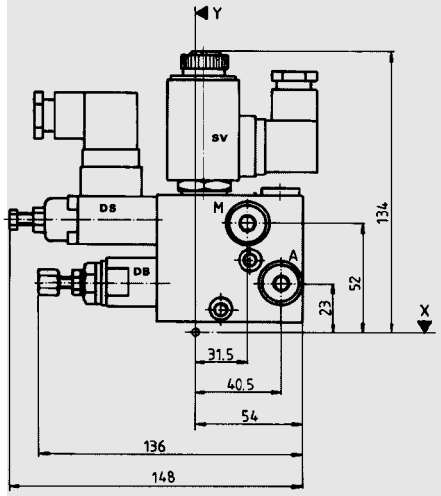
Pressure
relief valve DB
Pressure range
and type of adjustment
see point 6.4.

see point 2.1.8.
(build-on control)

P_N = 350 bar

Pressure control module





Installation dimension Z: 43 max.

G...

SB 3 Z -5 / 350 M + W...

Type

Directional seat valve SV
possible symbols
V, W, Y, Z
see point 6.5.

Pressure switch DS
see point 6.3.

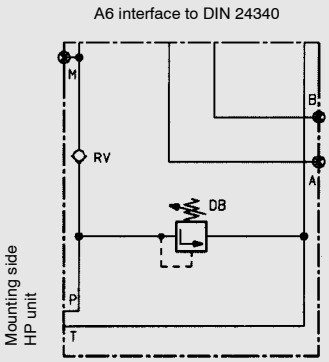
Pressure relief valve DB
Pressure range and type of adjustment
see point 6.4.

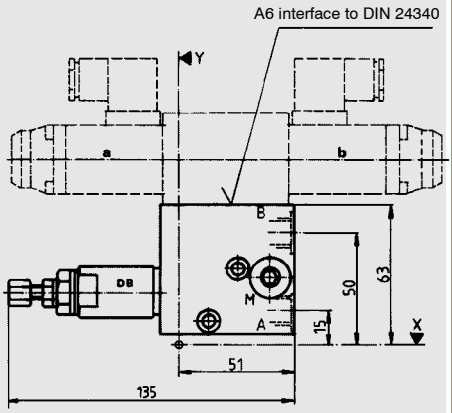
see point 2.1.8.
(build-on control)

p_N = 350 bar

Build-on module for valves with A6 interface to DIN 24340

Directional valve and sandwich plate valve construction possible





Installation dimension Z: 53 max.

CE R D 350 M - ...

Type

Check valve RV
no details ... no RV
R ... with RV

Pressure relief valve DB
D ... with DB

DB pressure range and type of adjustment
see point 6.4.

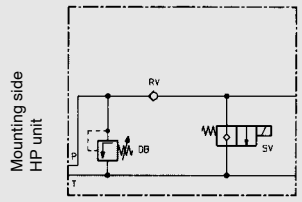
p_N = 350 bar
(or max. pressure of the built-on valves)

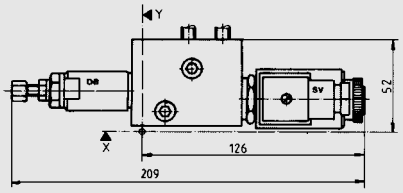
5.3. VALVE STACKING MODULES

For valves with A6 interface to DIN 24340 (p_N = 350 bar), ports A, B, P, T ... G 3/8

Designation and symbol | **Dimensions** | **Model code**

Base module

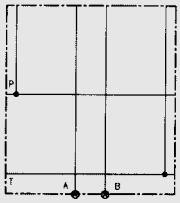


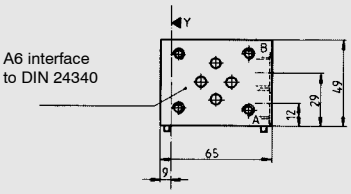


Installation dimension Z: 88 max.

Valve stacking module

A6 interface to DIN 24340





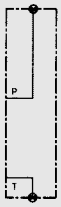
Installation dimension Z: 50 max.

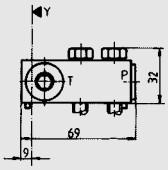
Model code

CL ... R D 350 M Z - ... +

Type
No. of valve stacking modules
(max. 6)
Check valve RV
no details ... no RV
R ... with RV
Pressure relief valve DB
D ... with DB
DB pressure range and type of adjustment
see point 6.4.
Directional seat valve SV
no details ... no SV
possible symbols V, W, Y, Z
see point 6.5.
Directional valves and sandwich plate valves
with standardised interface
(see point 6.1.3.)

Standard end module



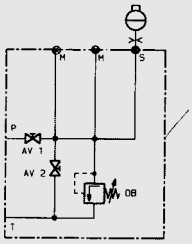


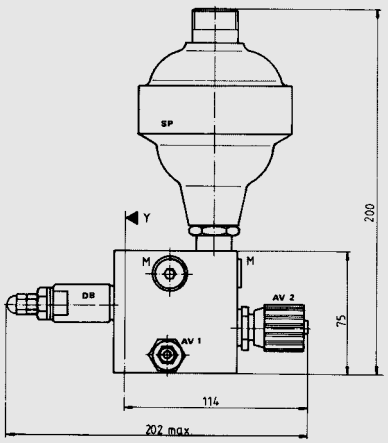
Installation dimension Z: 52 max.

+ PL

Typ

Accumulator safety end module





Port M ... G 1/4

+ PT 350 P 350 TÜV - ...

Type
DB pressure range
(see point 6.4.)
DB type of adjustment
P ... can be lead-sealed, on TÜV version lead-sealed
Pre-set cracking pressure DB
TÜV ... with TÜV approval for DB
no details ... no TÜV approval for DB
Details for pressure accumulator SP
Please quote in full
(see point 6.1.2.)

6. DESIGN RECOMMENDATIONS

6.1. DOCUMENTATION

6.1.1. **Valves and units**

DB - Pressure relief valves DB 4E
Brochure No. E 5.161

- Pressure relief valves DB 4E pressure-set and lead-sealed
Brochure No. E 5.163

DMV - Pressure reducing valves
Brochure No. E 5.162

DV - Flow control valves DV 5E
Brochure No. E 5.113

RV - Check valves RVE
Brochure No. E 5.176

SV - 2/2 directional seat valves 2 SVE
Brochure No. E 5.204

DS - Pressure switches Series 5 - 8

6.1.2. **Hydraulic accumulators**

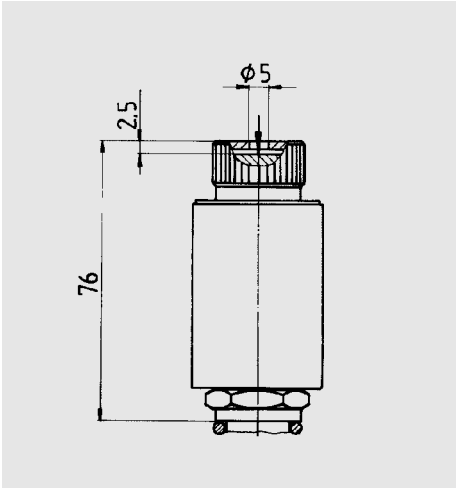
The following hydraulic accumulators can be fitted (when ordering, please state type in full):
Diaphragm accumulators, weld or screw version, type: SBO
Brochure No. E 3.100
Bladder accumulators type: SB
Brochure No. E 3.201

6.1.3. **Valves with A6 interface to DIN 24340**

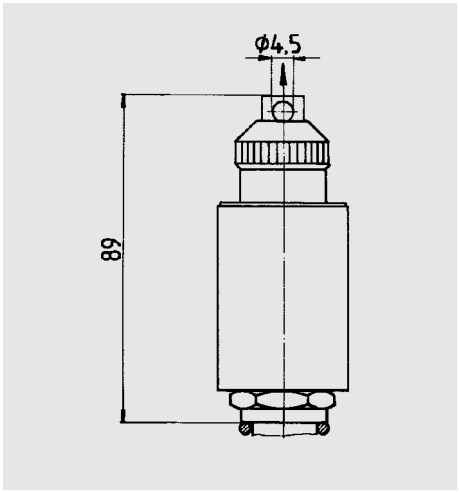
All directional valves with A6 interface to DIN 24340 or CETOP R35H-42-4-03 can be fitted to the CE build-on module and the CL horizontal stacking modules.
For example: HYDAC directional seat valves WSE 3 D as per brochure No. E 5.203 or directional spool valves.
Directional valves and sandwich plate valves can be supplied, if required. Please give symbols in full or specify circuit diagram.

6.2. EMERGENCY MANUAL OVERRIDE FOR DIRECTIONAL SEAT VALVES SV

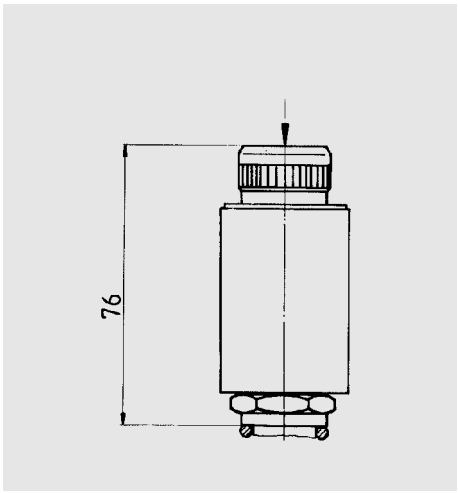
N ... pin type operation
Available for symbols V, W, Y, YR,
Mechanical operation is only possible with a pin.
The opening has a diameter of 5 mm. The pin is countersunk by 2.5 mm. The operating stroke is 1.5 mm.
The valve is switched as pressure is applied to the actuating mechanism by means of an appropriate pin.



N ... pin type operation
Available for symbols Z, ZR
The valve is switched as the actuating mechanism is pulled out using an appropriate tool.
The operating stroke is 1.5 mm.



NG ... thumb pressure operation (rubber cap)
Available for symbols V, W, Y, YR,
Manual operation is possible without tool (thumb pressure).

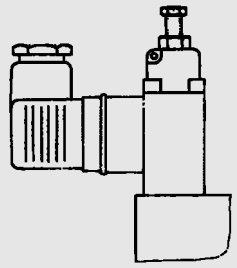


6.3. PRESSURE SWITCH DS

Series 5 - 8

Order code	Pressure range
5	50 bar
6	200 bar
7	350 bar
8	630 bar

- with adjustment screw
- compact construction



If solenoid valves with Z4 connectors are ordered, pressure switches with Z14 connectors are supplied (standard).
If solenoid valves with Z5L connectors are ordered, pressure switches with Z15L connectors are supplied.

6.4. ORDER DETAILS FOR PRESSURE RELIEF VALVE DB

350 M **315** - **300**

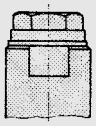
Pressure range
100 (... 100 bar)
200 (... 200 bar)
350 (... 350 bar)
630 (... 630 bar)

Type of adjustment
F ... fixed setting
M ... adjustable, advise pressure setting limit (standard)
SM ... scaled knob, advise pressure setting limit
P ... can be lead-sealed
A ... lockable, 2H lock

Max. pressure setting
Must be specified for M and SM
not required for A, F and P

Pre-set cracking pressure
Must be specified for F
Optional for M, SM, A, P
(no details: spring not set)

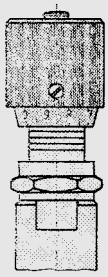
F



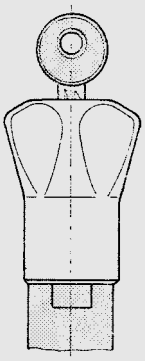
P

M (standard)

SM



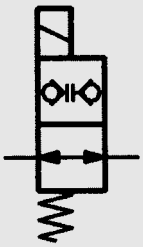
A



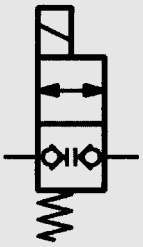
6.5. 2/2 DIRECTIONAL SEAT VALVES SV

Symbols
(For nominal voltage, electrical connection and emergency manual override of actuating solenoids, see point 2.1.8. Build-on control)

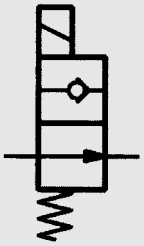
V



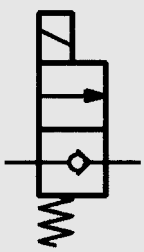
W



Y



Z



7. 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.