

**MANNESMANN
REXROTH****A10VSO Variable Displacement Pump**Series 31, Industrial Model, for Open Circuits
Axial Piston Swashplate Design**RE****92711/03.93**

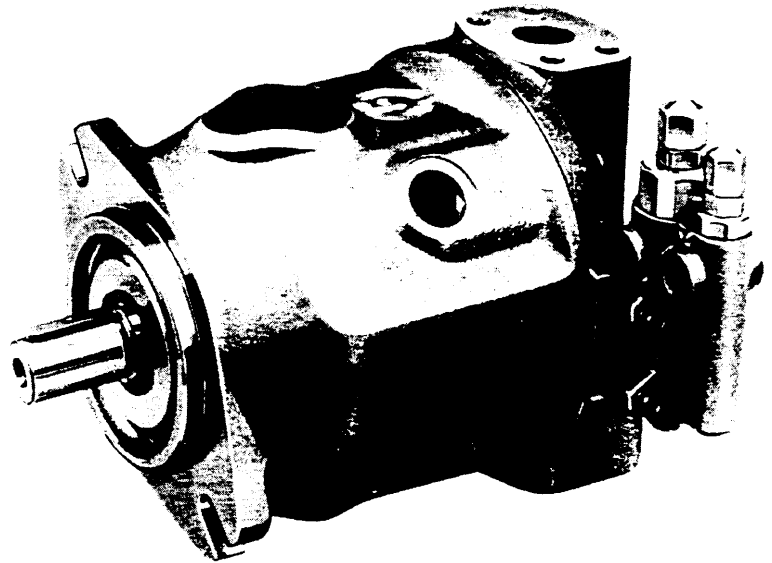
Brueninghaus Hydromatik

Size 28...140

Nominal pressure 280 bar

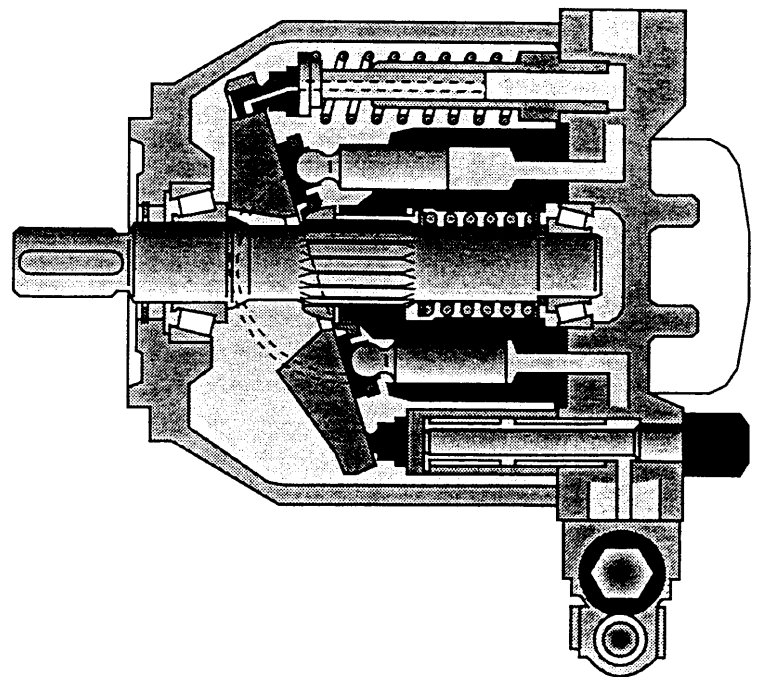
Peak pressure 350 bar

Replaces RE 92711/10.89

Medium pressure rangeA10VSO Size 18
See RE 92712

Variable displacement, axial piston pump A10VSO of swashplate design is designed for open circuit hydrostatic transmissions. Flow is proportional to the drive speed and the displacement. By adjusting the position of the swashplate it is possible to steplessly vary the flow.

- ISO 2 hole mounting flange
- flange connections SAE metric
- 2 case drain connections
- good suction characteristics
- permissible continuous operating pressure 250 bar
- low noise level
- long service life
- axial and radial loading of drive shaft possible
- high power/weight ratio
- wide range of controls available
- short control times
- optional through drive for tandem pumps



A10VSO Variable Displacement Pump, Series 31

Hydraulic fluid

Axial piston pump

Type of operation

Size

Control and adjustment device

Series

Direction of rotation

Seals

Perbunan (shaft sealing ring in Viton)

P

Viton

V

Shaft end

Parallel with key DIN 6885

P

Mounting flange

28 45 71 100 140

ISO 2-hole

●

●

●

●

-

A

ISO 4-hole

-

-

-

-

●

B

Service line connections

Pressure port B

SAE ports at opposite sides

Suction port S

Metric fixing thread

12

Through-drives

28 45 71 100 140

Without through-drive

●

●

●

●

●

N00

With through-drive to accept an axial piston pump, a gear pump or a radial piston pump

Mounting flange

Shaft/coupling

For mounting:

ISO 80, 2-hole

keyed shaft Ø 18

A10VSO 18

●

●

●

●

●

K51

ISO 100, 2-hole

keyed shaft Ø 22

A10VSO 28

●

●

●

●

●

K25

ISO 100, 2-hole

keyed shaft Ø 25

A10VSO 45

-

●

●

●

●

K26

ISO 125, 2-hole

keyed shaft Ø 32

A10VSO 71

-

-

●

●

●

K27

ISO 125, 2-hole

keyed shaft Ø 40

A10VSO 100

-

-

-

●

●

K37

ISO 180, 4-hole

keyed shaft Ø 45

A10VSO 140

-

-

-

-

●

K59

82-2(SAE A)

16-4 (SAE A)

G2

●

●

●

●

●

K01

101-2(SAE-B)

22-4 (SAE B)

G3

●

●

●

●

●

K02

ISO 100, 4-hole

splined shaft 21 X 24

GU (1) *

●

●

●

●

●

K54*

ISO 125, 4-hole

splined shaft 21 X 24

GU (2) *

-

●

●

●

●

K55*

ISO 160, 4-hole

splined shaft 30 X 34

GU (3) *

-

-

●

●

●

K56*

Metr.4-hole,Centr.Ø 63

keyed shaft Ø 25

R4

●

●

●

●

●

K57

*not for new projects, please consult us if required.

Combination pumps

- If a second Brueninghaus pump is to be fitted at factory then the two model codes must be linked with a "+" sign. Model code 1st pump + model code 2nd pump.
Ordering example: A10VSO 100DR/31R-PPA12K27 + A10VSO 71DFR/31R-PPAN00
- If a gear or radial piston pump is to be fitted at factory please consult us (RE 90139 in preparation).

Model coding

Fluid

Mineral oil (no short code)	
HFA-, HFB and HFC operation ¹⁾	E-

Axial piston unit

Variable, swashplate design for industrial use	A10VS
Nominal pressure 250 bar, peak pressure 315 bar	

Mode of Operation

Pump, in open circuit	O
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Size

≅ Displacement $V_{g\max}$ (cm ³)	28	45	71	100	140
---	----	----	----	-----	-----

Control Device

			28	45	71	100	140	
Constant pressure control	DR		●	●	●	●	●	DR
	DR	G	●	●	●	●	●	DRG
remotely controlled _____								
Pressure/flow control	DFR		●	●	●	●	●	DFR
	DFR	1	●	●	●	●	●	DFR1
X port plugged _____								
Pressure/flow power control			●	●	●	●	●	DFLR
Flow control, pilot pressure dependent with pressure control			●	●	●	●	○	FHD
Electrical flow control	FE		●	●	●	●	○	FE
	FE	D	●	●	●	●	○	FED
with pressure control _____								
Pressure/flow control, electronic			●	●	●	●	○	DFE1

For speed control, secondary control DS see RE 92715

Series

	31
--	----

Direction of rotation

Viewed on shaft end	clockwise	R
	anti-clockwise	L

* Project note for size 71

Pressure port B consists of a high pressure combination port

SAE 11/4" standard pressure range, 3000 psi, for pressures up to 250 bar

SAE 1" standard pressure range, 5000 psi, for pressures in excess of 250 bar (see p.11).

For new applications high pressure port SAE 1" must be used.

- = available
- = in preparation
- = not available

Hydraulic fluid

For extensive information on the range of fluids and application conditions please see our data sheet RE 90220 (mineral oils), RE 90221 (environmentally acceptable fluids) and RE 90223 (HF - fire resistant hydraulic fluids). When operating on HF-fluids any existing constraints in respect of technical data should be observed or, if necessary, consult our technical department. Operation on Skydrol hydraulic fluid is subject to consultation.

Operating viscosity range

In order to obtain optimum efficiency and service life we recommend that operating viscosity (at operating temperature) be selected from within the following range

$$v_{opt} = \text{opt. operating viscosity } 16...36 \text{ mm}^2/\text{s}$$

The above refers to the tank temperature (open circuits).

Viscosity limits

The following limiting values for viscosity are as follows:

$$v_{min} = 10 \text{ mm}^2/\text{s} \text{ short term at maximum permissible drain of } 90^\circ\text{C}.$$

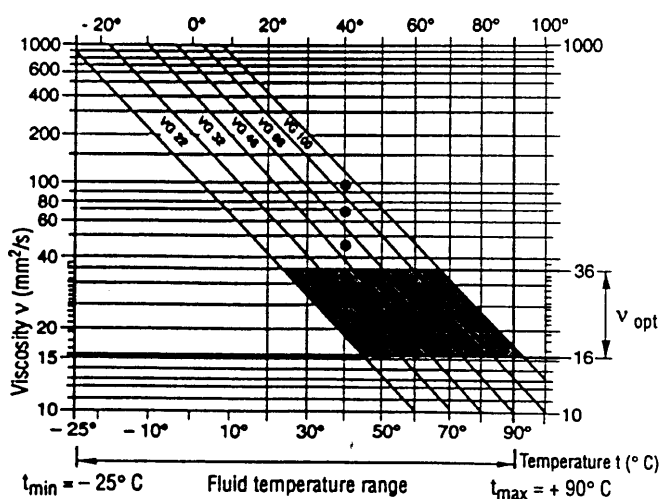
$$v_{max} = 1000 \text{ mm}^2/\text{s} \text{ or } 300 \text{ mm}^2/\text{s} \text{ with mounted auxiliary pump short term on cold start}$$

Temperature range (cf. selection diagram)

$$t_{min} = -25^\circ\text{C}$$

$$t_{max} = 90^\circ\text{C}$$

Selection diagram



Notes on hydraulic fluid selection

In order to select the correct fluid it is necessary to know the operating temperature in the tank (open loop) in relation to the ambient temperature.

The hydraulic fluid should be selected so that within the operating temperature range the operating viscosity lies within the optimum range (v_{opt}) (see shaded section of selection diagram). We recommend that the highest possible viscosity range be chosen in each case.

Example: At an ambient temperature of $X^\circ\text{C}$ the operating temperature is 60°C . Within the operating viscosity range (v_{opt} ; shaded area) this corresponds to viscosity ranges VG 46 or VG 68; VG 68 should be selected.

Important: The case drain oil temperature is influenced by pressure and speed and is always higher than the tank temperature. However, the temperature may not exceed 90°C at any point on the installation.

If it is not possible to comply with the above conditions because of extreme operating parameters or high ambient temperatures, please consult us.

Filtration of fluid

In order to guarantee correct functioning of the unit, a minimum level of cleanliness to

NAS 1638, class 9

SAE, ASTM, AIA or

18/15 to ISO/DIS 4406

This can be achieved (for instance) using filter element type ...D 020... (see RE 31278).

This gives a filter quotient of

$$\beta_{20} \geq 100.$$

Mechanical displacement limiter

Mechanical displacement limiter is possible on the non-through-drive model, N00 series but not for the model with through-drive.

Q_{max} : for sizes 28 to 140
Setting range $V_{g max}$ to $50\% V_{g max}$

Q_{min} : for sizes 100 and 140
Setting range $V_{g min}$ to $50\% V_{g max}$

Technical data

(valid for operation on mineral oil;
for water based fluids see RE 90223 and RE 90221
for environmentally friendly fluids)

Operating pressure range - inlet side

Absolute pressure at port S

$p_{abs \min}$ _____ 0,8 bar
 $p_{abs \max}$ _____ 30 bar

Operating pressure range - outlet side

Pressure at port B

Nominal pressure p_N _____ 280 bar

Peak pressure p_{max} _____ 350 bar

(Pressure data to DIN 24312)

Applications with intermittent operating pressures up to 315 bar at 10% duty are permissible.

Case drain pressure

Maximum permissible pressure of leakage fluid

(at port L, L₁):

Maximum 0,5 bar higher than the inlet pressure at port S, but no higher than 2 bar absolute.

Direction of through flow

S to B.

Determination of inlet pressure p_{abs} at suction port S or reduction in output flow for increasing speed

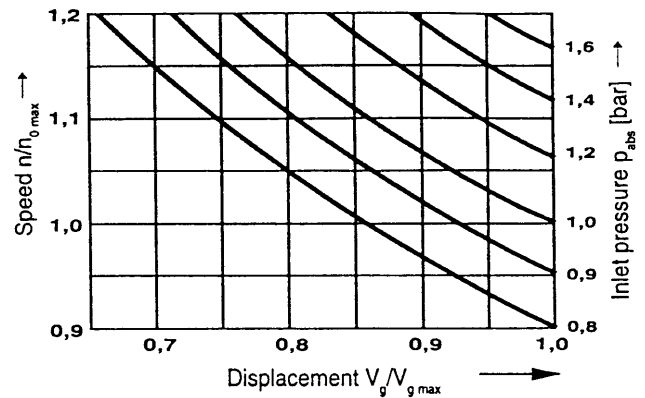


Table of values (theoretical values, without taking into account η_{mh} and η_v ; values rounded off)

Size				28	45	71	100	140
Displacement		$V_{g \max}$	cm ³	28	45	71	100	140
Max. speed ¹⁾	at $V_{g \max}$	$n_{o \max}$	rpm	3000	2600	2200	2000	1800
Max. permitted speed (limit speed)		$n_{o \max}$	rpm	3600	3100	2600	2400	2100
With increased input pressure p_{abs} or $V_g < V_{g \max}$								
Max. flow	at $n_{o \max}$	$Q_{o \max}$	L/min	84	117	156	200	252
	at $n_E = 1500$ rpm		L/min	42	68	107	150	210
Max. power ($\Delta p = 280$ bar)	at $n_{o \max}$	$P_{o \max}$	kW	39	55	73	93	118
	at $n_E = 1500$ rpm		kW	20	32	50	70	98
Max. torque ($\Delta p = 280$ bar)	at $V_{g \max}$	$M_{\max}$	Nm	125	200	316	445	623
Torque ($\Delta p = 100$ bar)	at $V_{g \max}$	M	Nm	45	72	113	159	223
Moment of inertia about drive axis		J	kgm ²	0,0017	0,0033	0,0083	0,0167	0,024
Case volume			L	0,7	1,0	1,6	2,2	3,0
Weight (excl. case volume)		m	kg	15	21	33	45	60
Permissible loading of drive shaft: max. axial force		$F_{ax \max}$	N	1000	1500	2400	4000	4800
Max. permissible radial force ²⁾		$F_{q \max}$	N	1200	1500	1900	2300	2800

¹⁾ These values are valid for an absolute pressure of 1 bar at the suction port S. By reducing the output flow or increasing the input pressure the speed can be increased as shown in the diagram.

²⁾ Please consult us for higher radial forces.

Determination of displacement

Output flow $Q = \frac{V_g \cdot n \cdot \eta_v}{1000}$ [L/min]

Torque $M = \frac{1,59 \cdot V_g \cdot \Delta p}{100 \cdot \eta_{mh}}$ [Nm]

Power $P = \frac{2\pi \cdot M \cdot n}{60000} = \frac{M \cdot n}{9549} = \frac{Q \cdot \Delta p}{600 \cdot \eta_t}$ [kW]

V_g = Displacement [cm³] per revolution

Δp = Differential pressure [bar]

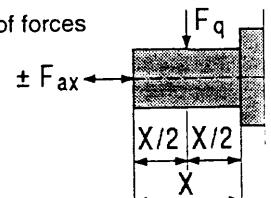
n = Speed [rpm]

η_v = Volumetric efficiency

η_{mh} = Mechanical hydraulic efficiency

η_t = Overall efficiency ($\eta_t = \eta_v \cdot \eta_{mh}$)

Application of forces



Installation Notes

Installation position is optional. The pump housing must be filled with oil during commissioning and stay full when operating. In order to achieve the lowest possible noise level all connections (suction, pressure and drain connections) must be de-coupled from the tank by means of flexible elements.

A non-return valve in the drain line should be avoided.

However, it may be permitted following discussion with ourselves.

See RE 90400 for detailed installation notes and commissioning information

Performance Curves for Pump with Constant Pressure Control DR

Noise level

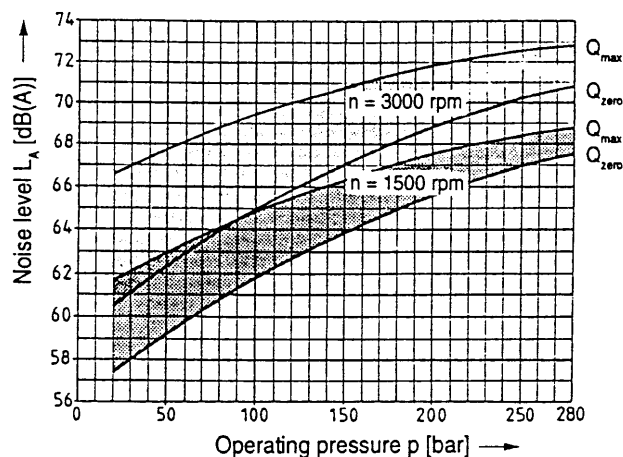
Measured in an anechoic chamber

Distance from microphone to pump = 1 m

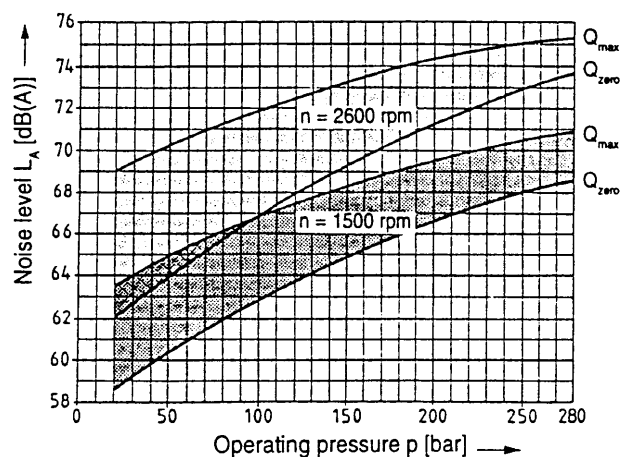
Measuring error: ± 2 dB (A)

(Fluid: Hydraulic oil to ISO VG 46 DIN 51519, $t = 50^\circ\text{C}$)

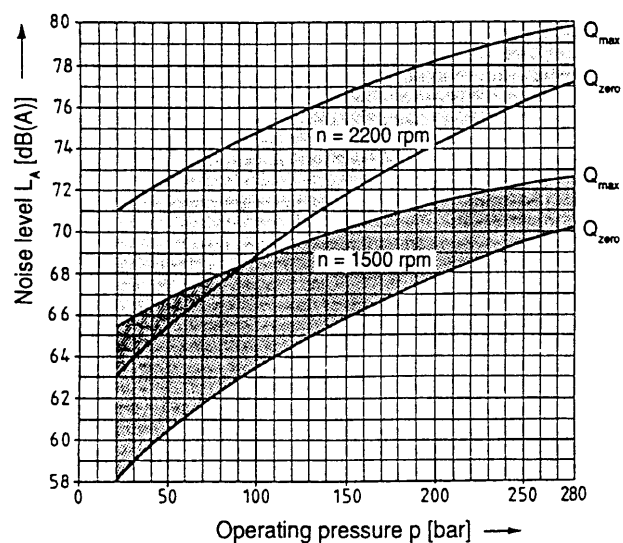
Size 28



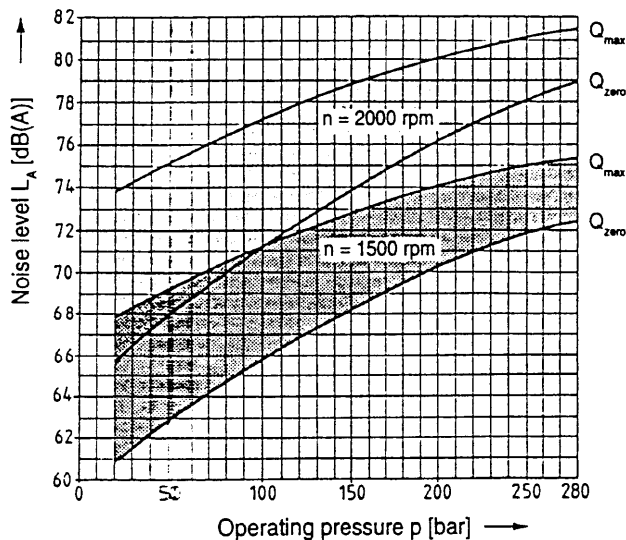
Size 45



Size 71



Size 100



Operating Curves for Pump with Constant Pressure Control DR

Noise level

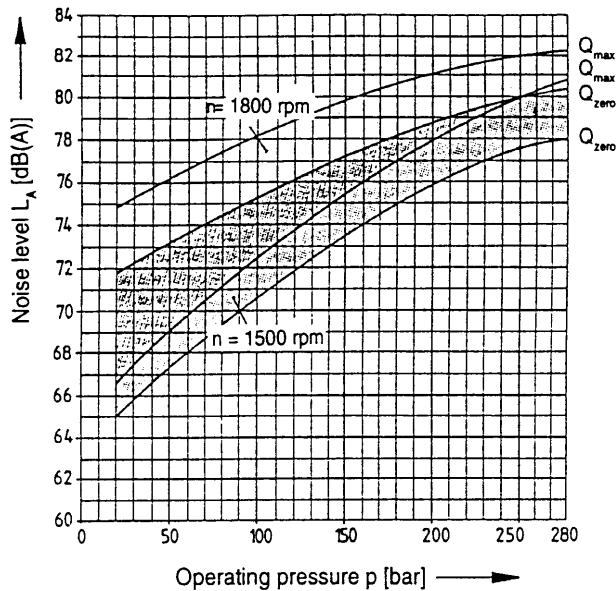
Measured in an anechoic chamber

Distance from microphone to pump = 1 m

Measuring error: ± 2 dB (A)

(Fluid: Hydraulic oil to ISO VG 46 DIN 51519, $t = 50^\circ\text{C}$)

Size 140



Drive power and Output Flow

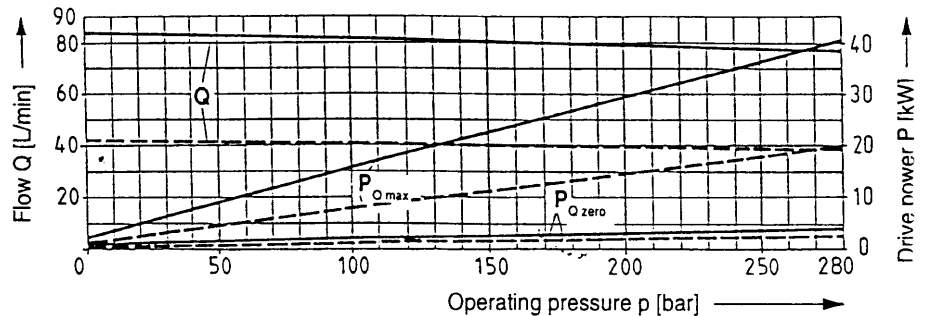
(Fluid:

Hydraulic oil ISO VG 46 DIN 51519, $t = 50^\circ\text{C}$)

Size 28

--- $n = 1500$ rpm

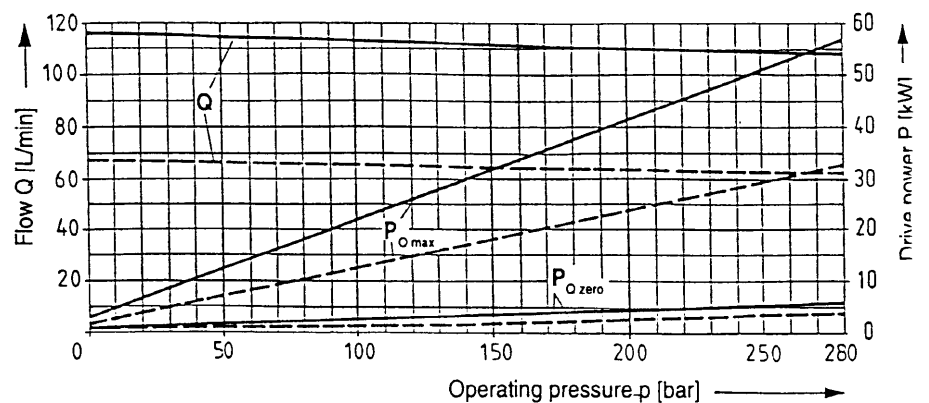
— $n = 3000$ rpm



Size 45

--- $n = 1500$ rpm

— $n = 2600$ rpm

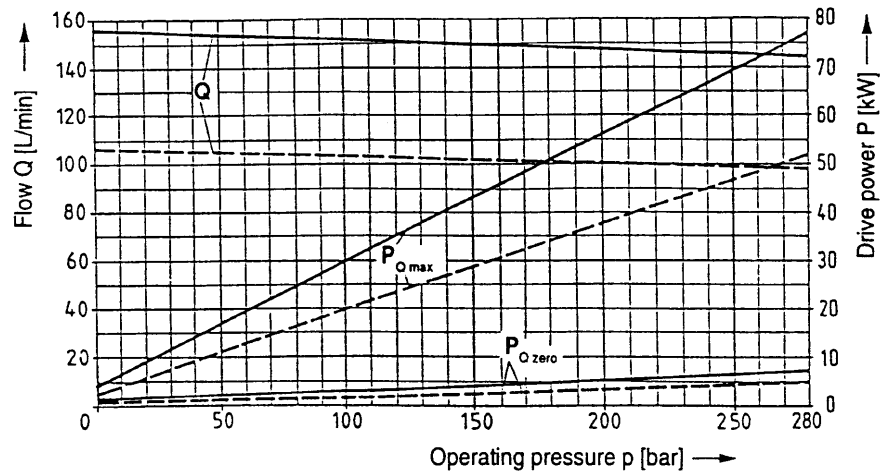


Drive Power and Output Flow

(Fluid: Hydraulic oil to ISO VG 46 DIN 51519, $t = 50^\circ \text{C}$)

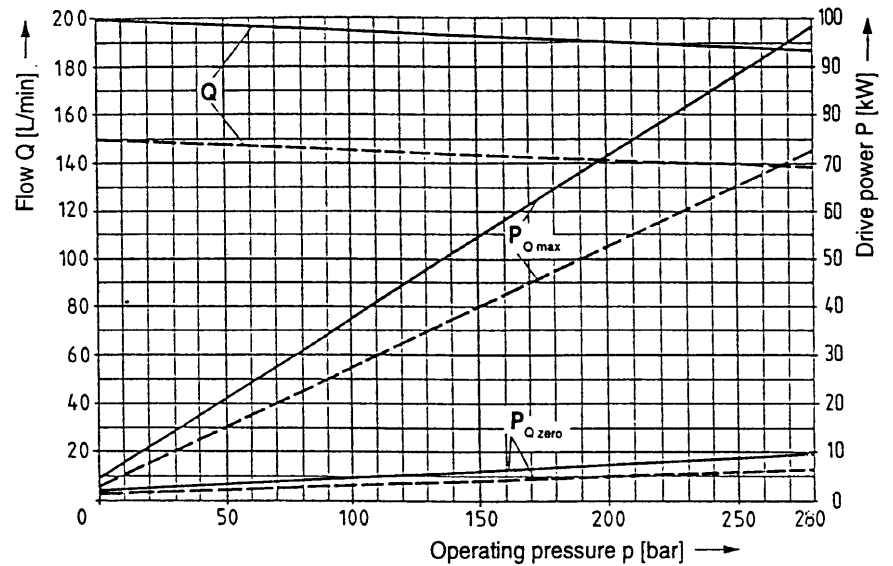
Size 71

----- $n = 1500 \text{ rpm}$
 ——— $n = 2200 \text{ rpm}$



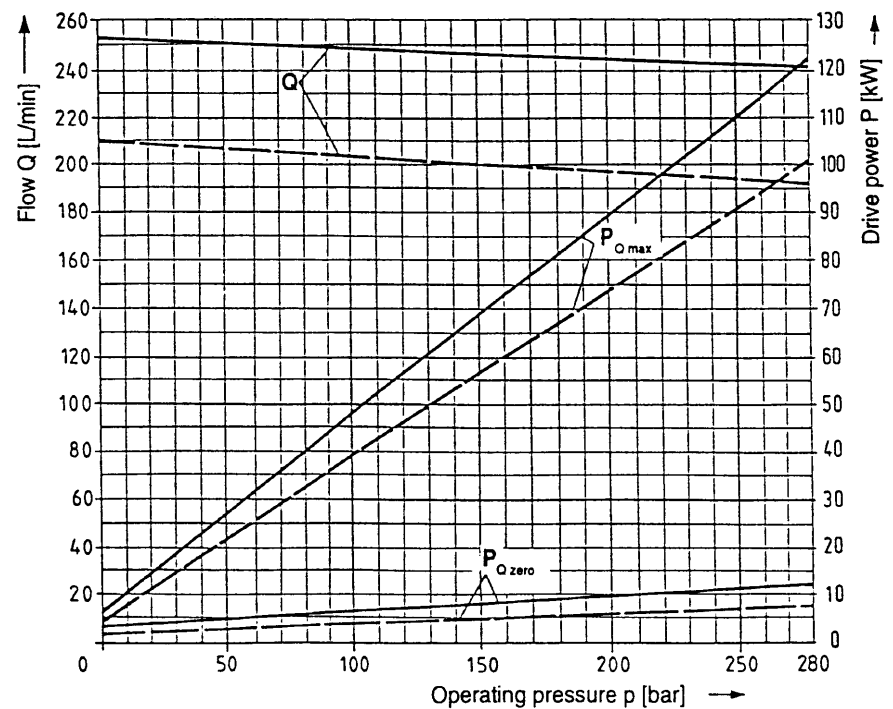
Size 100

----- $n = 1500 \text{ rpm}$
 ——— $n = 2000 \text{ rpm}$



Size 140

----- $n = 1500 \text{ rpm}$
 ——— $n = 1800 \text{ rpm}$



Overall efficiency

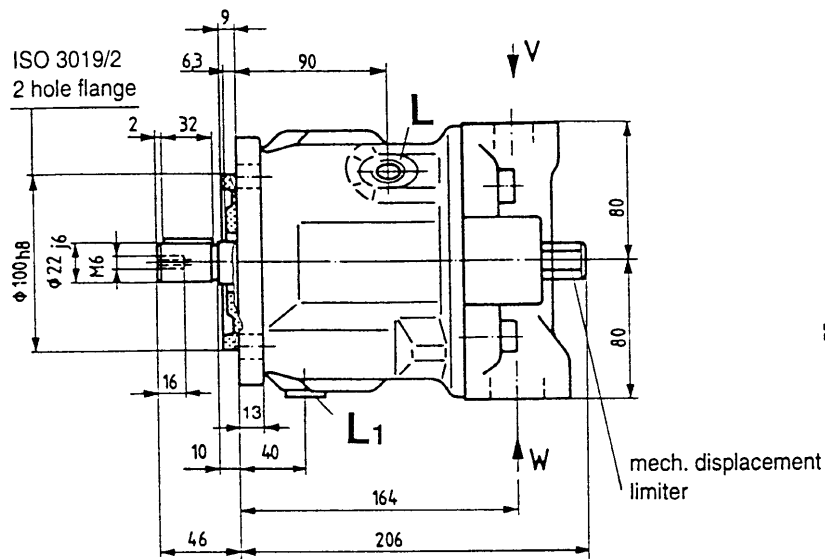
$$\eta_t = \frac{Q \cdot p}{P_{Q \max} \cdot 600}$$

Volumetric efficiency:

$$\eta_v = \frac{Q}{Q_{\text{theor.}}}$$

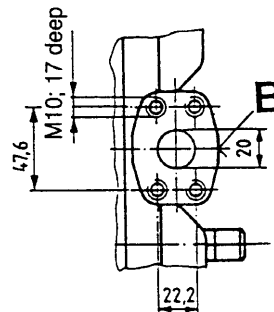
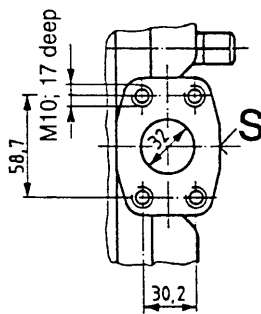
Unit Dimensions Size 28

N00 model (without through drive)
not including control

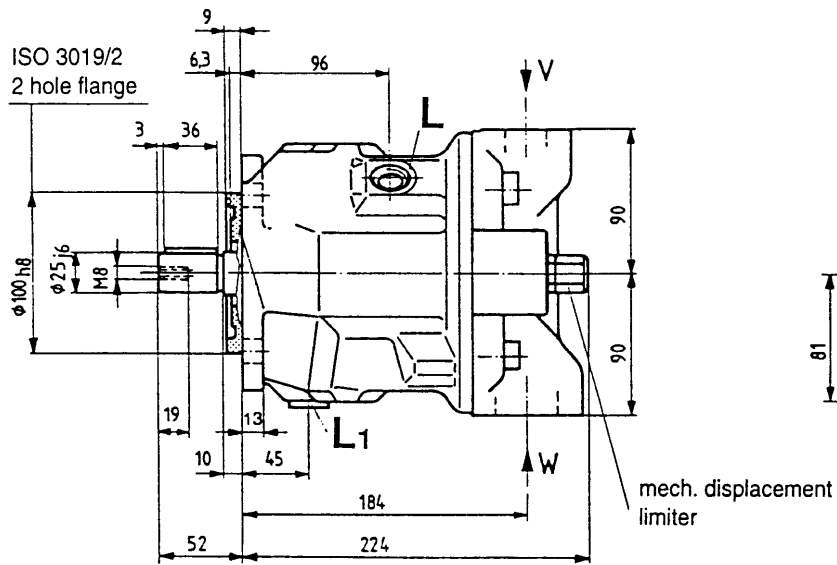


View W

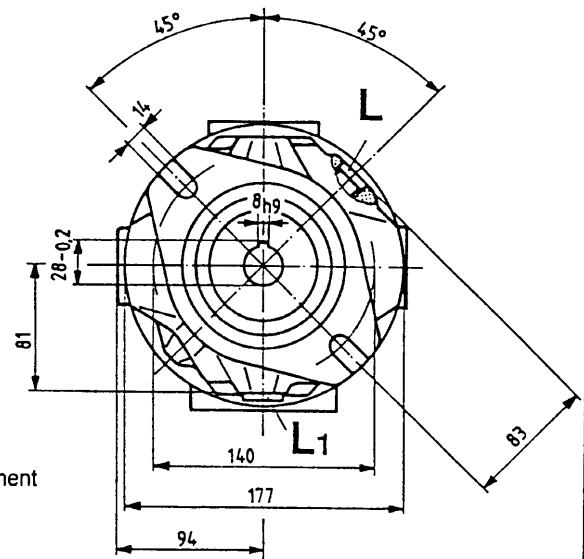
View V



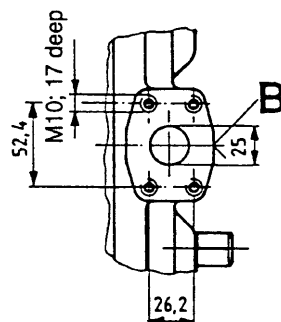
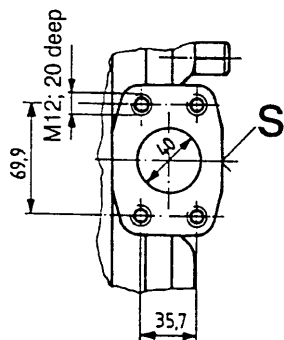
- | | | |
|------------------|--------------------------|-------------------------------------|
| B | Pressure port SAE 3/4" | (Standard pressure series) |
| S | Suction port: SAE 1 1/4" | (Standard pressure series) |
| L/L ₁ | Case drain ports M18x1,5 | (L ₁ plugged at factory) |

Unit Dimensions Size 45N00 model (without through drive)
not including controls

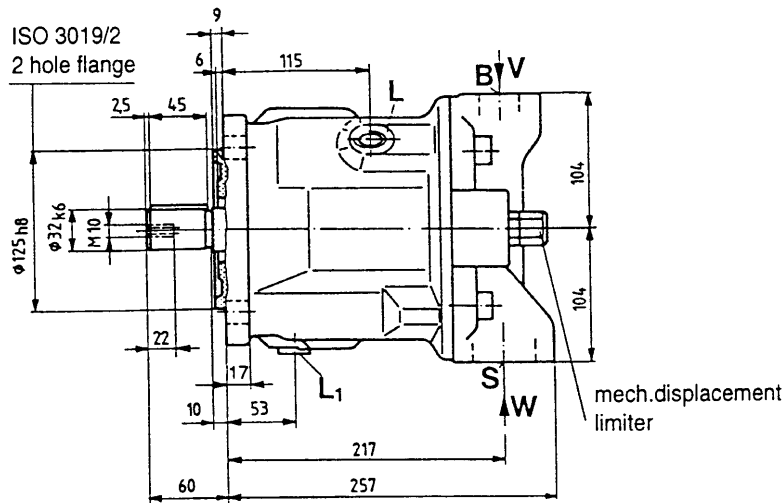
View W



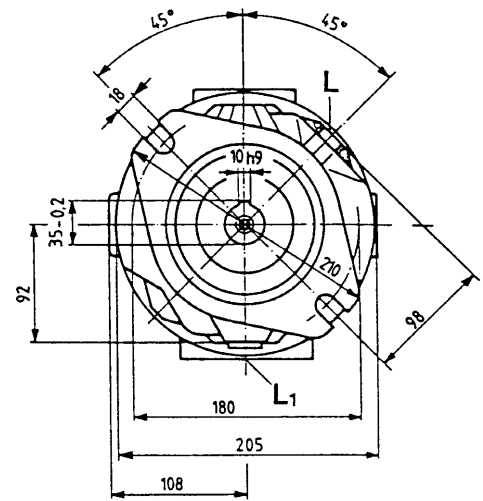
View V



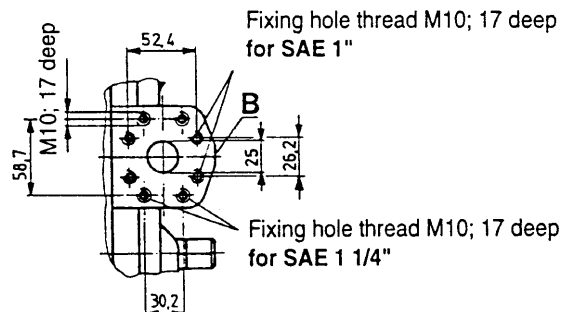
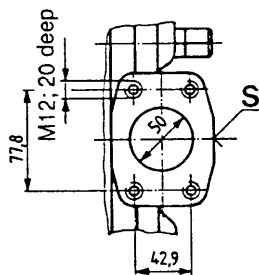
B	Pressure port	SAE 1"	(Standard pressure series)
S	Suction port	SAE 1 1/2"	(Standard pressure series)
L/L ₁	Case drain ports	M22x1,5	(L ₁ plugged at factory)

Unit Dimensions Size 71N00 model (without through drive)
not including control

View W



View V

**Note:**

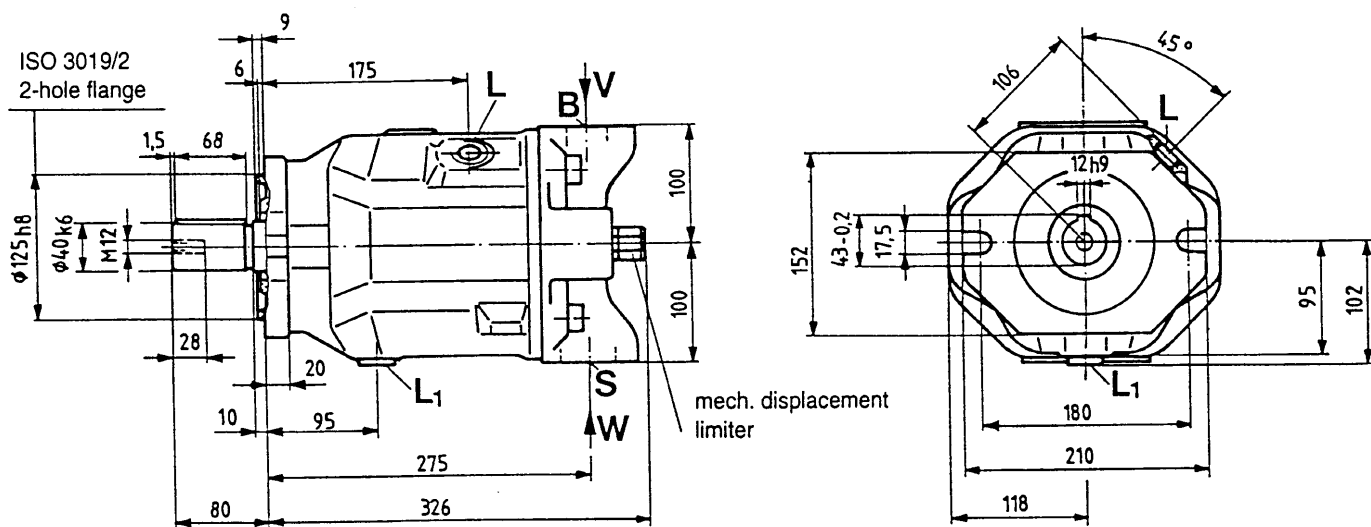
At pressure port B there are two SAE mountings available, each offset by 90°.

SAE 1 1/4" Standard pressure series, 3000 psi, for pressures up to 250 bar or

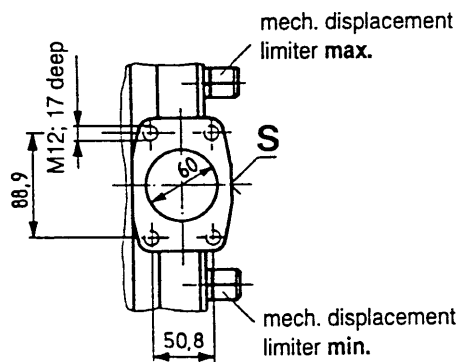
SAE 1" standard pressure series, 5000 psi, for pressures in excess of 250 bar.

For operating pressures in excess of 250 bar or for new projects an SAE 1" pressure flange should be used.

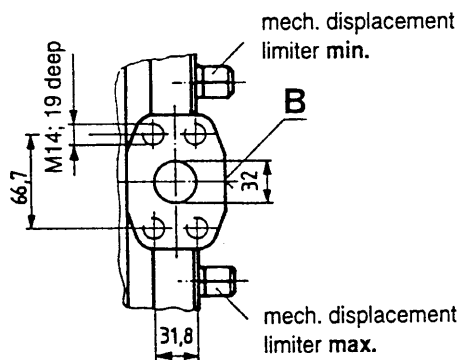
B	Pressure port	SAE 1"	(Standard pressure series) fixing hole thread to either SAE 1" or SAE 1 1/4" (optional)
S	Suction port	SAE 2"	(Standard pressure series)
L/L ₁	Case drain ports	M22x1,5	(L ₁ plugged at factory)

Unit Dimensions size 100N00 model (without through drive)
not including control

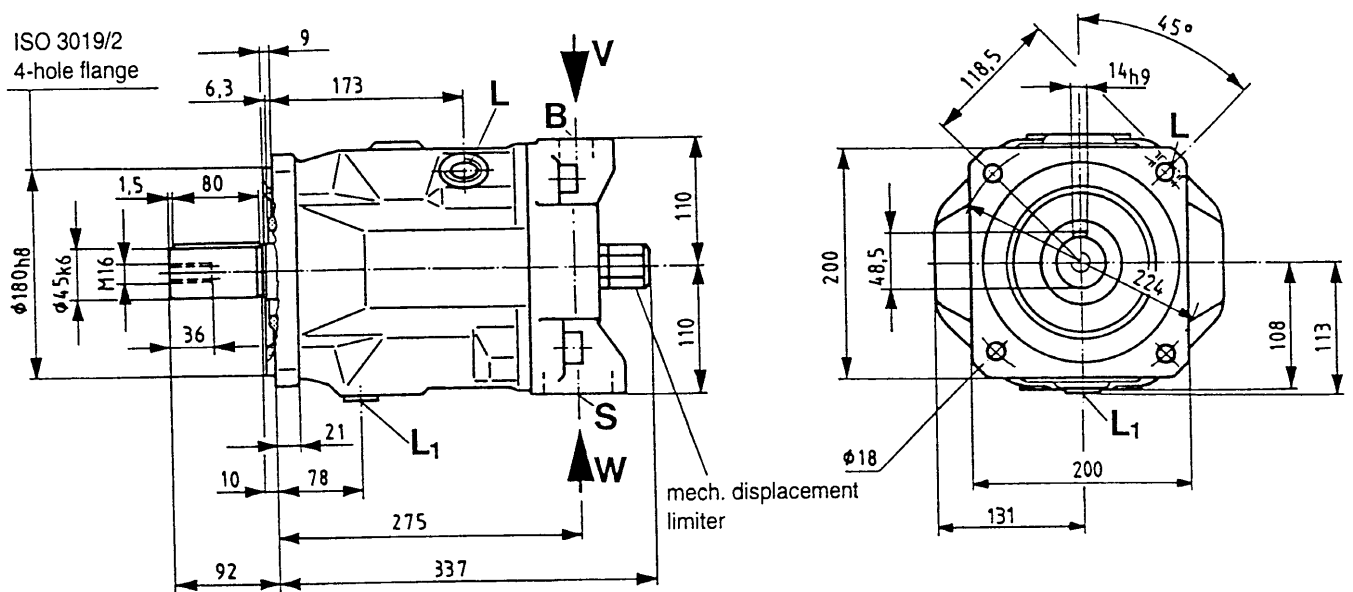
View W



View V

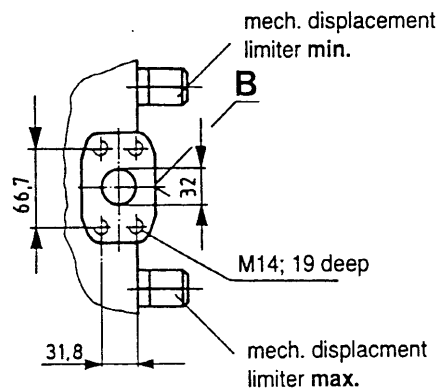
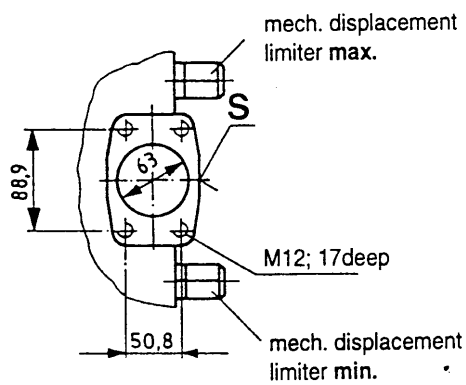


B	Pressure port	SAE 1 1/4"	(High pressure series)
S	Suction port	SAE 2 1/2"	(Standard pressure series)
L/L ₁	Case drain ports	M27x2	(L ₁ plugged at factory)

Unit Dimensions size 140N00 (without through drive)
not including control

View W

View V



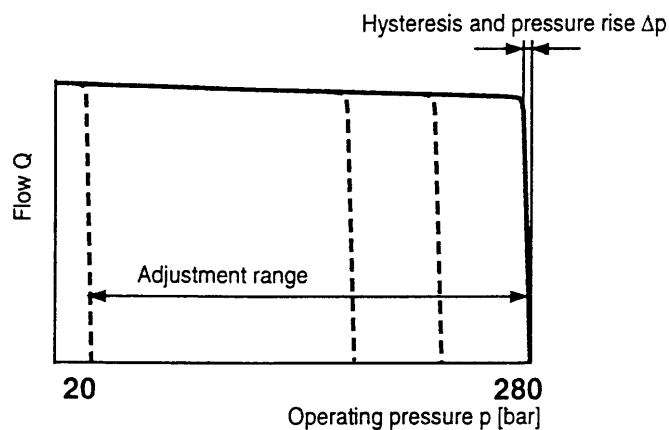
B	Pressure port	SAE 1 1/4"	(High pressure series)
S	Suction port	SAE 2 1/2"	(Standard pressure series)
L/L ₁	Case drain ports	M27x2	(L ₁ , plugged at factory)

DR Constant Pressure Control

The pressure controller serves to maintain a constant pressure in a hydraulic system within the control range of the pump. The pump therefore supplies only the amount of hydraulic fluid required by the system. Pressure may be steplessly set at the pilot valve.

Static Operating Curve

(at $n_1 = 1500 \text{ rpm}$; $t_{oil} = 50^\circ \text{ C}$)



Dynamic Operating Curves

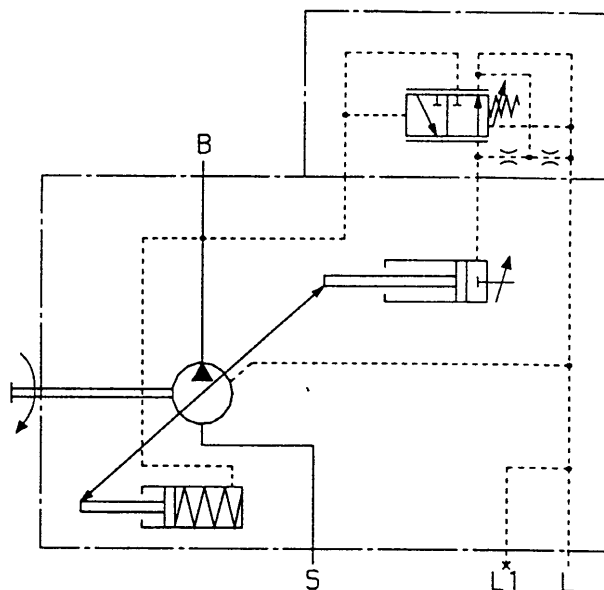
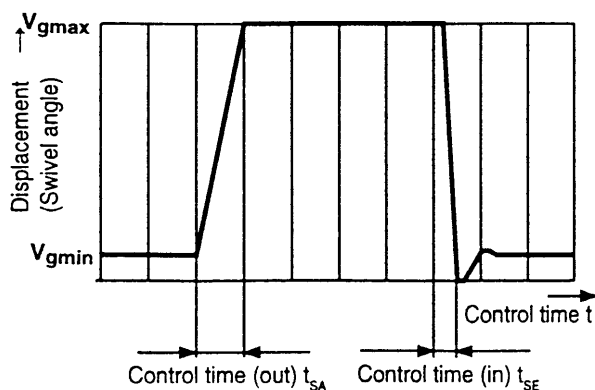
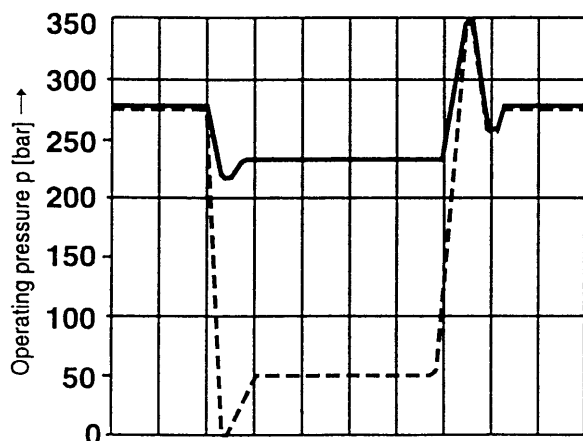
The operating curves are mean values measured under test conditions with the unit mounted inside the tank.

Conditions: $n = 1500 \text{ rpm}$

$t_{oil} = 50^\circ \text{ C}$

Pressure cut-off at 350 bar

Load steps were obtained by suddenly opening and closing the pressure line with a pressure relief valve as load valve 1 m from the output flange of the pump.



Ports

B

S

L, L1

Pressure port

Suction port

Case drain ports (L1 plugged)

Controller data

Hysteresis and pressure rise Δp _____ max. 4 bar

Pilot oil requirement _____ max. approx. 3 L/min

Flow loss at Q_{max} see pages 7 and 8.

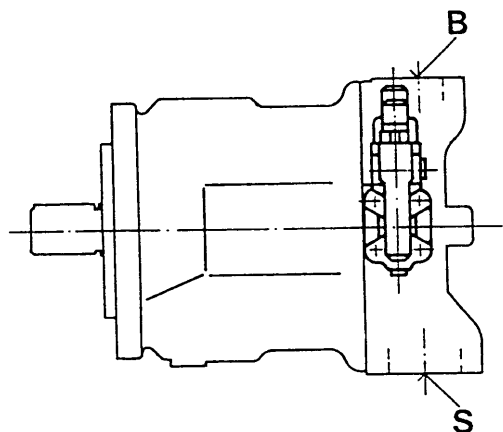
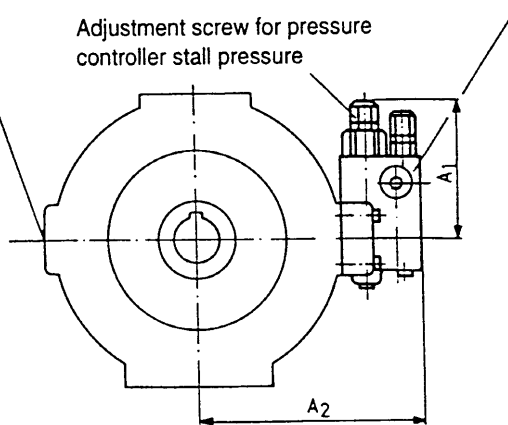
Control times

Size	t_{SA} (ms) against 50 bar	t_{SA} (ms) against 220 bar	t_{SE} (ms) stalled at 280 bar
28	60	30	20
45	80	40	20
71	100	50	25
100	125	90	30
140	130	150	30

Unit Dimensions

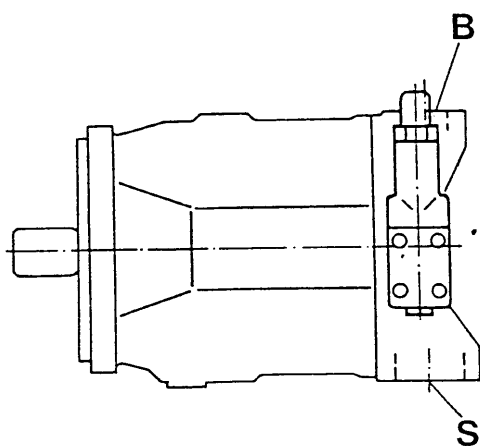
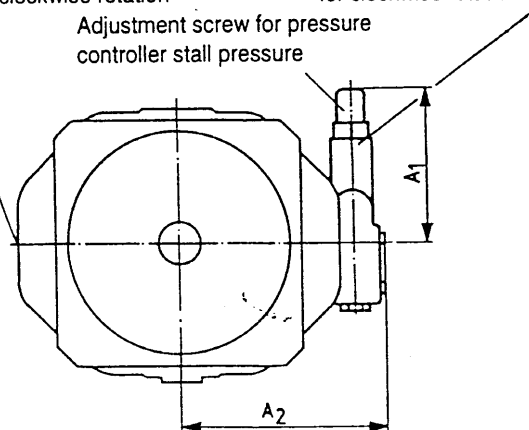
DR Pressure Control

Size 28...100

Pilot valve installed here
for anti-clockwise rotationPilot valve installed here
for clockwise rotationAdjustment screw for pressure
controller stall pressure

On sizes 28 to 100 the DFR valve used has the flow control port blocked in the factory and is not tested.

Size 140

Pilot valve installed here
for anti-clockwise rotationPilot valve installed here
for clockwise rotationAdjustment screw for pressure
controller stall pressure

Size	A ₁	A ₂
28	104,5	136
45	104,5	146
71	104,5	160
100	104,5	165
140	125	169

DRG Pressure controller, remote controlled

Function and equipment as for DR.

A pressure relief valve can be connected to port X for remote control applications; this is not included in the items supplied with the DRG control.

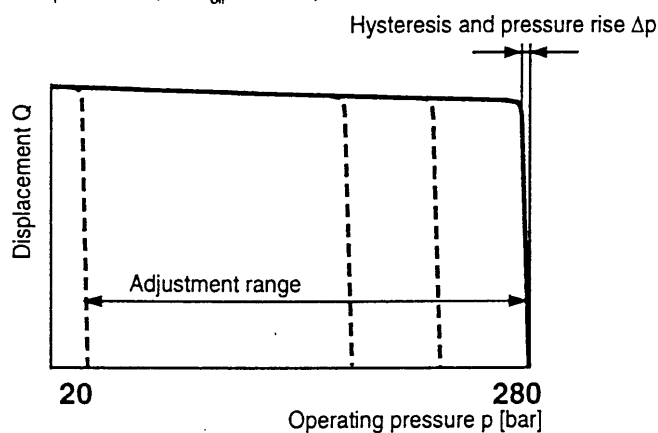
The standard pressure differential setting at the pilot valve is 20 bar. A pilot oil flow of approx. 1,5 L/min is then required. If a further setting (range 10–22 bar) is required please indicate in clear text.

We recommend the following as separate pressure relief valves:
DBDH 6 (hydraulic) to RE 25402,
DBEC-3X (electric) to RE 29142 or
DBETR-SO 381 with orifice $\phi 0,8$ in P (electric) to RE 29166.

The max. pipe length should not exceed 2m.

Static Operating Curve

(at $n_1 = 1500$ rpm; $t_{oil} = 50^\circ \text{C}$)



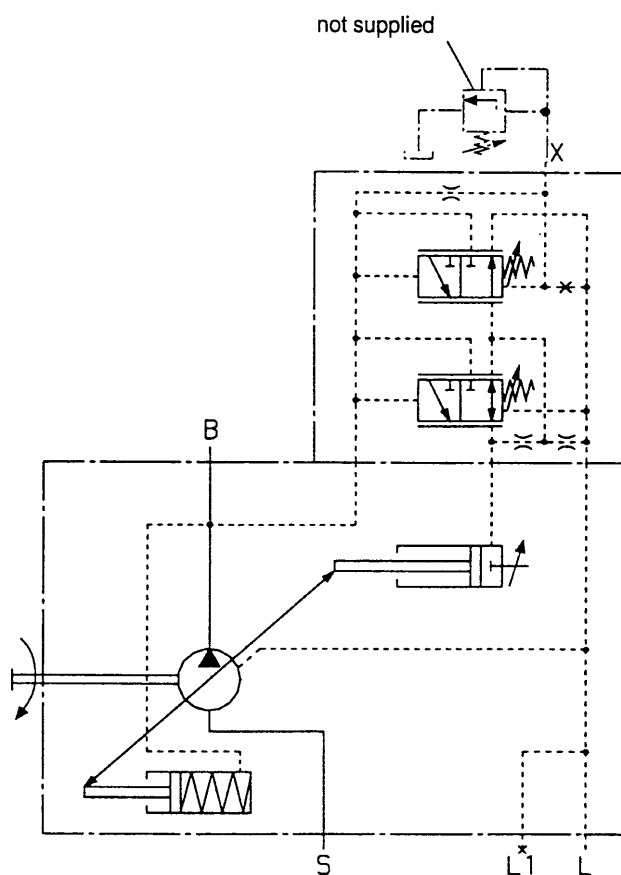
Controller data

Hysteresis and pressure rise Δp _____ max. 4 bar

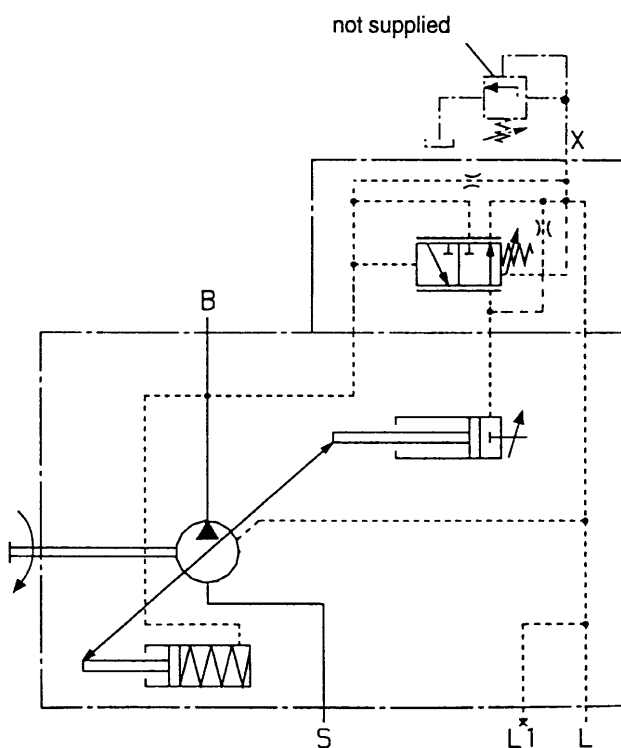
Pilot oil requirement _____ approx. 4,5 L/min

Flow loss at Q_{max} see pages 7 and 8.

Size 28...100



Size 140



Ports

B

Pressure port

S

Suction port

L, L1

Case drain ports (L1 plugged)

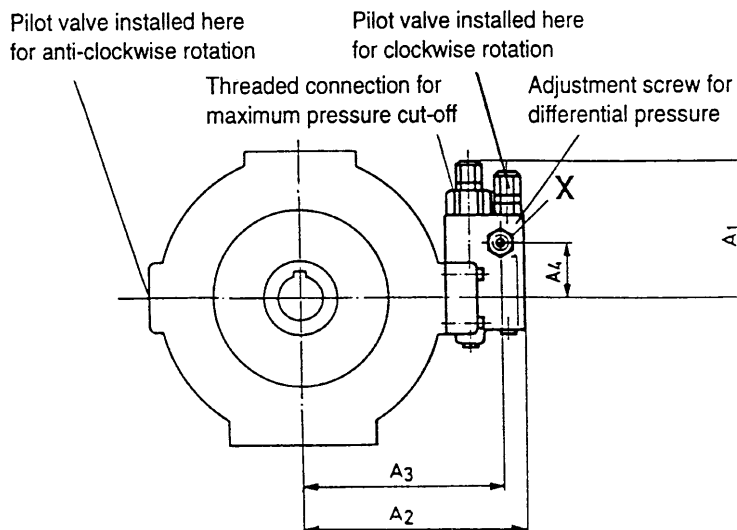
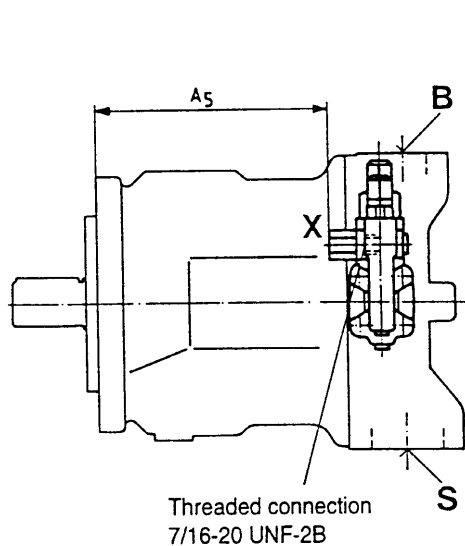
X

Pilot pressure port

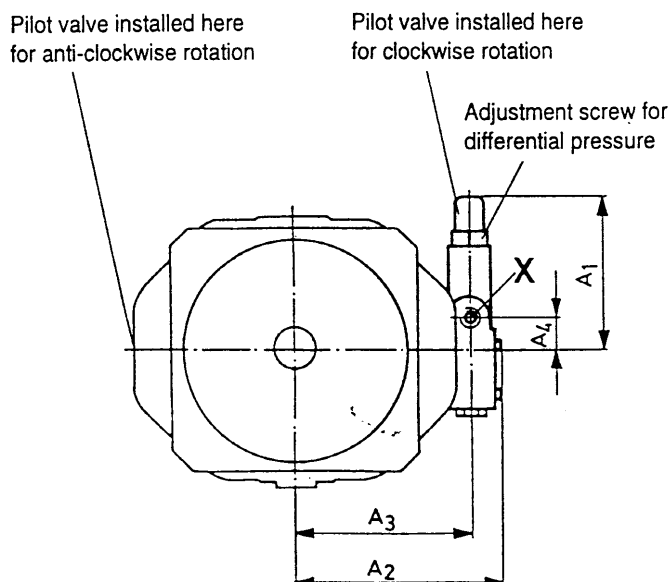
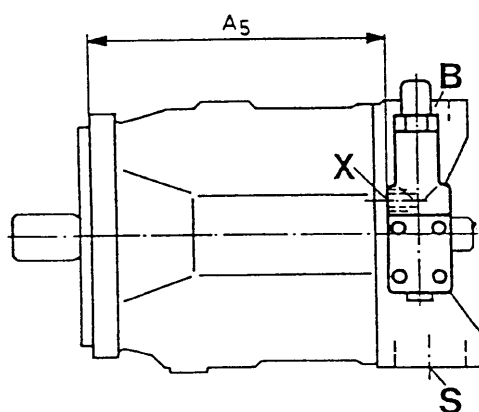
Unit Dimensions

DRG Pressure controller with remote control

Sizes 28...100



Size 140



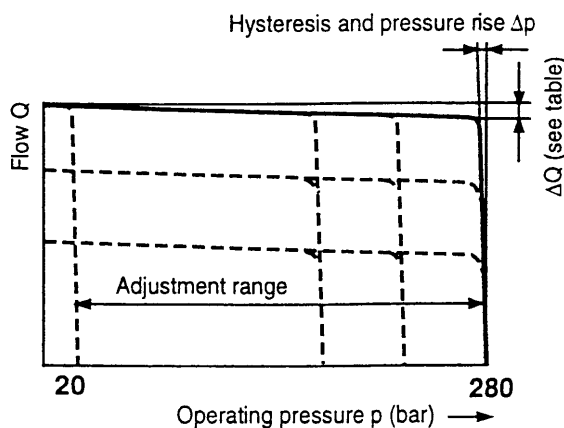
Size	A ₁	A ₂	A ₃	A ₄	A ₅	Port X
28	104,5	136	119	40	120	M14x1,5; 12 deep
45	104,5	146	129	40	135	M14x1,5; 12 deep
71	104,5	160	143	40	163	M14x1,5; 12 deep
100	104,5	165	148	40	230	M14x1,5; 12 deep
140	125	209	183	26	244	M14x1,5; 12 deep

DFR/DFR1 Pressure /flow controller

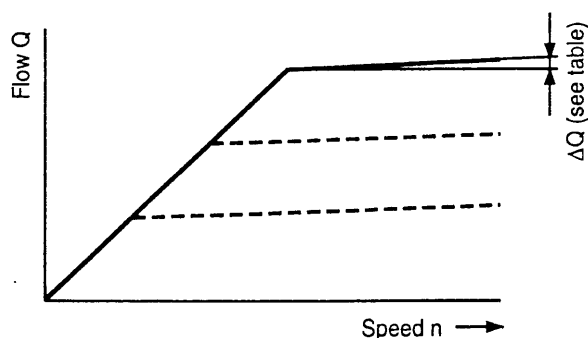
In addition to the constant pressure control function the pump flow may be regulated by means of a differential pressure (e.g. an orifice) installed in the service line.
On model DFR1 the X- orifice is plugged.

Static Operating Curve

(at $n_1 = 1500$ rpm; $t_{oil} = 50^\circ \text{C}$)

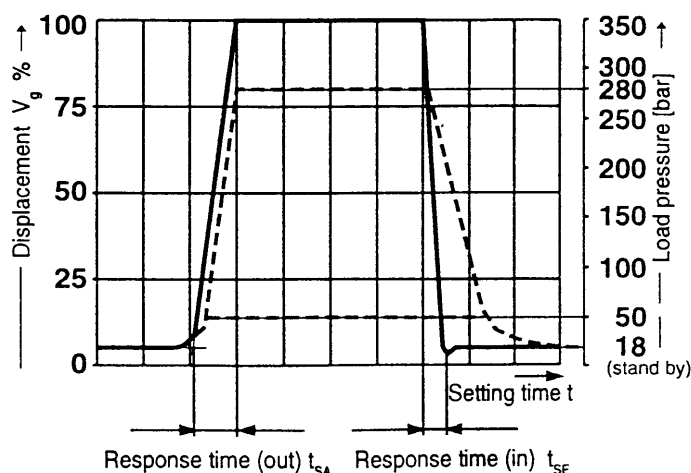


Static Operating Curve at Variable Speed

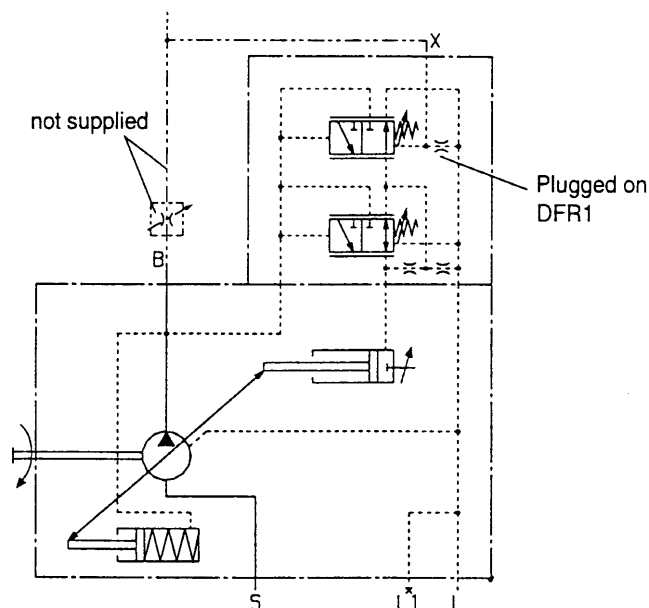


Dynamic Flow Control Operating Curve

The operating curves are average values measured under test conditions with the unit mounted inside the tank.



Size	t_{SA} (ms) stand by-280 bar	t_{SE} (ms) 280 bar-stand by	t_{SE} 50 bar-stand by
28	40	20	40
45	50	25	50
71	60	30	60
100	120	60	120
140	130	60	130



Ports

- B Pressure port
- S Suction port
- L, L1 Case drain ports (L1 plugged)
- X Pilot pressure port

Differential pressure Δp :

Adjustable between 10 and 22 bar (higher values on request).
Standard setting: 14 bar. If a different setting is required please indicate in clear text.

When port X is unloaded to tank a "cut-off pressure" of $p = 18 \pm 2$ bar ("stand by") results.

Controller data

Max. flow variation (hysteresis and increase)
measured at drive speed $n = 1500$ rpm

Size	28	45	71	100	140
ΔQ_{max}	L/min 1	1,8	2,8	4,0	6,0

Hysteresis and pressure increase Δp _____ max. 4 bar

DFR pilot oil consumption _____ max. approx. 3 ... 4,5 L/min

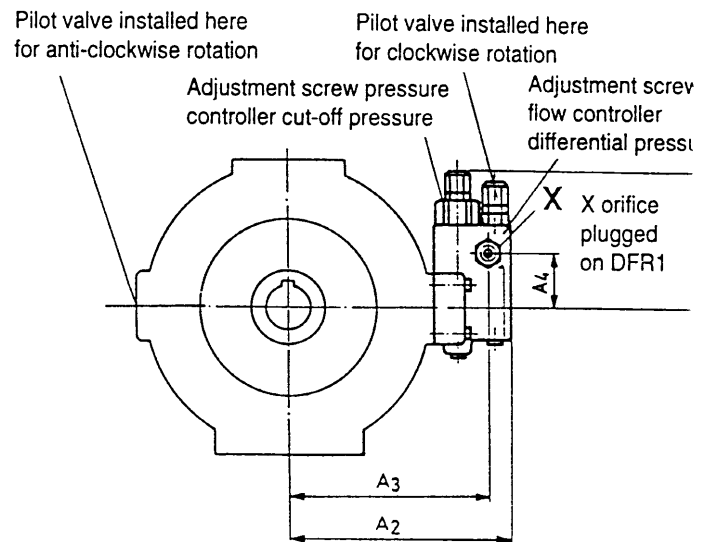
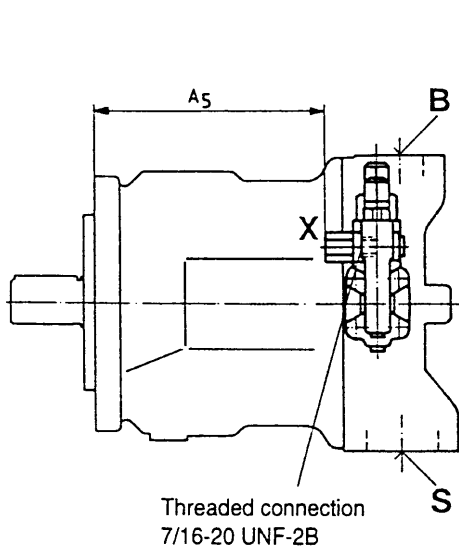
DFR1 pilot oil consumption _____ max. approx. 3 L/min

Flow loss at Q_{max} see pages 7 and 8.

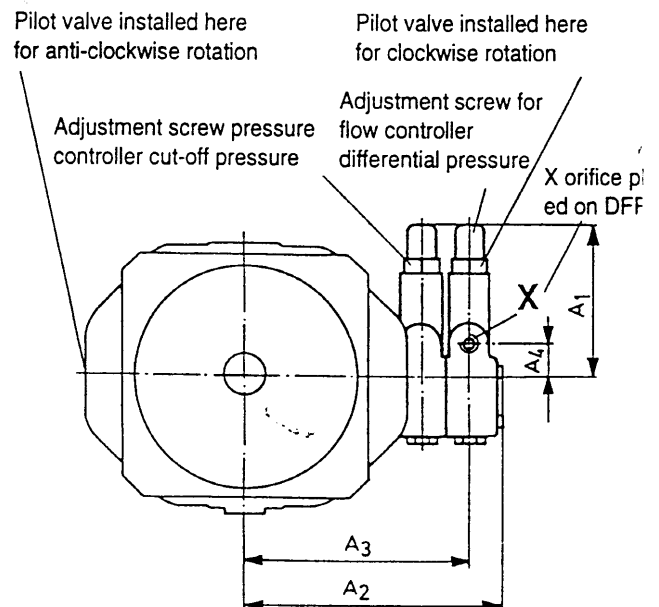
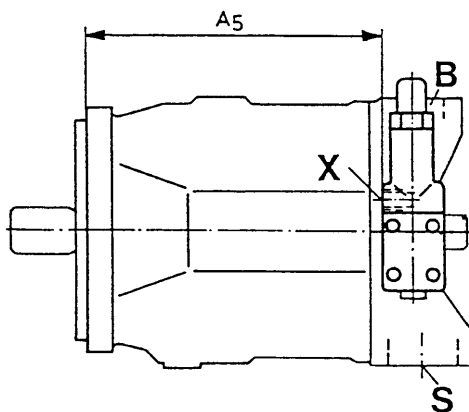
Unit Dimensions

DFR; DFR1 Pressure and Flow Regulator

Sizes 28...100



Size 140



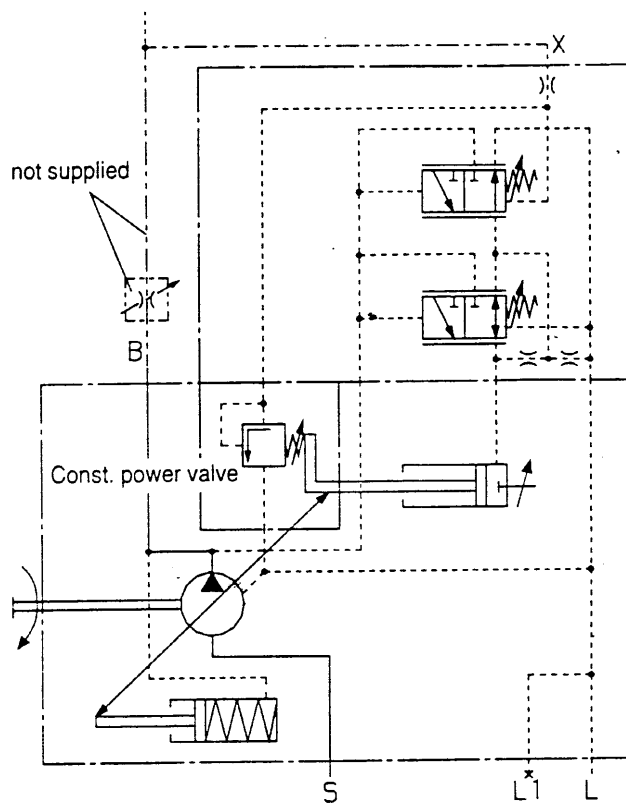
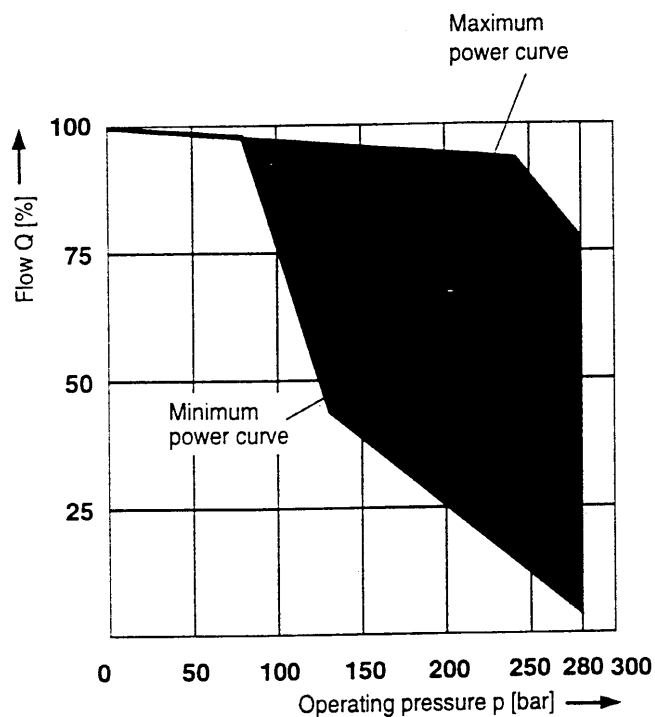
Size	A ₁	A ₂	A ₃	A ₄	A ₅	Port X
28	104,5	136	119	40	120	M14x1,5; 12 deep
45	104,5	146	129	40	135	M14x1,5; 12 deep
71	104,5	160	143	40	163	M14x1,5; 12 deep
100	104,5	165	148	40	230	M14x1,5; 12 deep
140	125	209	183	26	244	M14x1,5; 12 deep

DFLR Constant Pressure / Flow / Power Control

In order to achieve a constant drive torque with a varying operating pressure. The swivel angle and with it the output flow of the axial piston pump is varied so that the product of flow and pressure remains constant.

Constant flow control is possible below the power curve.

Static Operating Curve



Ports
B
S
L, L1
X

Pressure port
Suction port
Case drain ports (L1 plugged)
Pilot pressure port

The power curve is set at the factory, please state your requirements in clear text e.g. 5 kW at 1500 rpm.

When port X is unloaded to tank a "cut-off pressure" of $p = 18 \pm 2$ bar ("stand by") results.

A maximum of 5,5 L/min pilot oil is required.

Controller data

Start of control _____ from 80 bar

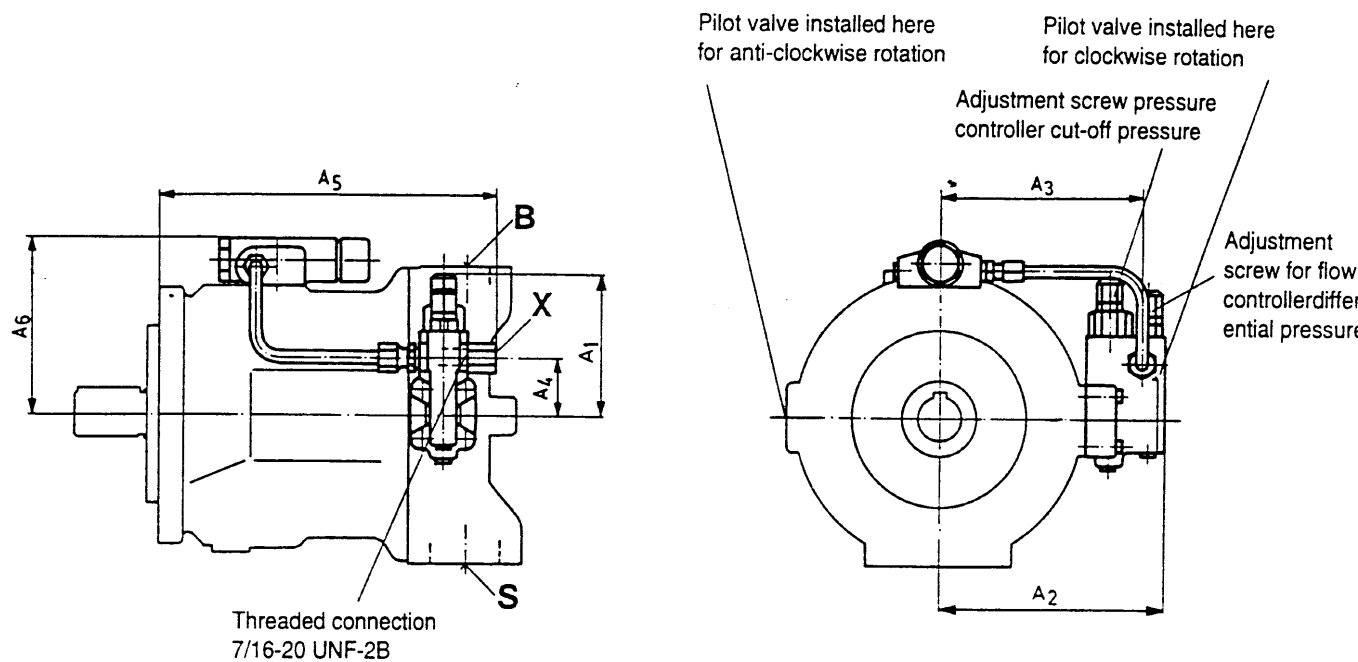
Pilot oil requirement _____ max. approx. 5,5 L/min

Flow loss at Q_{max} see pages 7 and 8.

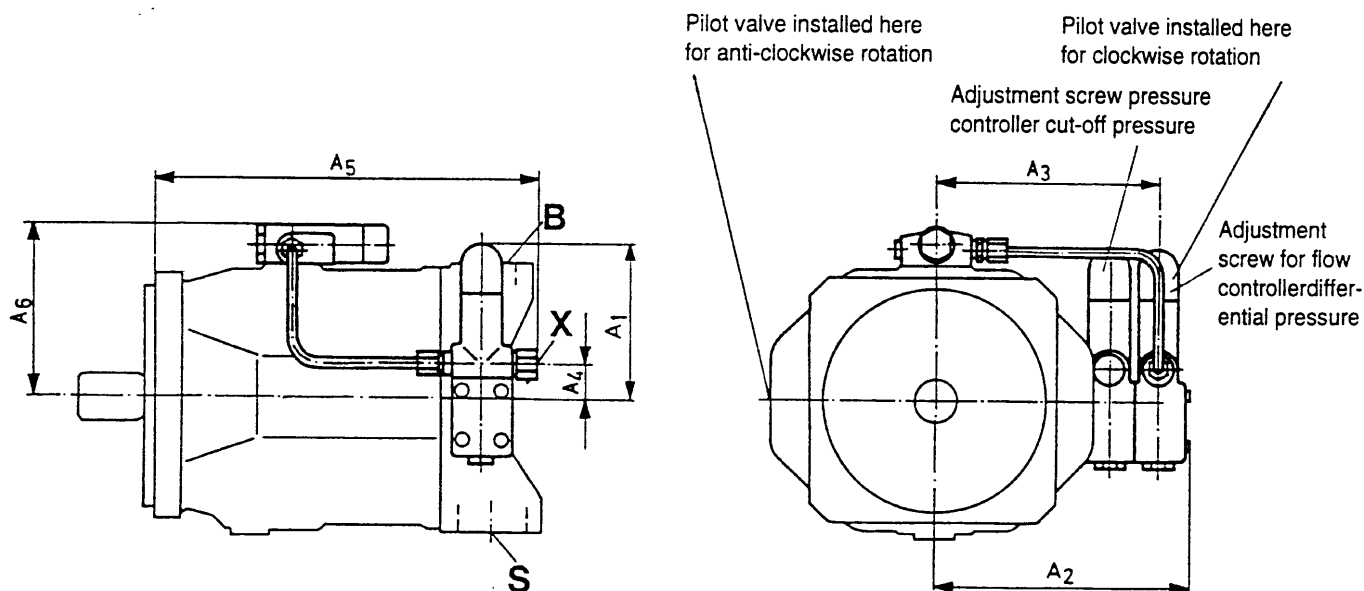
Unit Dimensions

Constant Pressure / Flow / DFLR

Sizes 28...100



Size 140



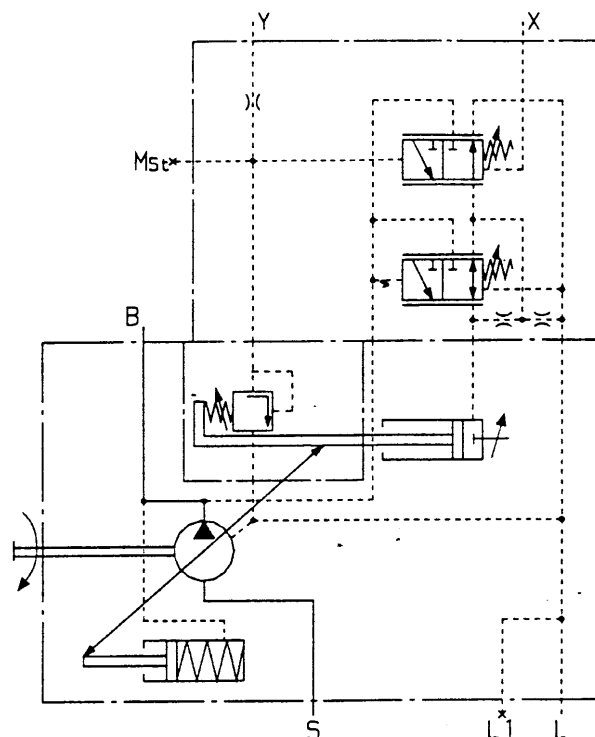
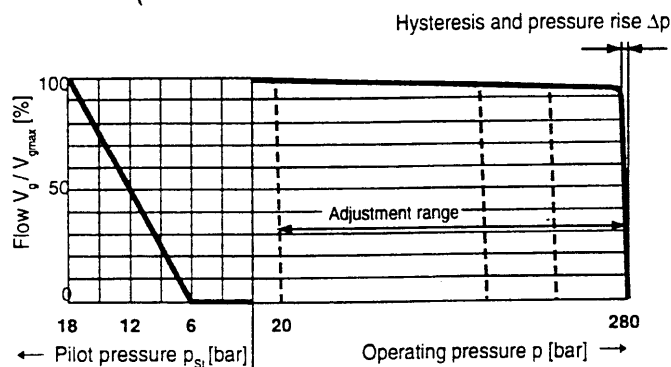
Size	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	Port X
28	104,5	136	119	40	193	106,5	M14x1,5; 12 deep
45	104,5	146	129	40	208	112	M14x1,5; 12 deep
71	104,5	160	143	40	236	126	M14x1,5; 12 deep
100	104,5	165	148	40	303	129	M14x1,5; 12 deep
140	125	209	183	26	314	139,5	M14x1,5; 12 deep

FHD Pilot pressure dependent flow control with pressure cut-off

The swivel angle of the pump and therefore its displacement is dependent on the pilot pressure P_{stx} present in port X. A constant pressure of $p_y = 35$ bar should be applied to port Y. The integral pressure control is steplessly adjustable. (Please state set value required in clear text).

Static Curve

(at $n_1 = 1500$ rpm; $t_{oil} = 50^\circ \text{C}$)



Controller data

Hysteresis $\pm 2\%$ of V_{gmax}

External pilot oil consumption in Y approx. 3 ... 4,5 L/min max.

Pressure rise Δp _____ max. 4 bar

Flow loss at Q_{max} see pages 7 and 8.

Ports

B

Pressure port

S

Suction port

L, L1

Case drain port (L1 plugged)

X, Y

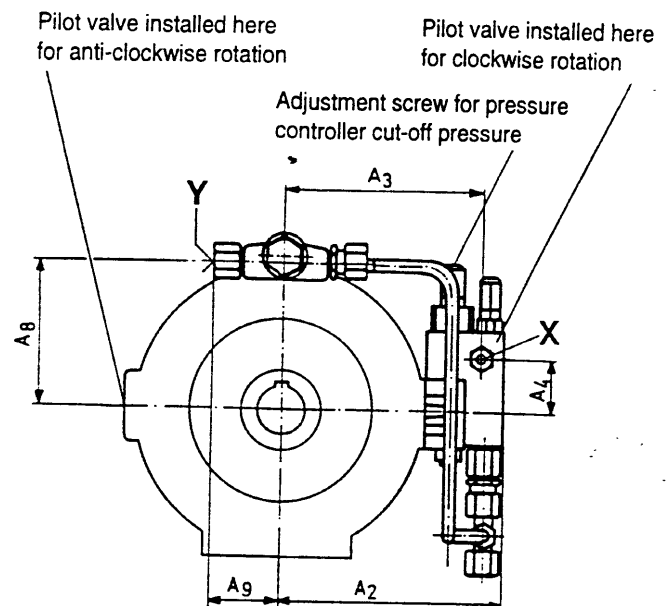
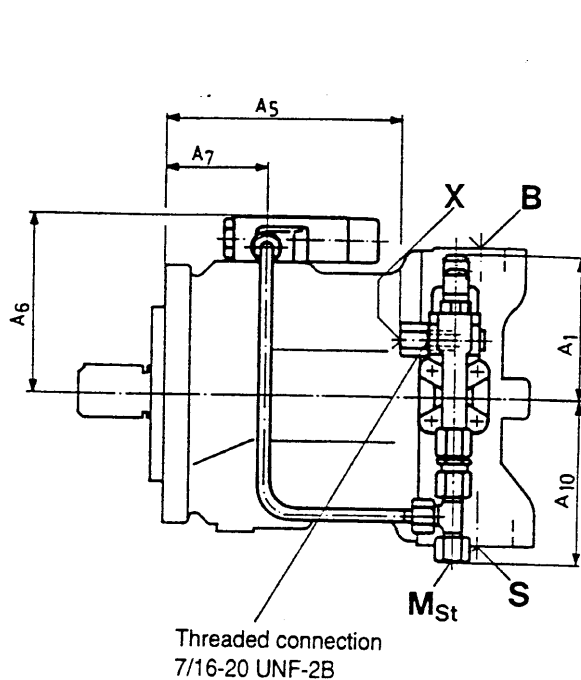
Pilot pressure ports

MSt

Test port

Unit Dimensions**FHD pilot pressure dependent flow control with pressure cut-off**

Size 28...100



Size	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	Port X	Port Y	M _{St}
28	104,5	136	119	40	120	106,5	49	86	48	109	M14x1,5	M14x1,5	Pipe dia.8x1,5 DIN 2391
45	104,5	146	129	40	135	112	54	91,5	48	109	M14x1,5	M14x1,5	Pipe dia.8x1,5 DIN 2391
71	104,5	160	143	40	163	124	69	103,5	48	109	M14x1,5	M14x1,5	Pipe dia.8x1,5 DIN 2391
100	104,5	165	148	40	230	129	111	108,5	48	109	M14x1,5	M14x1,5	Pipe dia.8x1,5 DIN 2391
140	in preparation												

FE Electrical Flow Control

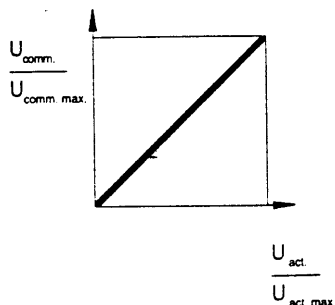
The output flow of the pump is set by an electrically controlled proportional valve.

Flow control is achieved by means of the variable swivel angle of the pump, possible variations in drive speed (e.g. diesel engine speeds) are not taken into consideration.

The swivel angle of the pump is fed back via an inductive positional transducer to the amplifier card VT 5036 (RE 29957) or the amplifier module VT 11019 (RD 29763) required for control.

The amplifier card /amplifier module are used to control pump flow and should be ordered separately.

Static Curve

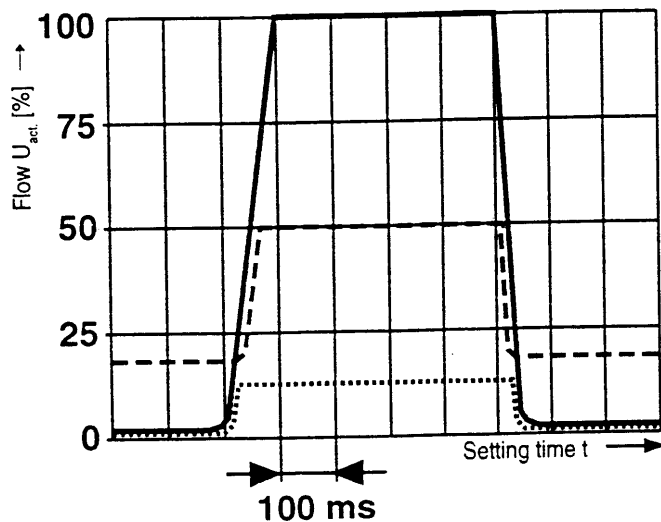


Dynamic Curve

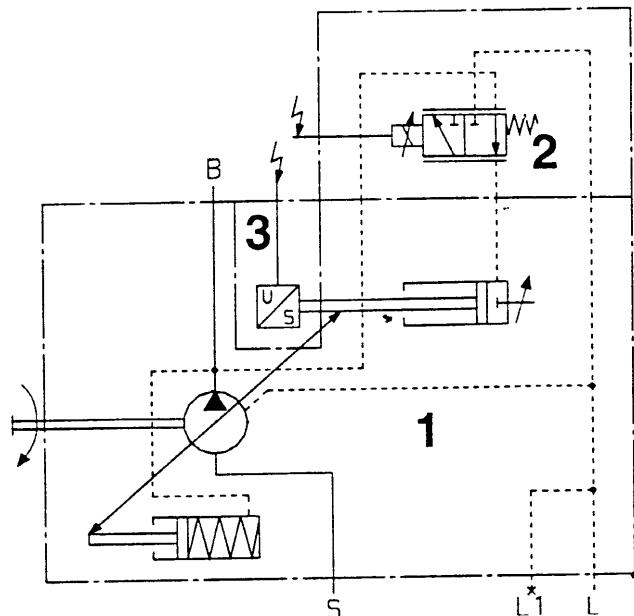
Displacement time characteristics

measured: A10VSO 45 FE

Stepped pressure signal value 100 bar (Pressure relief valve)



5% - 100% - 5% Flow $U_{act.}$
 20% - 50% - 20% Flow $U_{act.}$
 5% - 15% - 5% Flow $U_{act.}$



Ports

B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 plugged)

Components

- 1 A10VSO with hydraulic control device
- 2 Control valve FT 202-4-0
- 3 Inductive positional transducer IW9-03-01

Control data

Minimum setting pressure required _____ 20 bar
 Pilot oil consumption _____ max. 2,5 L/min approx.
 Hysteresis _____ $\leq \pm 1\%$ of $V_{g\max}$
 Repeatability _____ $\leq \pm 1\%$
 Flow loss at $Q_{\max}$ see pages 7 and 8.

Pilot valve:

Type of voltage _____ DC
 Nominal voltage _____ 24 V
 Coil resistance at 20° C _____ 12 Ω
 Duty _____ 100 %
 Ambient temperature _____ ...50° C
 Coil temperature _____ ...150° C
 Insulation to DIN 40050 _____ IP 65
 Insulation class to VDE 0580 _____ F

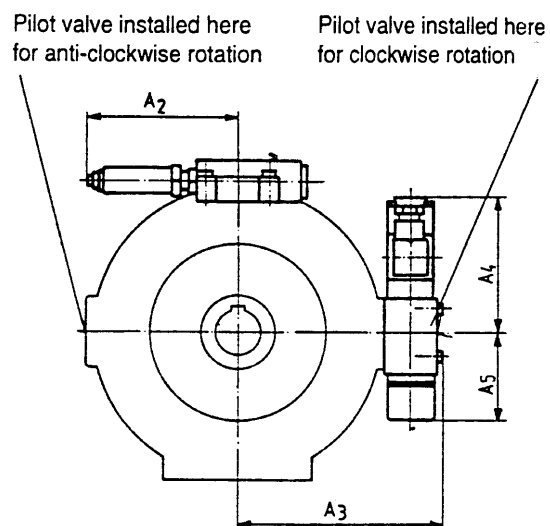
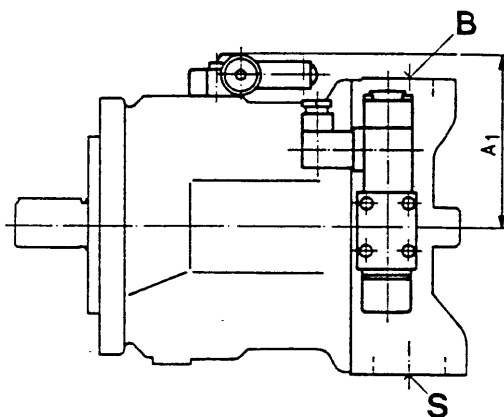
Inductive positional transducer:

Carrier frequency _____ 1000 Hz...5000 Hz
 Inductivity _____ 9.5 mH

Unit Dimensions

Electrical flow controller FE

Size 28...100



Size	A ₁	A ₂	A ₃	A ₄	A ₅
28	103,5	106,5	123,5	95	61
45	109	106,5	133,5	95	61
71	126	106,5	147,5	95	61
100	131	106,5	152,5	95	61
140	in preparation				

FED Electrical flow controller with pressure cut-off

The output flow of the pump is controlled by means of an electrically operated proportional valve.

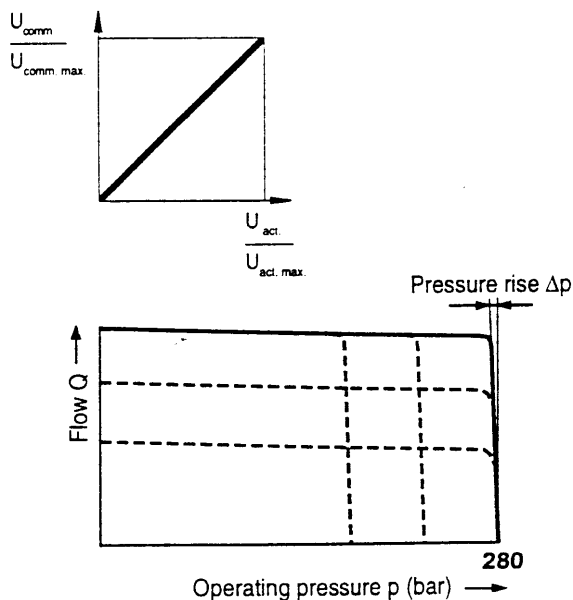
Control of output flow is achieved by varying the swivel angle of the pump. Possible variations in drive speed (e.g. diesel engine speeds) are not taken into consideration.

The position of the pump is fed back via an inductive positional transducer to amplifier card VT 5036 (RE 29957) or amplifier module VT 11019 (RE 29763).

The amplifier card / amplifier module is used to control the flow of the pump and is subject to separate order.

As opposed to the FE, this control is fitted with an additional sandwich valve (item 4) so as to give a supplementary hydraulic pressure control facility.

Static Curves

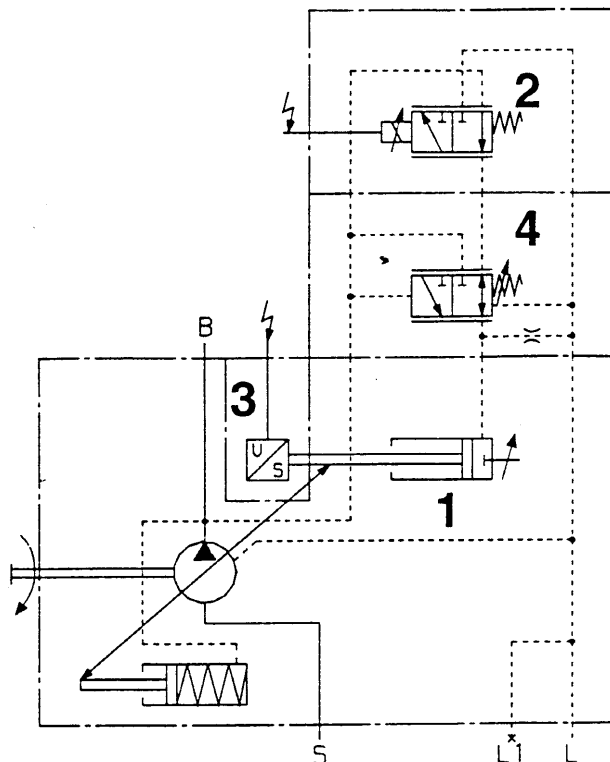
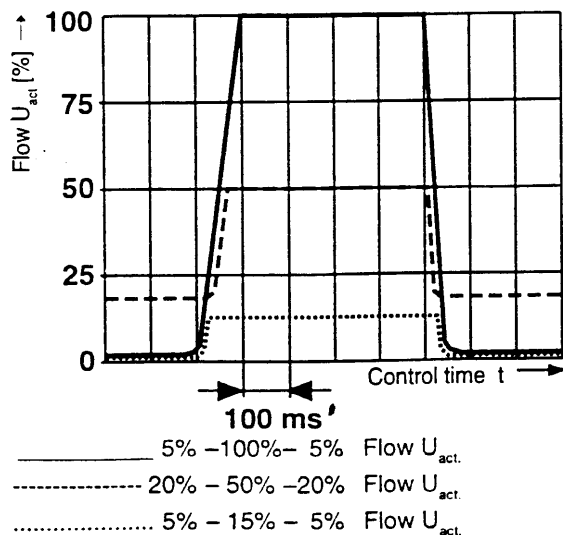


Dynamic Curve

Displacement time characteristics

measured: A10VSO 45 FE

Stepped press. signal value against 100 bar (press. relief valve)



Ports

B Pressure port
S Suction port
L, L1 Case drain ports (L1 plugged)

Components

- 1 A10VSO with hydraulic control device
- 2 Control valve FT 202-4-0
- 3 Inductive positional transducer IW9-03-01
- 4 Sandwich plate valve

Control data

Minimum setting pressure required _____ 20 bar
Pilot oil consumption _____ approx. 3 L/min max.
 Δp pressure rise _____ max. 4 bar
Hysteresis _____ $\leq \pm 1\%$ of $V_{g, max}$
Repeatability _____ $\leq \pm 1\%$
Flow loss at Q_{max} see pages 7 and 8

Pilot valve:

Type of voltage _____ DC
Nominal voltage _____ 24 V
Coil resistance at 20° C _____ 12 Ω
Duty _____ 100 %
Ambient temperature _____ ...50° C
Coil temperature _____ ...150° C
Insulation to DIN 40050 _____ IP 65
Insulation class to VDE 0580 _____ F

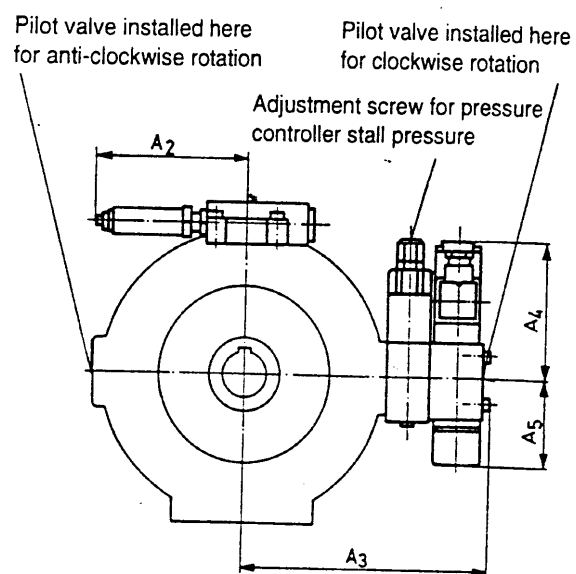
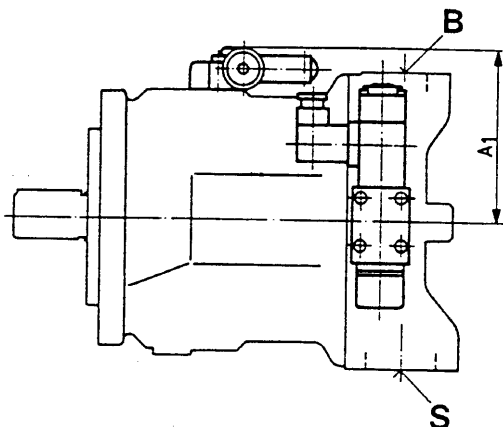
Inductive positional transducer:

Carrier frequency _____ 1000 Hz...5000 Hz
Inductivity _____ 9.5 mH

Unit Dimensions

FED electrical flow controller with pressure cut-off

Sizes 28...100



Size	A ₁	A ₂	A ₃	A ₄	A ₅
28	103,5	106,5	156,5	104	61
45	109	106,5	166,5	104	61
71	126	106,5	180,5	104	61
100	131	106,5	195,5	104	61
140	in preparation				

DFE1 Electronic pressure and flow control

The pressure and output flow of the pump are controlled electronically by means of a proportional valve. The output flow is controlled by varying the swivel angle of the pump. Variations in pump speed - e.g. with a diesel engine drive - are not taken into consideration. The pump pressure and position are fed back via a pressure sensor and inductive positional transducer to the amplifier card which is necessary to the control.

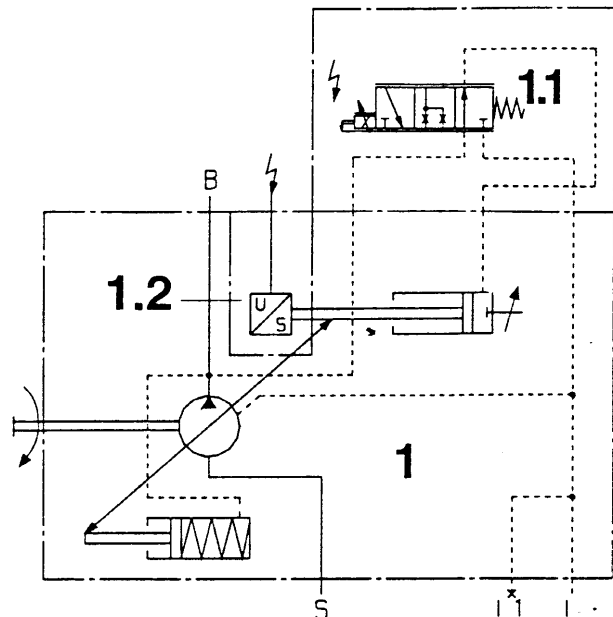
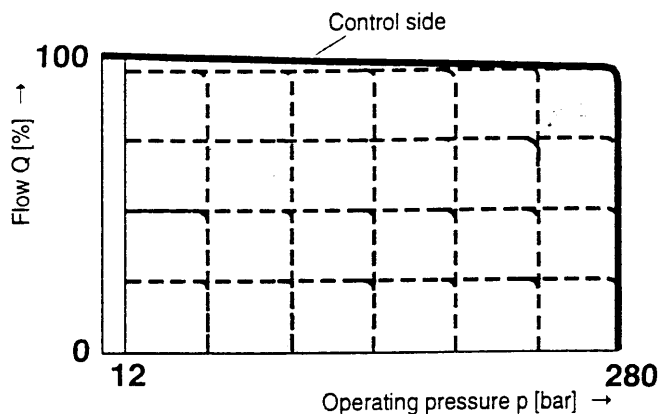
The DFE1 model pump is suitable for control applications in conjunction with analogue amplifier card VT 5041.

The amplifier card and the pressure sensor should be ordered separately.

For safety reasons an additional pressure relief valve should be mounted near to the pump pressure control system. This is used to ensure that the maximum permissible operating pressure is not exceeded.

For further information and typical applications see RE 67016 and RE 98090.

Static Curves



Ports

B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 plugged)

Components

1 A10VSO with hydraulic control device

1.1 Proportional valve

1.2 Inductive positional transducer

Pressure sensors and electronic control items are supplied 'loose' (please order separately as per RE 67016)

Control data

Hysteresis _____ < 1% of $V_{g \max}$

Repeatability _____ < 1%

Pilot oil consumption _____ approx. 2,5 L/min max.

Loss of flow at $Q_{\max}$ see pages 7 and 8.

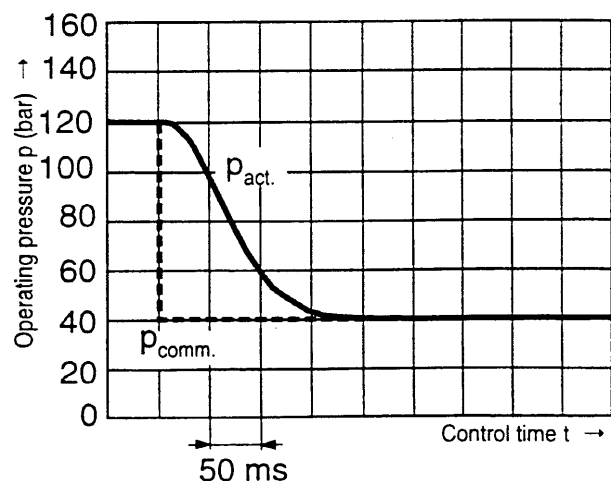
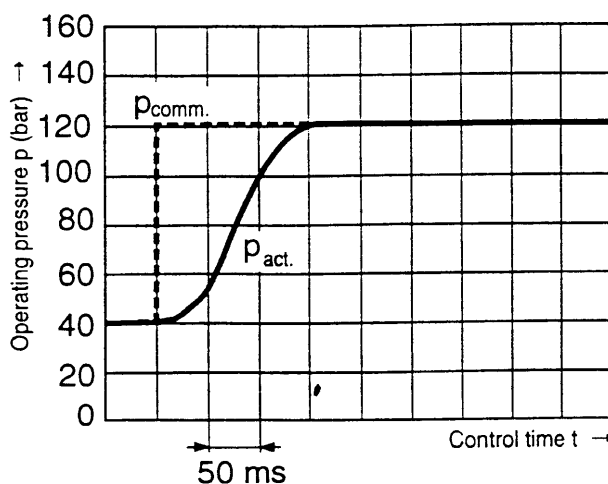
Dynamic Curves

Stepped pressure signal value e.g. 40 bar – 120 bar

DFE1 45 with oil compression volume (5L)

Stepped pressure signal value e.g. 120 bar – 40 bar

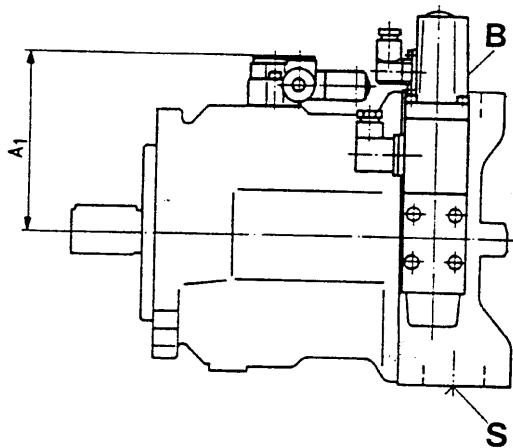
DFE1 45 with oil compression volume (5L)



Unit Dimensions

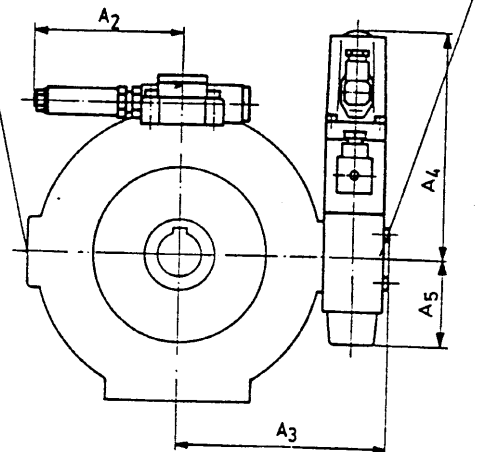
DFE1 electronic pressure and flow control

Sizes 28...100



Pilot valve installed here
for anti-clockwise rotation

Pilot valve installed here
for clockwise rotation



Size	A ₁	A ₂	A ₃	A ₄	A ₅
28	104	107	128	158	63
45	109	107	138	158	63
71	121	107	152	158	63
100	126	107	157	158	63
140	140	110	195	143	78

Through drive

The A10VSO pump can be supplied with through drive in accordance with the type code on page 3.

Code (K01-K59) is used to identify the through drive model.

The following items are included in the supply:

Coupling, fixing screws, seal and, if necessary, an adaptor flange.

Combination pumps

By building on further pumps it is possible for the user to obtain mutually independent circuits:

1. If the combination pump consists of **2 Brueninghaus units** and if these are to be **supplied assembled** then the two order codes should be linked by means of a "+" sign.

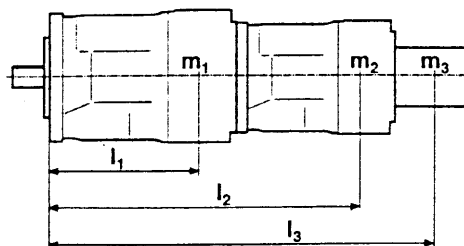
Ordering example:

A10VSO 71 DR/31 R-PPA12K25 +

A10VSO 28 DR/31 R-PPA12N00

2. If a **gear or radial piston pump** is to be built on at the factory, please refer to **RE 90139**. In this the possible combinations for built-on pumps are listed along with the key coding for the first pump.

Permissible bending moment

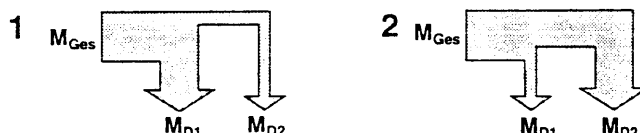


m_1, m_2 [kg] Pump weight
 l_1, l_2 [mm] Centre to centre spacing

$$M_m = (m_1 \times l_1 + m_2 \times l_2 + m_3 \times l_3) \cdot \frac{1}{102} \text{ [Nm]}$$

Size		28	45	71	100	140
Max. bending moment	$M_{\max}$ Nm	88	137	216	300	450
Weight	m kg	15	21	33	45	60
Centre to centre spacing	l_1 mm	110	130	150	160	160

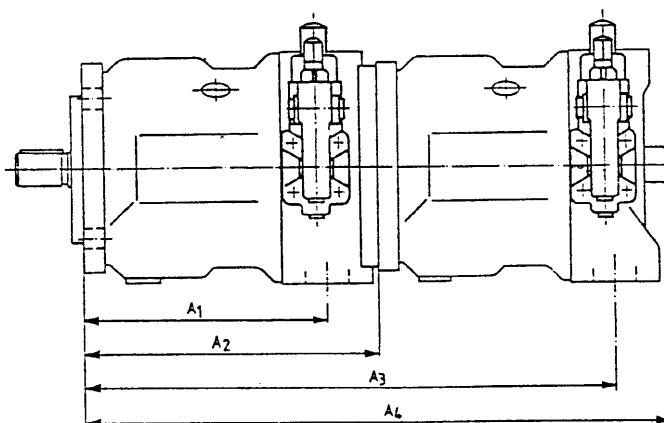
Permissible through drive torque



Size		28	45	71	100	140
Max. perm. total through drive torque at shaft pump 1 (Pump1 + Pump 2) $M_{\text{vel. max}}$ Nm						
		156	249	392	618	867
1	Permissible through drive torque $M_{D1\max}$ Nm	125	200	316	445	623
	$M_{D2\max}$ Nm	31	49	76	173	244
2	Permissible through drive torque $M_{D1\max}$ Nm	31	49	76	173	244
	$M_{D2\max}$ Nm	125	200	316	445	623

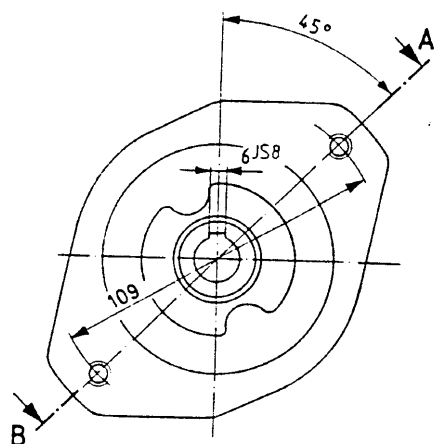
Unit Dimensions: combination pumps

A10VSO + A10VSO

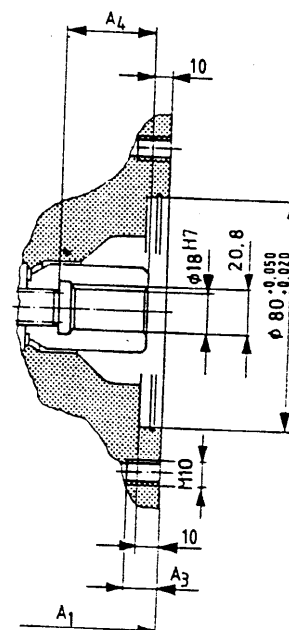


Main p. Built-on p.	A10VSO 28				A10VSO 45				A10VSO 71				A10VSO 100				A10VSO 140			
	A ₁	A ₂	A ₃	A ₄	A ₁	A ₂	A ₃	A ₄	A ₁	A ₂	A ₃	A ₄	A ₁	A ₂	A ₃	A ₄	A ₁	A ₂	A ₃	A ₄
A10VSO 18	164	204	349	399	184	229	374	424	217	267	412	462	275	338	483	533	275	350	495	545
A10VSO 28	164	204	368	410	184	229	393	435	217	267	431	473	275	338	502	544	275	350	514	556
A10VSO 45	-	-	-	-	184	229	413	453	217	267	451	491	275	338	522	562	275	350	534	574
A10VSO 71	-	-	-	-	-	-	-	-	217	267	484	524	275	338	555	595	275	350	567	607
A10VSO 100	-	-	-	-	-	-	-	-	-	-	-	-	275	356	631	682	275	368	643	694
A10VSO 140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	275	368	643	705

Built-on A10VSO 18; see RE 92712
Order code **K51**

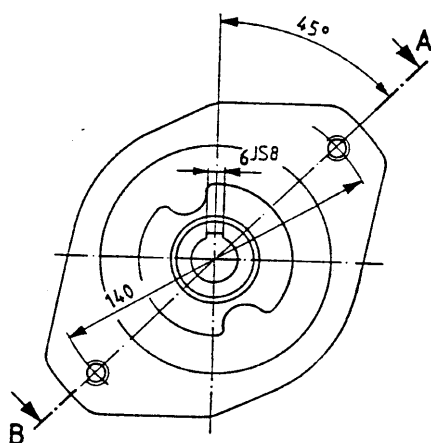


Size	A ₁	A ₃	A ₄
28	204	16	37
45	229	16	43
71	267	20	51
100	338	20	55
140	350	20	67

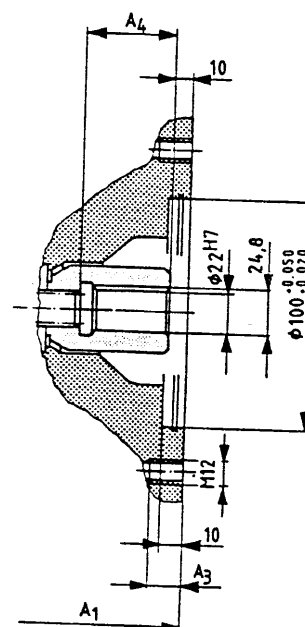


to pump mounting flange

Built-on A10VSO 28;
Order code **K25**

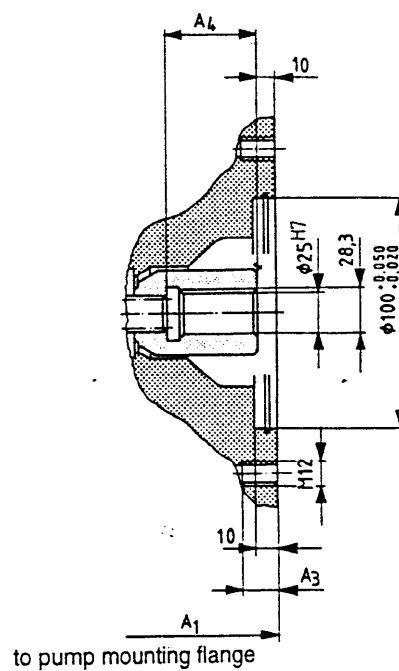
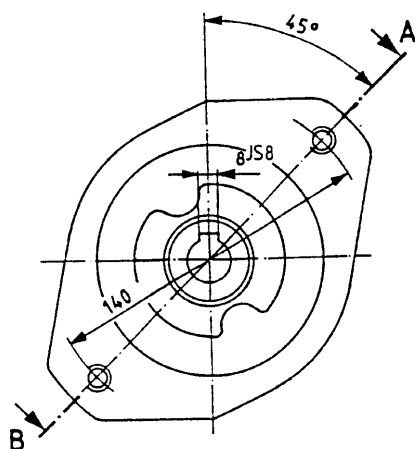


Size	A ₁	A ₃	A ₄
28	204	14	37
45	229	14	43
71	267	23	51
100	338	20	55
140	350	24	62



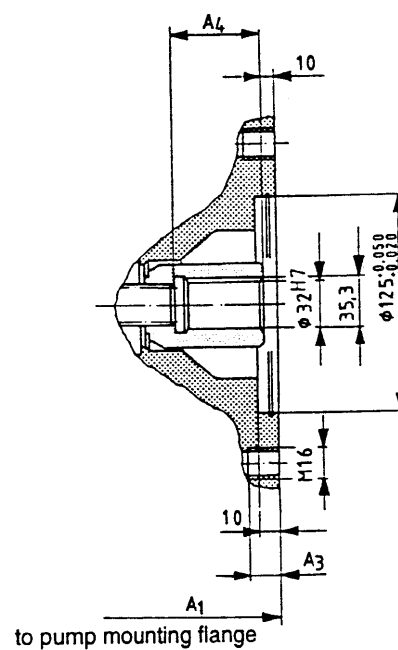
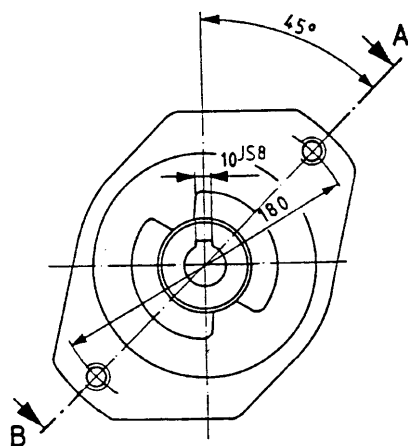
to pump mounting flange

Built-on A10VSO 45;
Order code **K26**



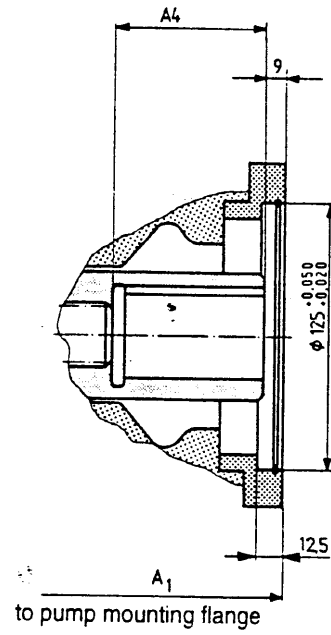
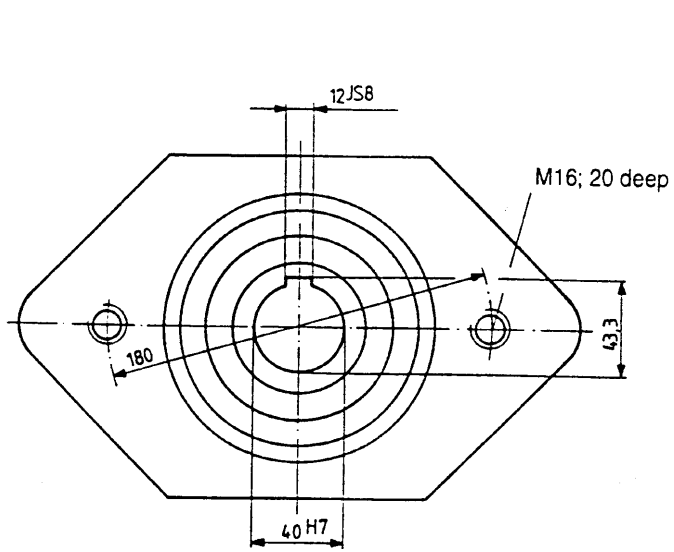
Size	A ₁	A ₃	A ₄
45	229	14	43
71	267	23	51
100	338	20	56
140	350	24	67

Built-on A10VSO 71;
Order code **K27**



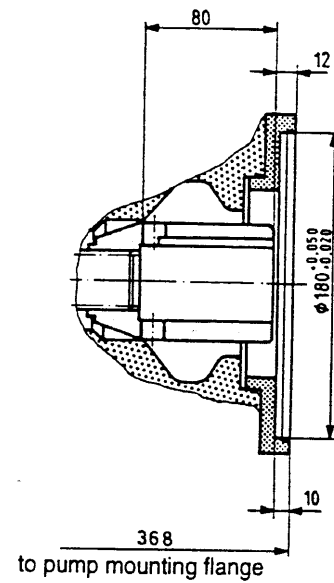
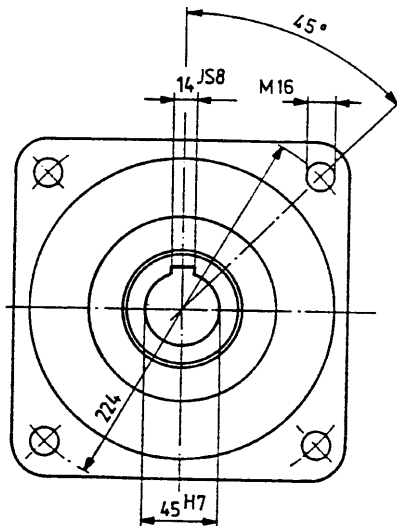
Size	A ₁	A ₂	A ₄
71	267	18	51
100	338	20	54
140	350	24	63

Built-on A10VSO 100;
Order code **K37**



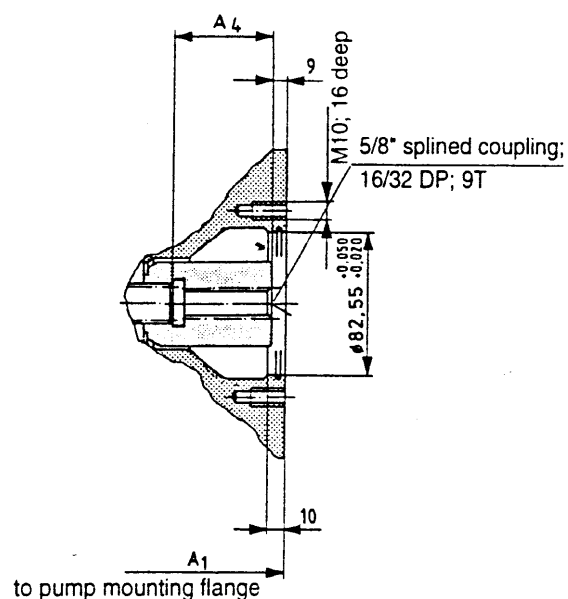
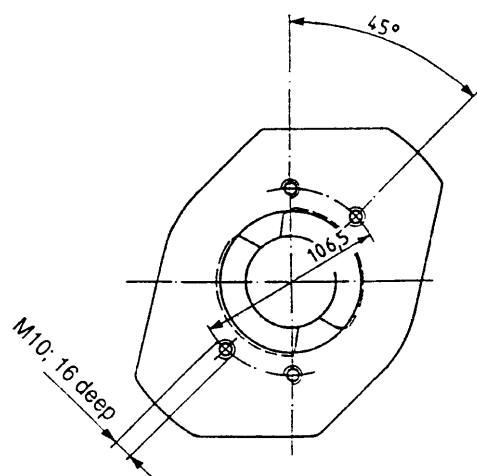
Size	A ₁	A ₄
100	356	71
140	368	80

Built-on A10VSO 140;
Order code **K59**



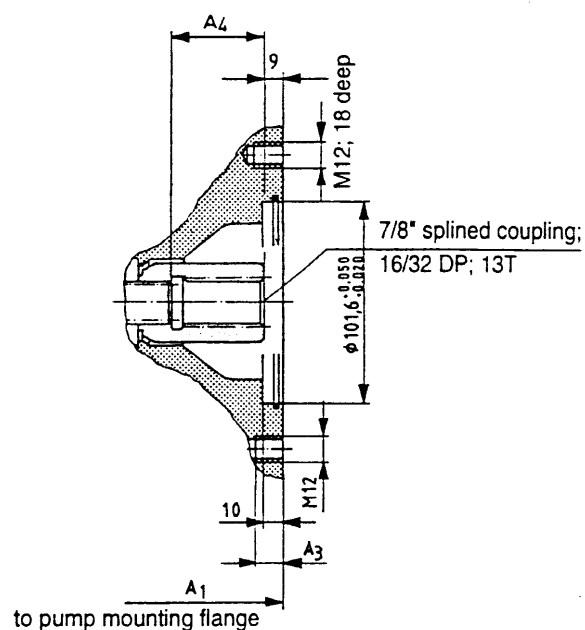
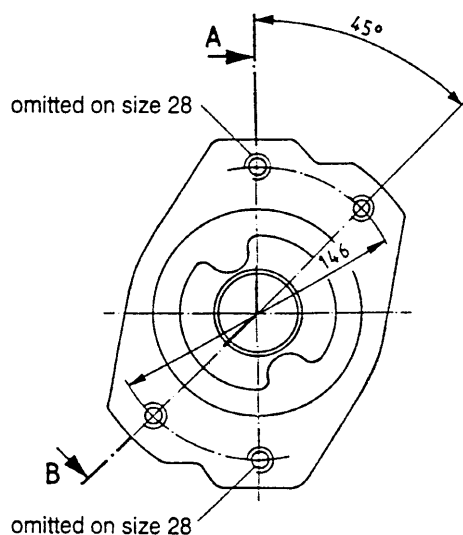
Dimensions

SAE A for built-on gear pump G2
(see RE 10030), order code **K01**



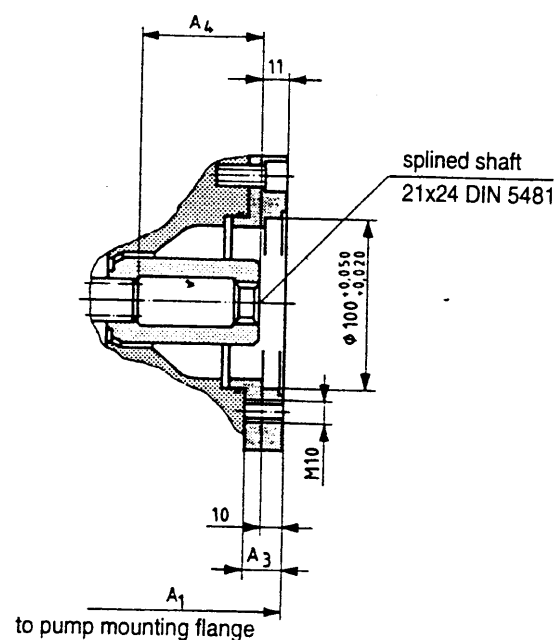
Size	A ₁	A ₄
28	204	38
45	229	44
71	267	52
100	338	56
140	350	68

SAE B for built-on G3 (see RE 10039);
Order code **K02**



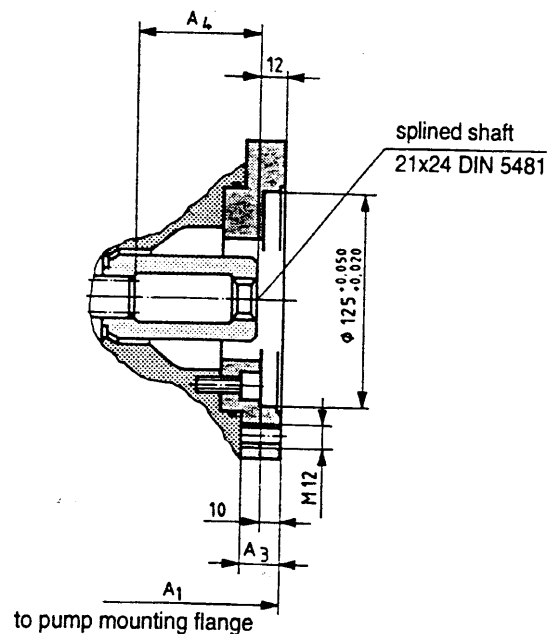
Size	A ₁	A ₃	A ₄
28	204	14	38
45	229	18	44
71	267	20	52
100	338	20	56
140	350	20	68

Size	A_1	A_3	A_4
28	226	22	58
45	251	22	65
71	289	22	72
100	360	22	77
140	372	22	86,5



1 PF2G^U_N 1-1X
2-2X/...RG 07^M_V K O
3-1X

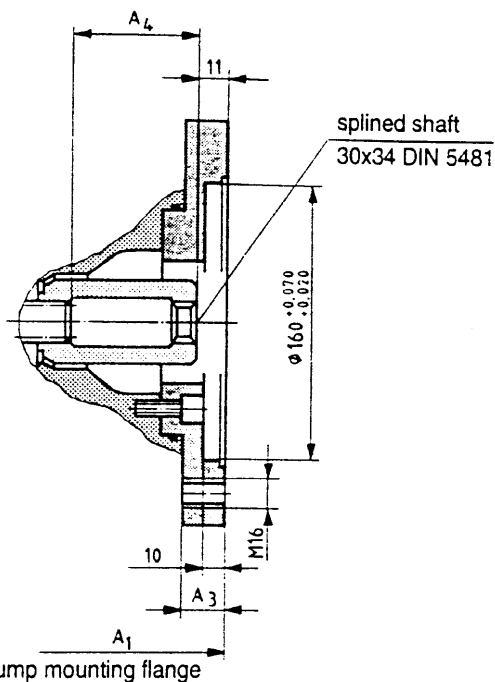
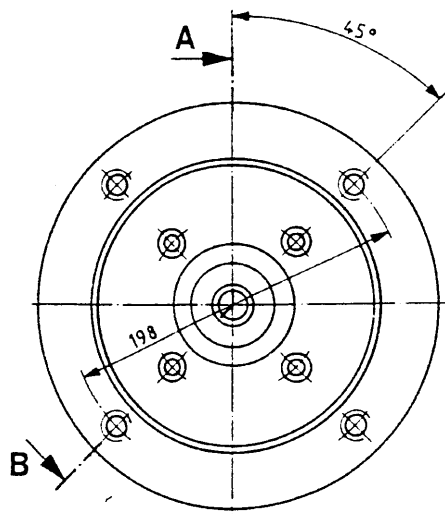
Size	A_1	A_3	A_4
45	262	18	73
71	290	20	72
100	361	23	78
140	372	22	86



1 PF2G^U_N^{1-1X}
2-2X/...RG 07^M_VK O
3-1X

with built-on combination sections A10 + GU
Clockwise rotation only.

ISO 160, 4-hole, for built-on internal gear pump GU(3)
(shaft G; see RE 10211), order code **K56**.
Not for new projects; please consult us if required.



Size	A ₁	A ₃	A ₄
71	291	22	74
100	363	22	79
140	350	22	66

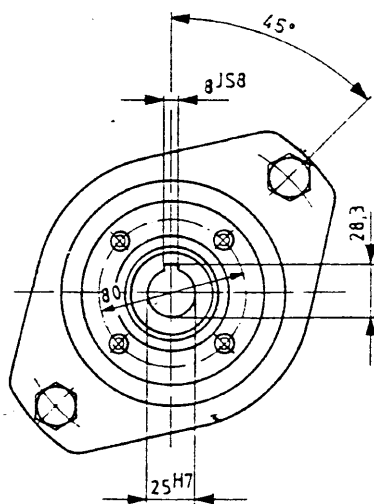
When ordering separately please give the following information:

1 PF2G^U_N 1-1X
2-2X/...RG 07^M_V K O
3-1X

with built-on combination sections A10 + GU

Clockwise rotation only.

Metric 4-hole flange for built-on radial piston pump R4 (see RE 11263),
Order code **K57**



Size	A ₁	A ₄	A ₇
28	233	47	8
45	258	71,5	8
71	283	68	8
100	354	70,5	8
140	366	84	8

