MANNESMANN REXROTH

Brueninghaus Hydromatik

A10VSO Variable Displacement Pump

Series 31, Industrial Model, for Open Circuits
Axial Piston Swashplate Design

Size 28...140 | Nominal pressure 280 bar | Peak pressure 350 bar

RE 92711/03.93

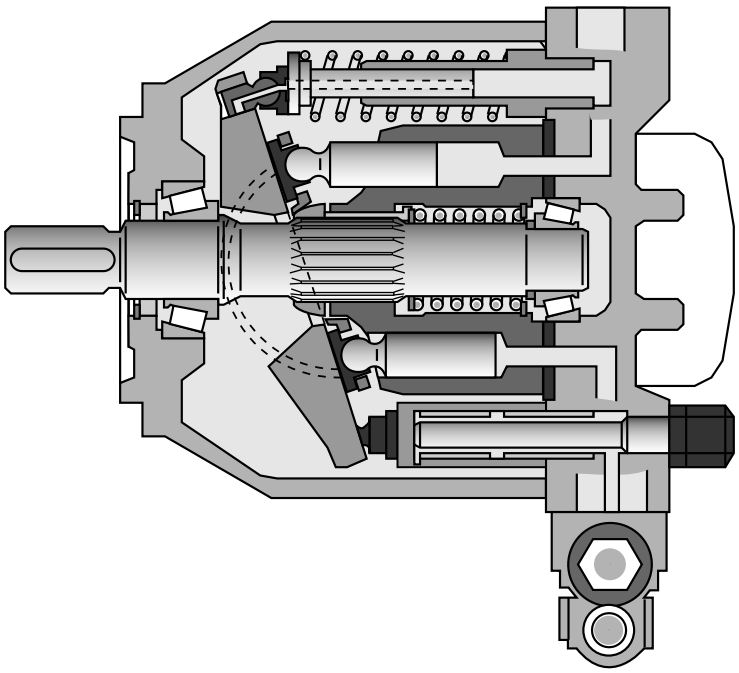
Replaces RE 92711/10.89

Medium pressure range

A10VSO 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



Ordering code

Fluid

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

Axial piston unit

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

Mode of Operation

Pump, in open circuit	**O**

Size

		28	45	71*	100	140	
≙	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.**

prefered program
short delivery times
type list see page 29

● = available
❍ = in preparation
– = not available

	A10VS	O			/	31		–		P		12	

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 Suction port S	SAE ports at opposite sides 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

1. 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
2. If a **gear or radial piston pump is to be fitted at factory** please consult us (RE 90139 in preparation).

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 efficiciency and service life we recommend that operating viscosity (at operating temperature) be selected from within the following range

ν_{opt} = opt. operating viscosity 16...36 mm²/s

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

Viscosity limits

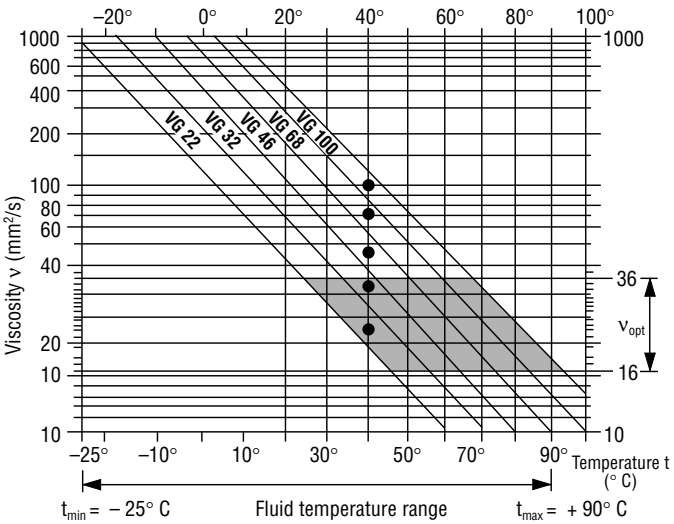
The following limiting values for viscosity are as follows:

ν_{min} = 10 mm²/s
short term at maximum permissible drain of 90°C.°

ν_{max} = 1000 mm²/s or 300 mm²/s with mounted auxiliary pump short term on cold start

Temperature range (cf. selection diagram)
t_{min} = – 25° C
t_{max} = 90° 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 (ν_{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° C the operating temperature is 60° C . Within the operating viscosity range (ν_{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 sizes100 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, L_1):
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

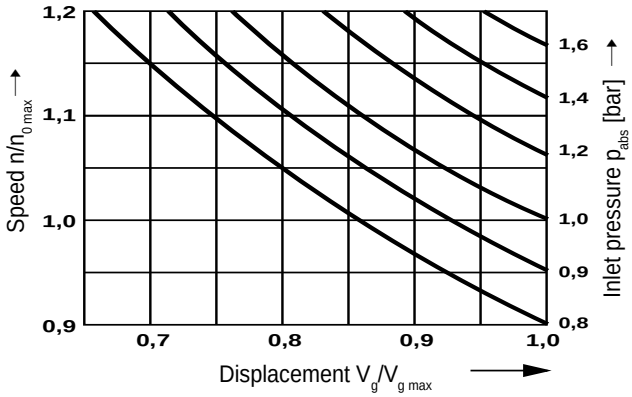
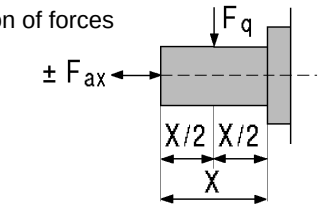


Table of values (theoretical values, without taking into account η_{mh} and η_v; values rounded off)

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) With increased input pressure p_{abs} or $V_g < V_{g\ max}$		$n_{o\ max}$	rpm	3600	3100	2600	2400	2100
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 (Δp = 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 (Δp = 280 bar)	at $V_{g\ max}$	M_{max}	Nm	125	200	316	445	623
Torque (Δp = 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	0,0242
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.

Application of 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 [cm^3] per revolution
Δp = Differential pressure [bar]
n = Speed [rpm]
η_v = Volumetric efficiency
η_{mh} = Mechanical hydraulic efficiency
η_t = Overall efficiency ($\eta_t = \eta_v \cdot \eta_{mh}$)

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.

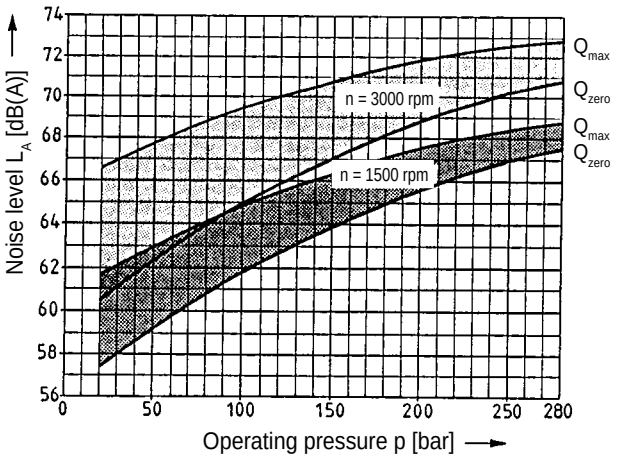
See RE 90400 for detailed installation notes and commissioning information

Performance curves for pump with constant pressure control DR

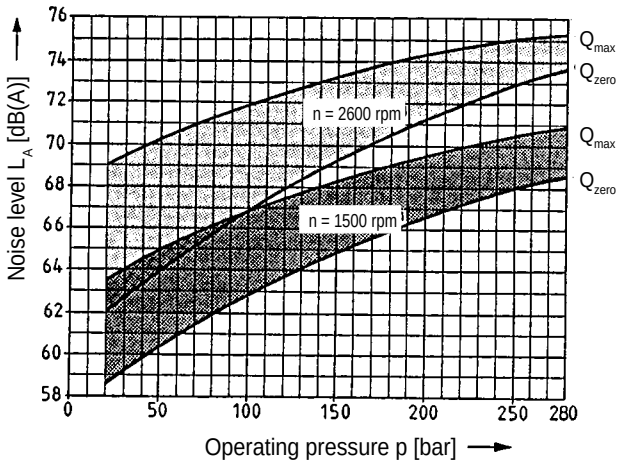
Noise level

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° C)

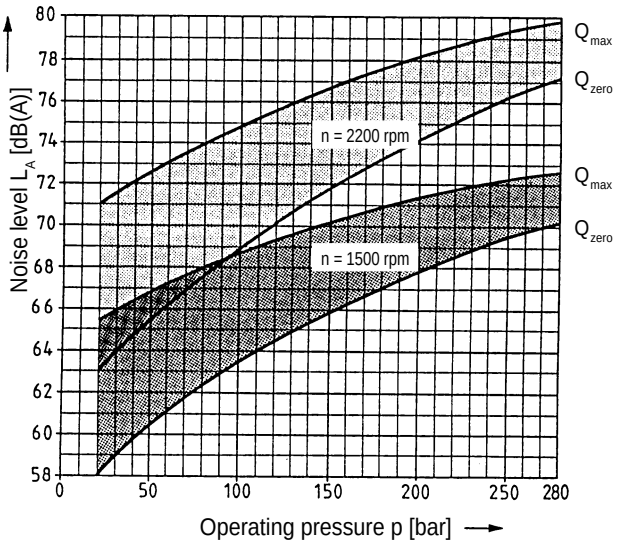
Size 28



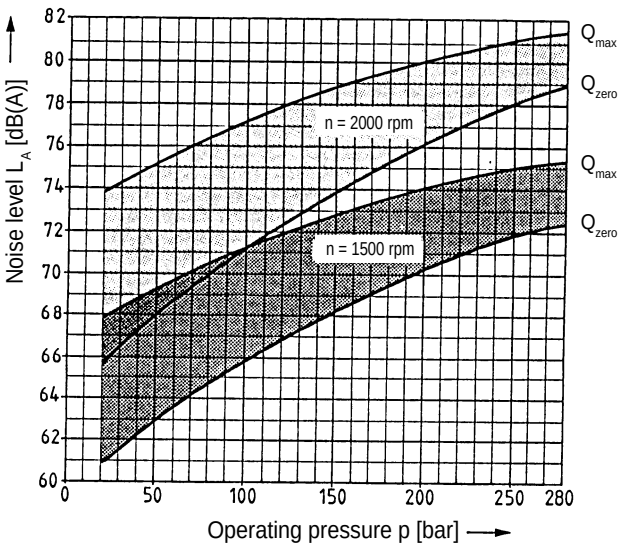
Size 45



Size 71



Size 100

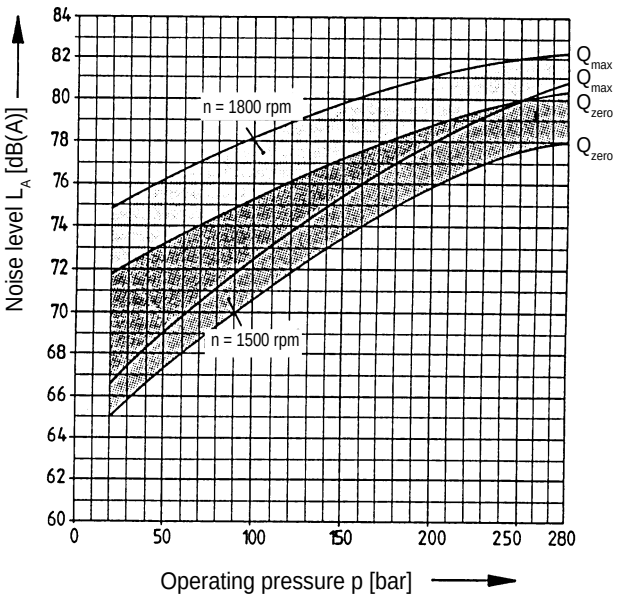


Operating curves for pump with constant pressure control DR

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° C)

Size 140

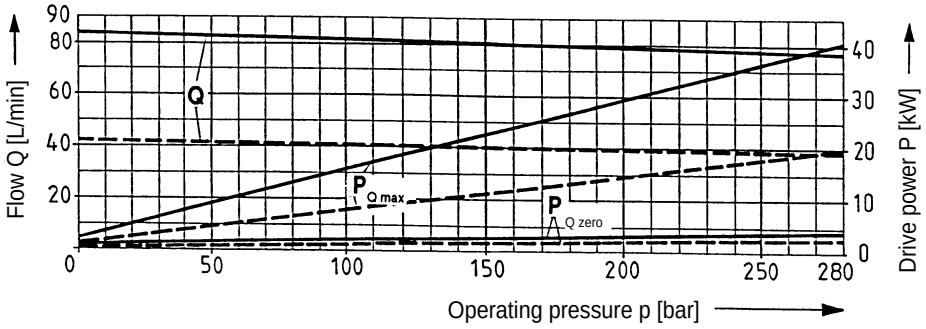


Drive power and output flow

(Fluid:
Hydraulic oil ISO VG 46 DIN 51519, t = 50° C)

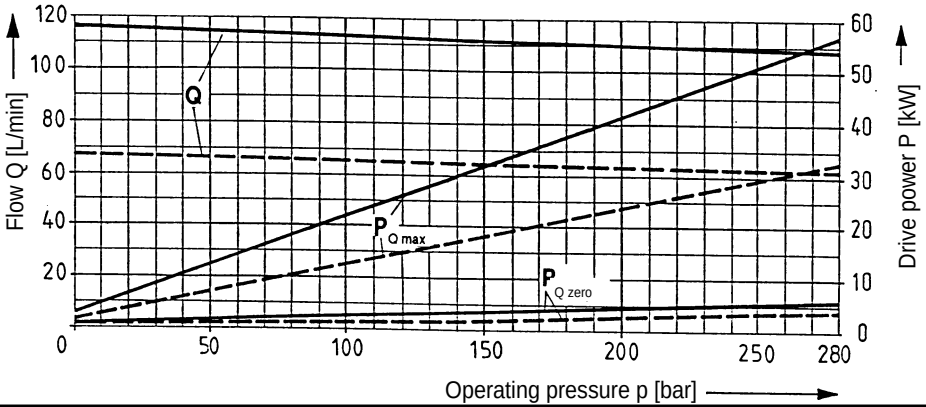
Size 28

– – – – n = 1500 rpm
_____ n = 3000 rpm



Size 45

– – – – n = 1500 rpm
_____ n = 2600 rpm



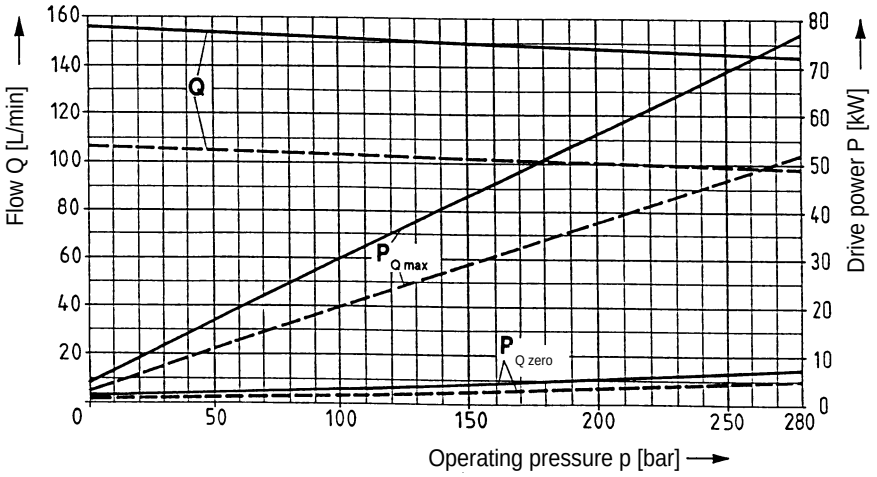
Drive power and output flow

(Fluid: Hydraulic oil to ISO VG 46 DIN 51519, t = 50° C)

Size 71

– – – – n = 1500 rpm

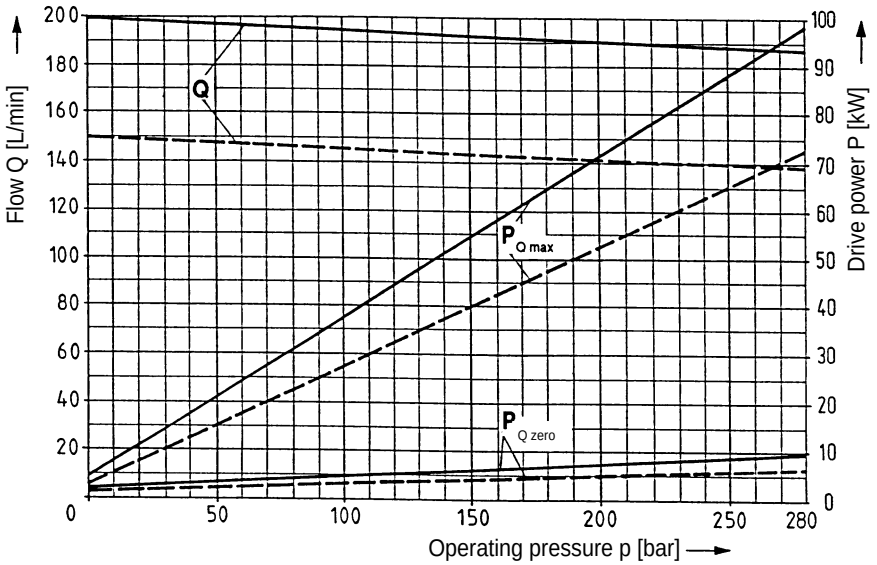
——— n = 2200 rpm



Size 100

– – – – n = 1500 rpm

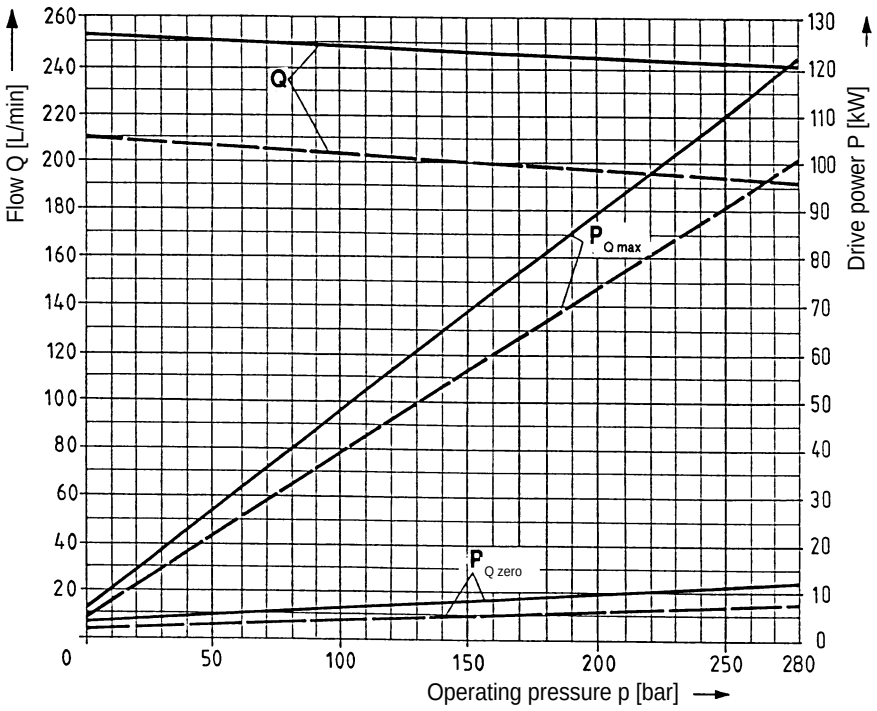
——— n = 2000 rpm



Size 140

– – – – n = 1500 rpm

——— n = 1800 rpm



Overall efficiency

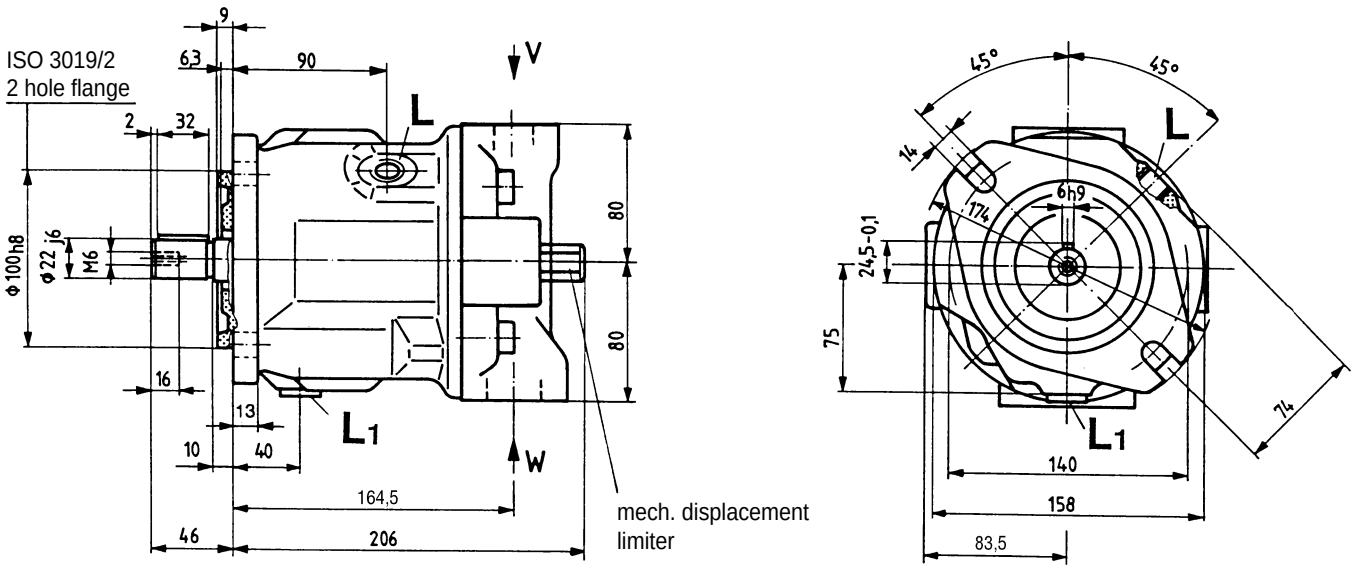
$$\eta_t = \frac{Q \cdot p}{P_{Q\,max} \cdot 600}$$

Volumetric efficiency:

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

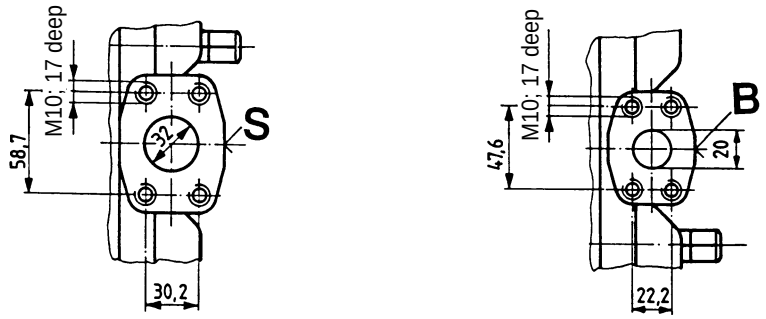
Unit dimensions size 28

N**00** model (without through flow)
not including control



View W

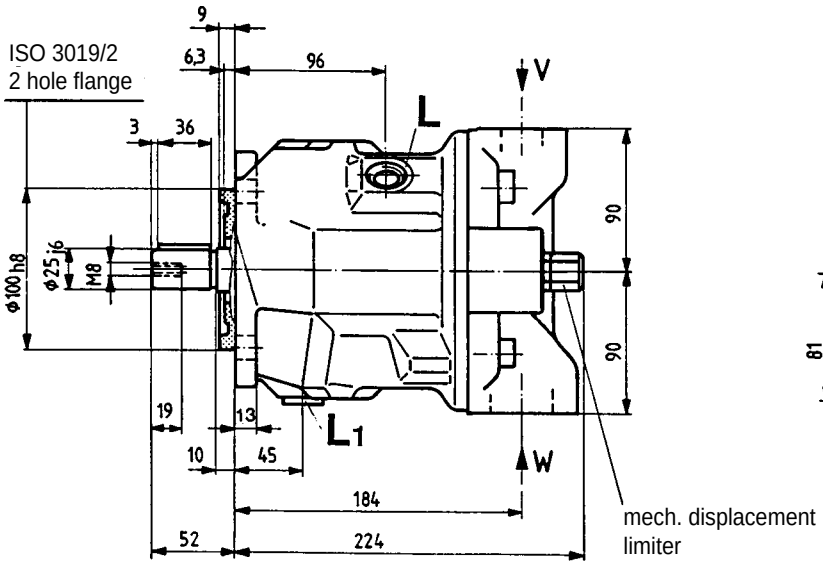
View V



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 45

N**00** model (without through drive)
not including controls



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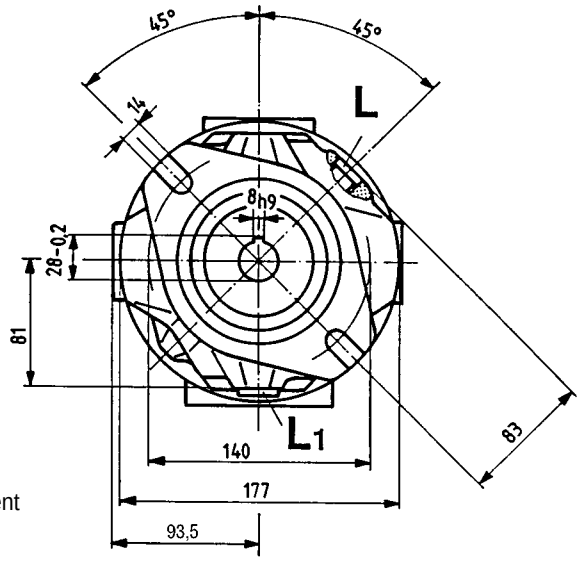

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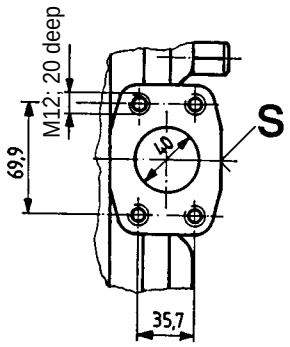
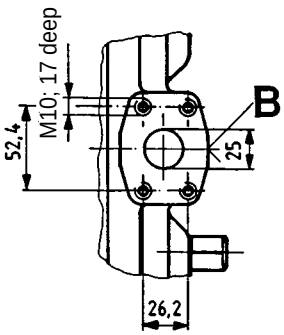
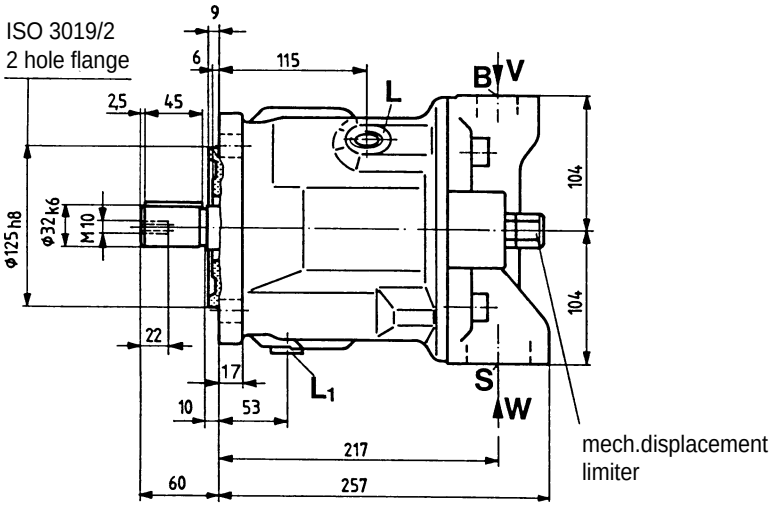


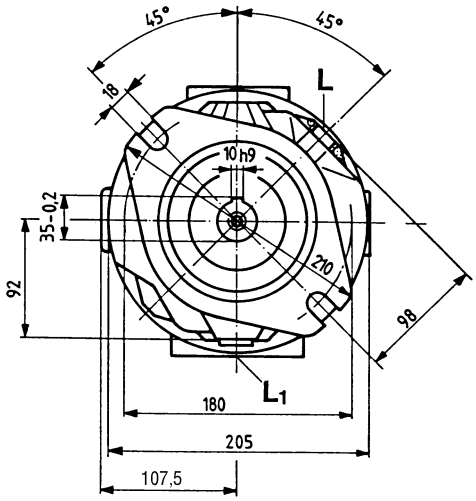


B	Pressure port	SAE 1"	(Standard pressure series)
S	Suction port	SAE 1 1/2"	(Standard pressure series)
L/L_1	Case drain ports	M22x1,5	(L_1 plugged at factory)

Unit dimensions size 71

N**00** model (without through drive)
not including control





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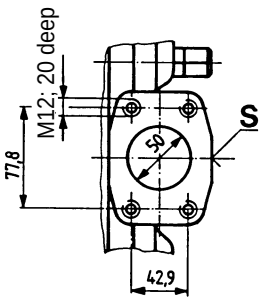
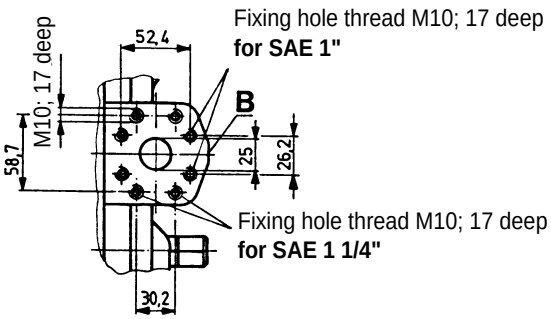


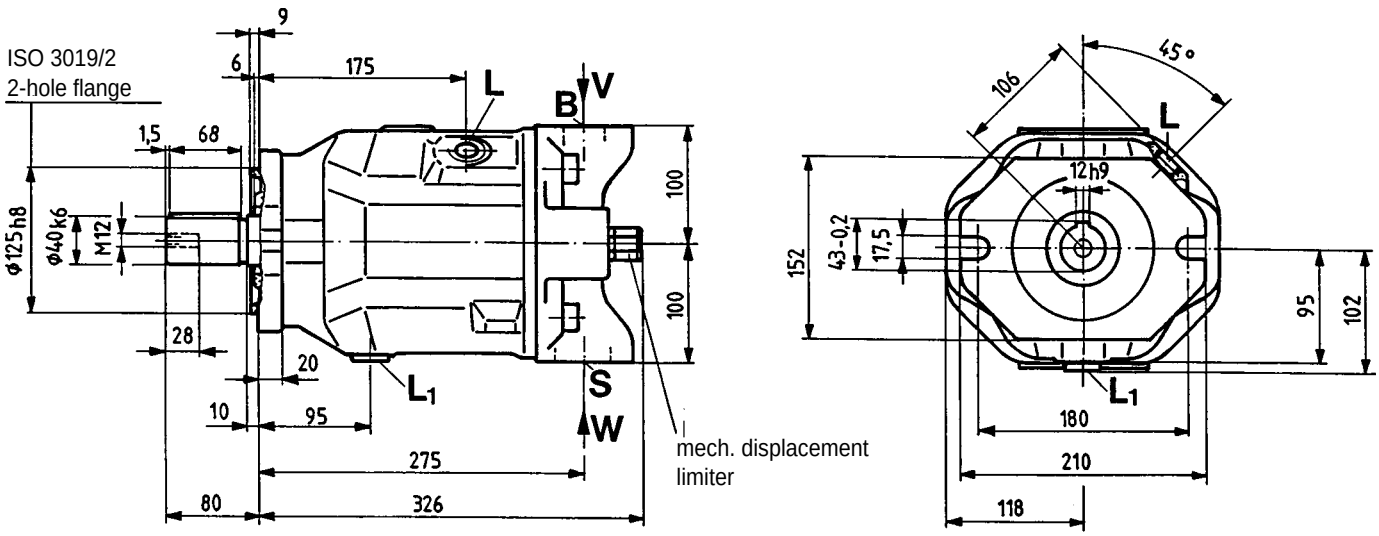


Note:
At **pressure port B** there are two SAE mountings available, each offset by 90° .
SAE 1 1/4" Standard pressure series, 3000 psi, for pressures **up to 250 bar** or
SAE 1" standard pressure series, 5000 psi, for pressures **in excess of 250 bar**.
For operating pressures in excess of 250 bar or 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 11/4" (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 100

N**00** model (without through drive)
not including control



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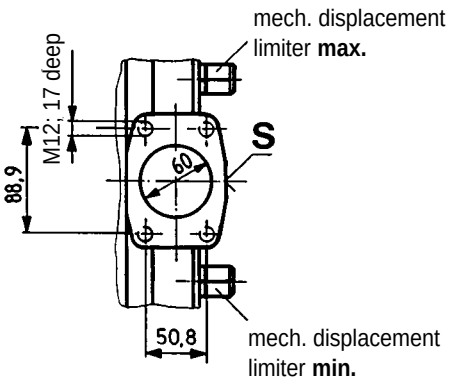
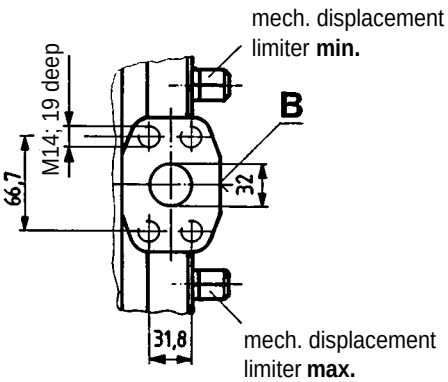


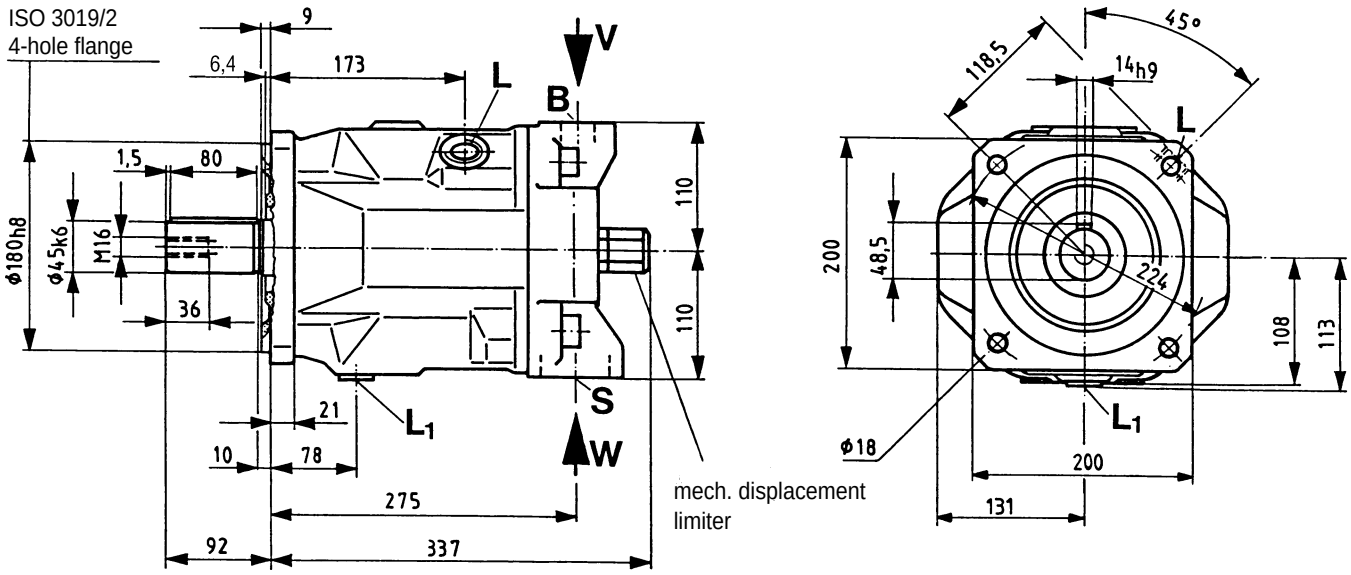
View V



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)

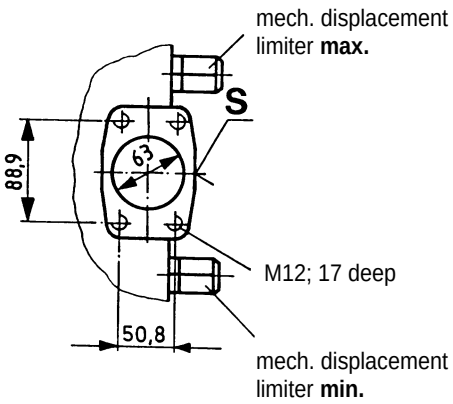
Unit dimensions size 140

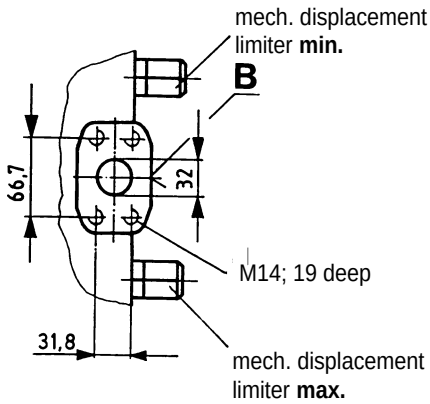
N**00** (without through drive)
not including control



View W

View V



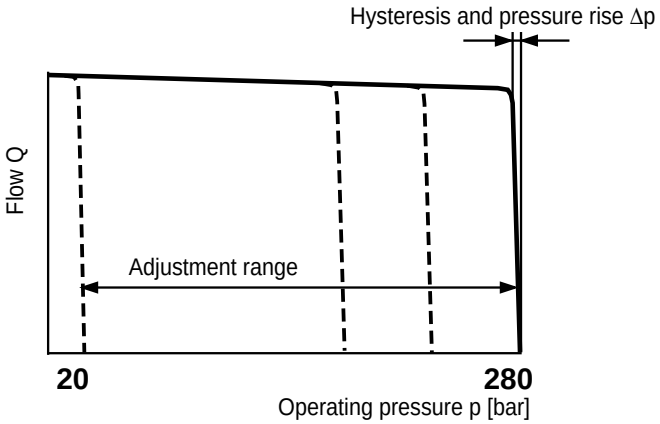


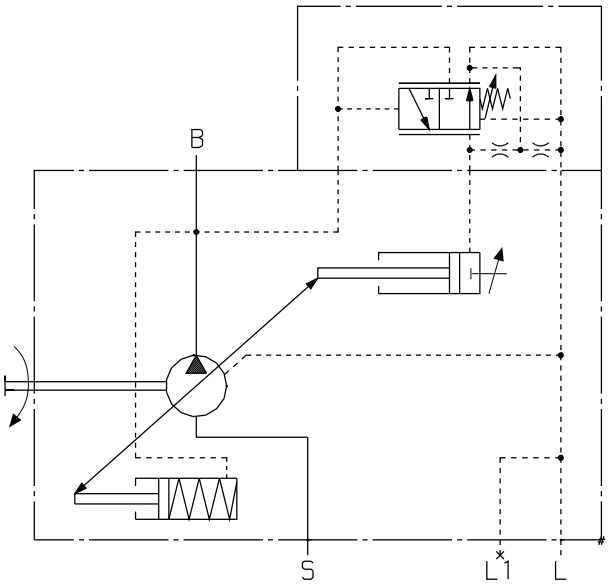
B	Pressure port	SAE 1 1/4"	(High pressure series)
S	Suction port	SAE 2 1/2"	(Standard pressure series)
L/L_1	Case drain ports	M27x2	(L_1 plugged at factory)

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 rpm; t_{oil} = 50° C)

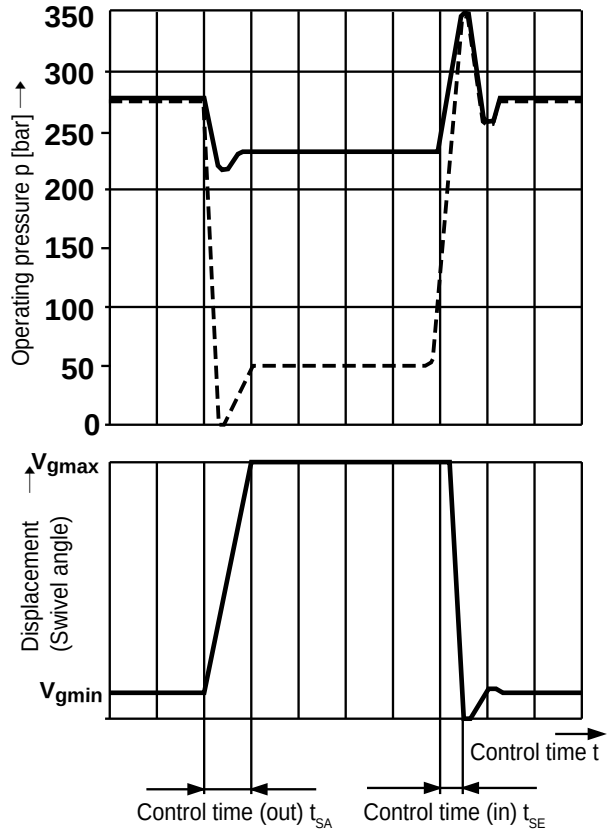




Ports

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

Dynamic Operating Curves
The operating curves are mean values measured under test conditions with the unit mounted inside the tank.
Conditions: n = 1500 rpm
t_{oil} = 50° 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.



Controller data

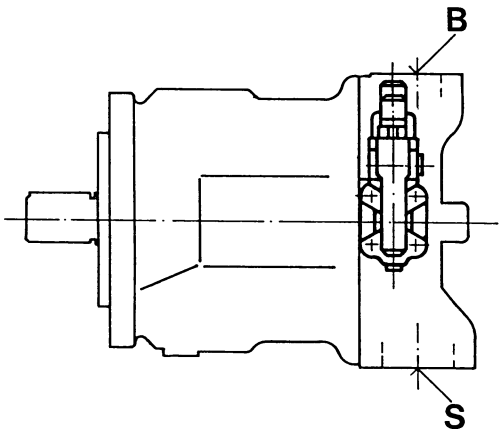
Hysteresis and pressure rise Δp ——— max. 4 bar
Pilot oil requirement ——— max. approx. 3 L/min
Flow loss at Q_{max} see pages 7 and 8.

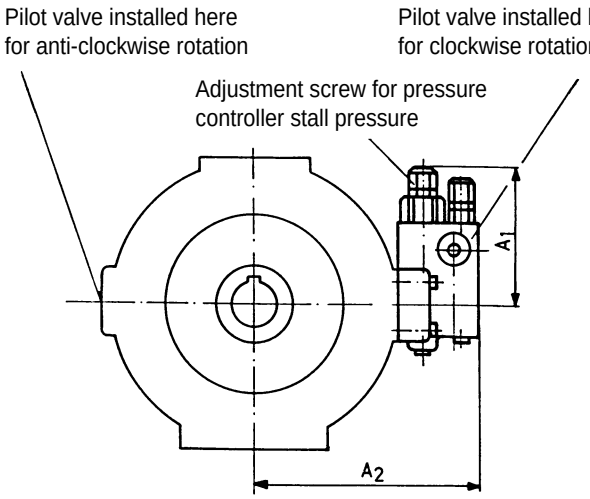
Control times

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	110	30

Unit dimensions
DR Pressure control

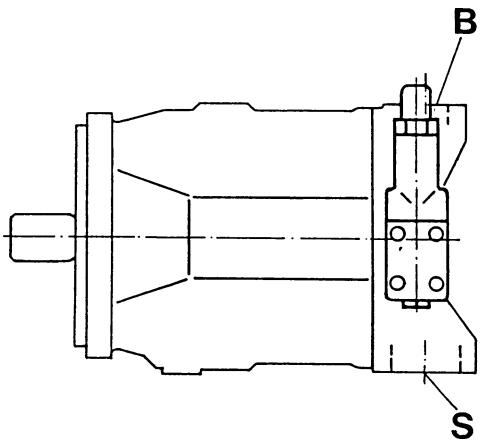
Sizes 28…100

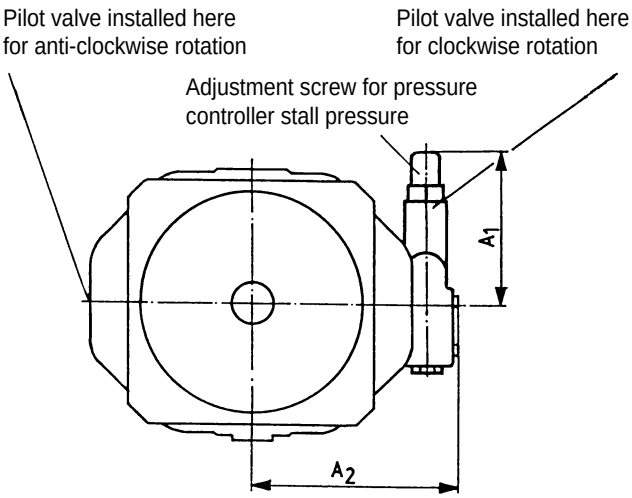




On sizes 28 to 100 the DFR valve used has the flow control port blocked in the factory and is not tested.

Size 140





Size	A_1	A_2
28	105	135,5
45	105	145,5
71	105	159,5
100	105	164,5
140	125	169

DRG Pressure controller, remote controlled

Function and equipment as for DR.

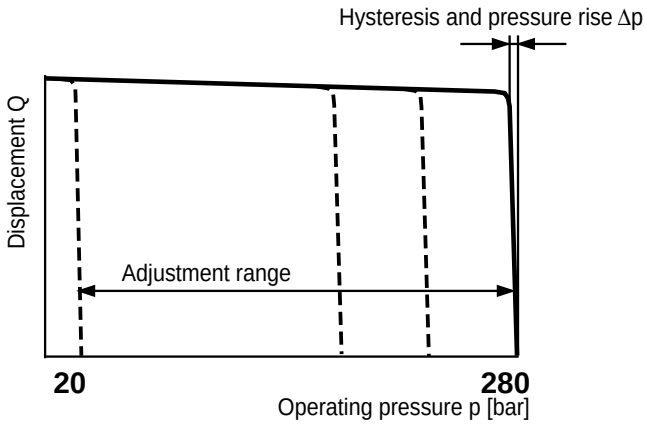
A pressure relief valve can be connected to port X for remote control applications; this is not included in the items supplied with the DRG control.

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 ø0,8 in P (electric) to RE 29166.

The max. pipe length should not exceed 2m.

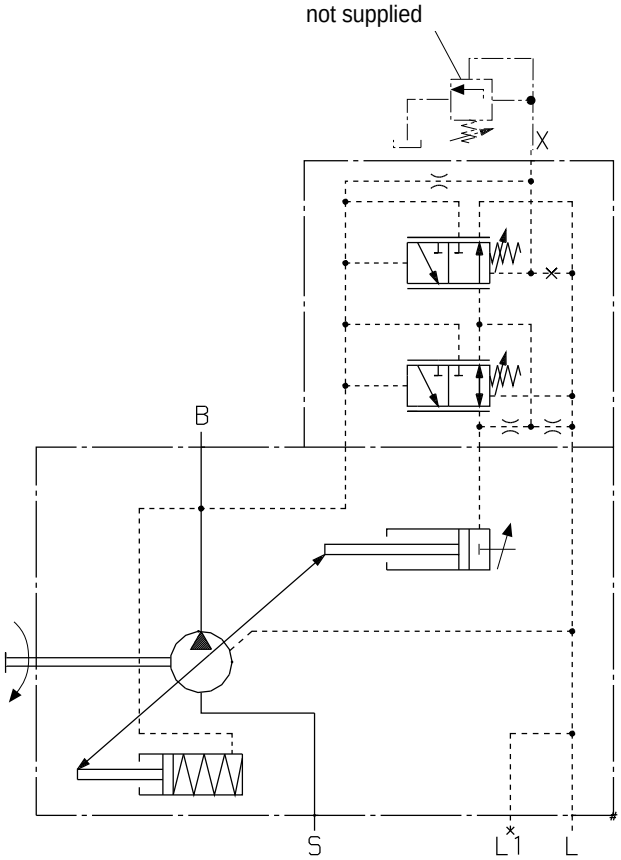
Static Operating Curve
(at n_1 = 1500 rpm; t_{oil} = 50° C)



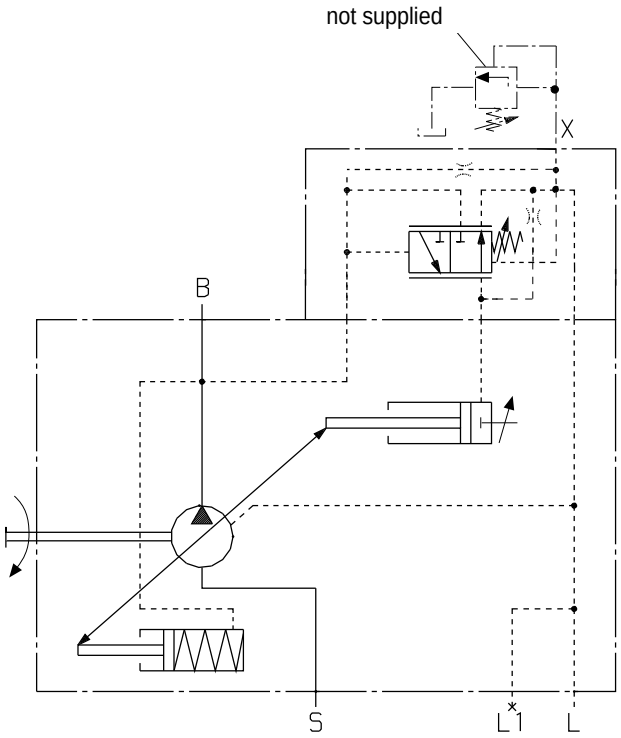
Controller data

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.

Sizes 28…100



Size 140

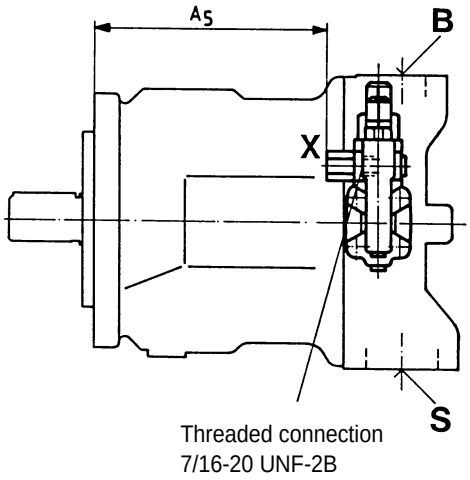


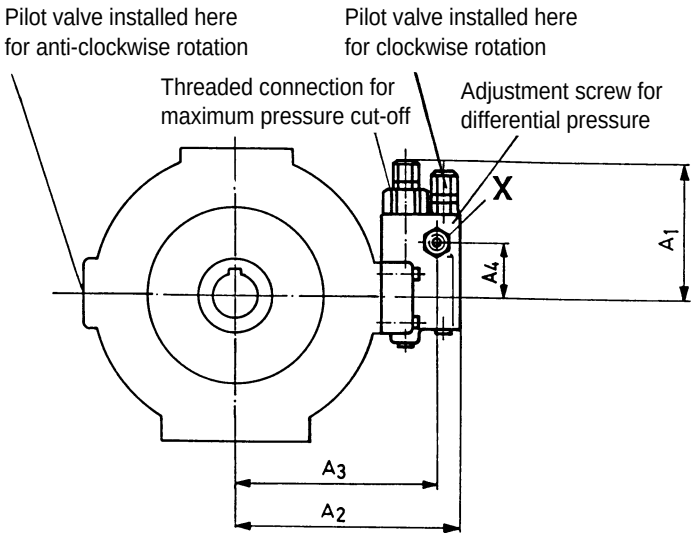
Ports

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

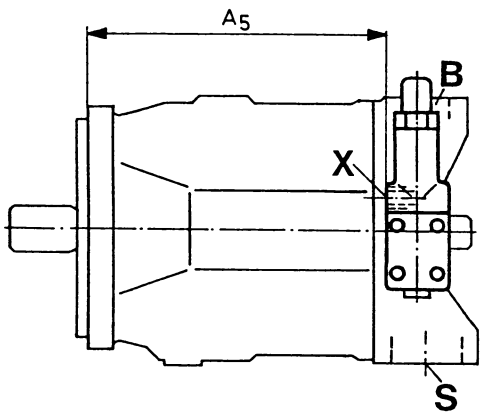
Unit dimensions
DRG Pressure controller with remote control

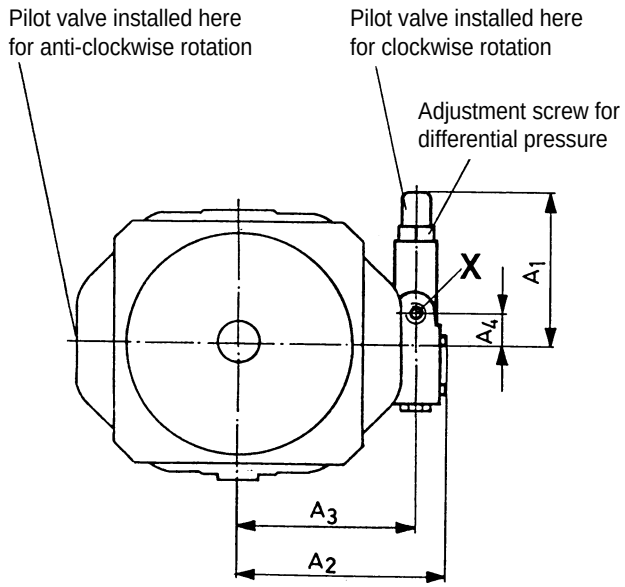
Sizes 28…100





Size 140



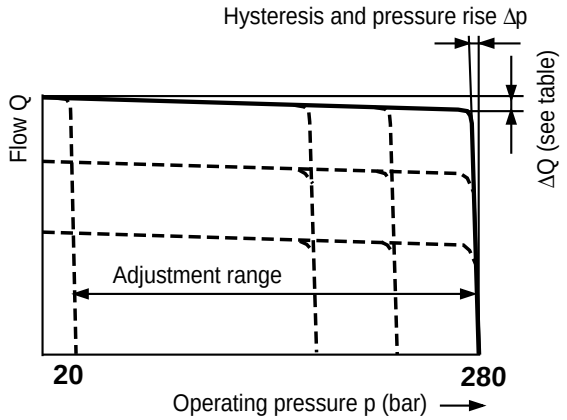


Size	A_1	A_2	A_3	A_4	A_5	Port X
28	105	135,5	119	40	119	M14x1,5; 12 deep
45	105	145,5	129	40	134	M14x1,5; 12 deep
71	105	159,5	143	40	162	M14x1,5; 12 deep
100	105	164,5	148	40	229	M14x1,5; 12 deep
140	125	209	183	26	244	M14x1,5; 12 deep

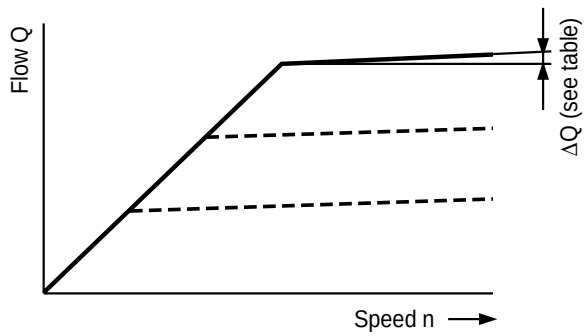
DFR/DFR1 Pressure /flow controller

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.

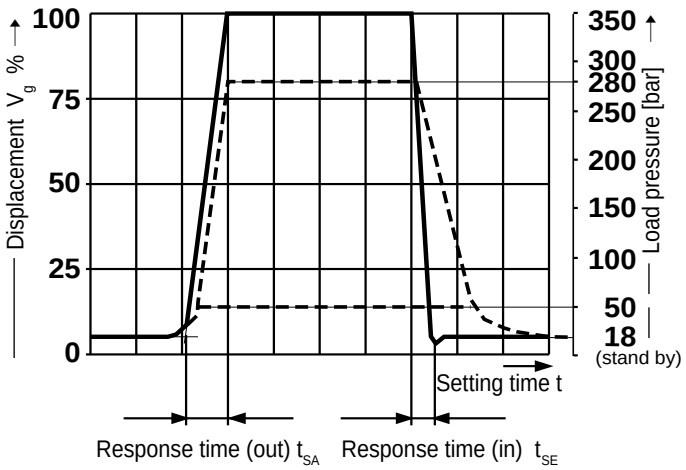
Static Operating Curve
(at n_1 = 1500 rpm; t_{oil}= 50° C)



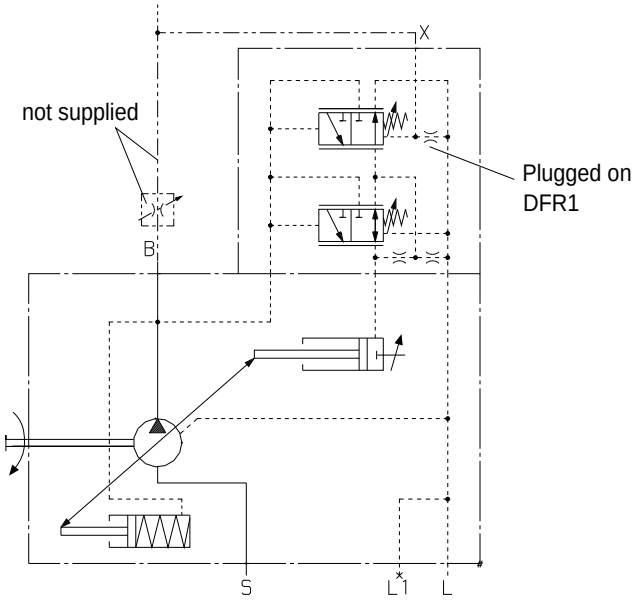
Static Operating Curve at Variable Speed



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 ± 2 bar ("stand by") results.

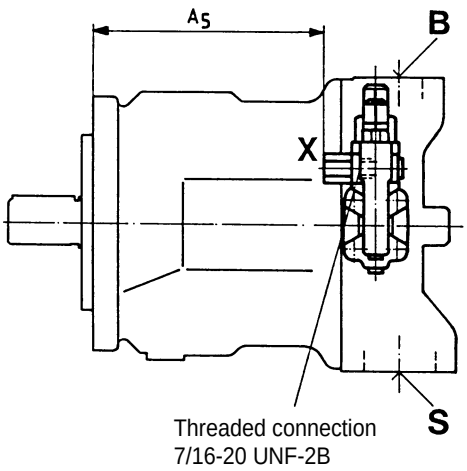
Controller data
Max. flow variation (hysteresis and increase) measured at drive speed n = 1500 rpm

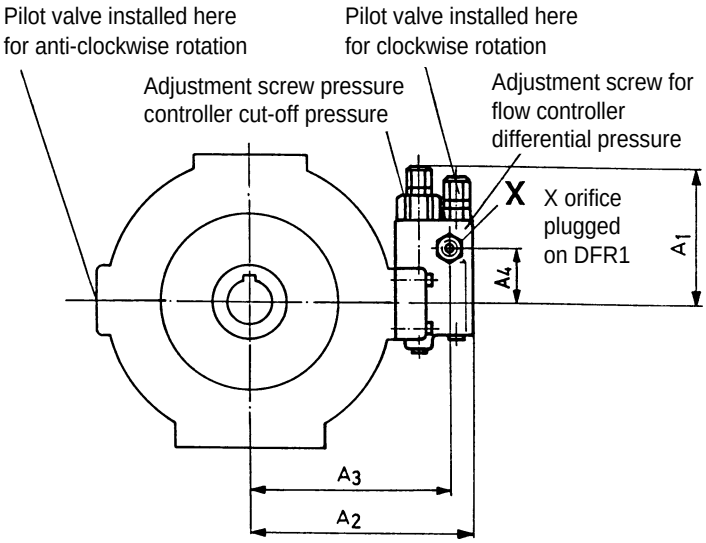
Size		28	45	71	100	140
ΔQ_{max}	L/min	1	1,8	2,8	4,0	6,0

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.

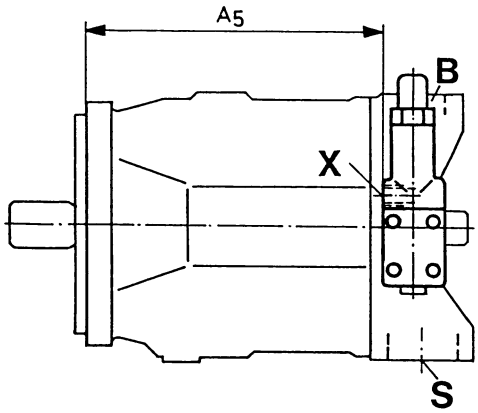
Unit dimensions
DFR; DFR1 Pressure and flow regulator

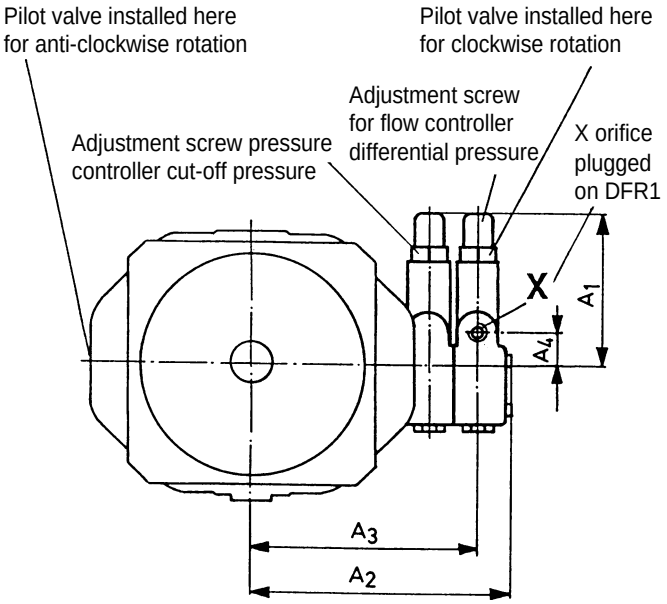
Sizes 28…100





Size 140



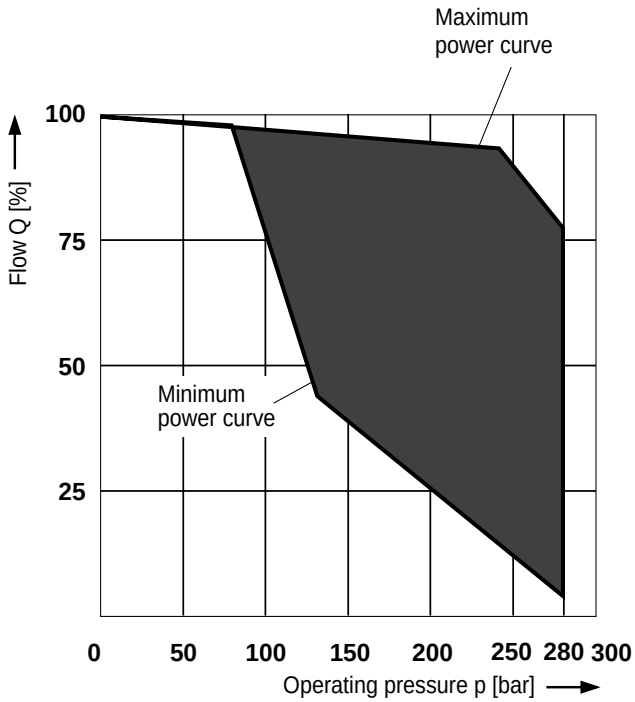


Size	A_1	A_2	A_3	A_4	A_5	Port X
28	105	135,5	119	40	119	M14x1,5; 12 deep
45	105	145,5	129	40	134	M14x1,5; 12 deep
71	105	159,5	143	40	162	M14x1,5; 12 deep
100	105	164,5	148	40	229	M14x1,5; 12 deep
140	125	209	183	26	244	M14x1,5; 12 deep

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.

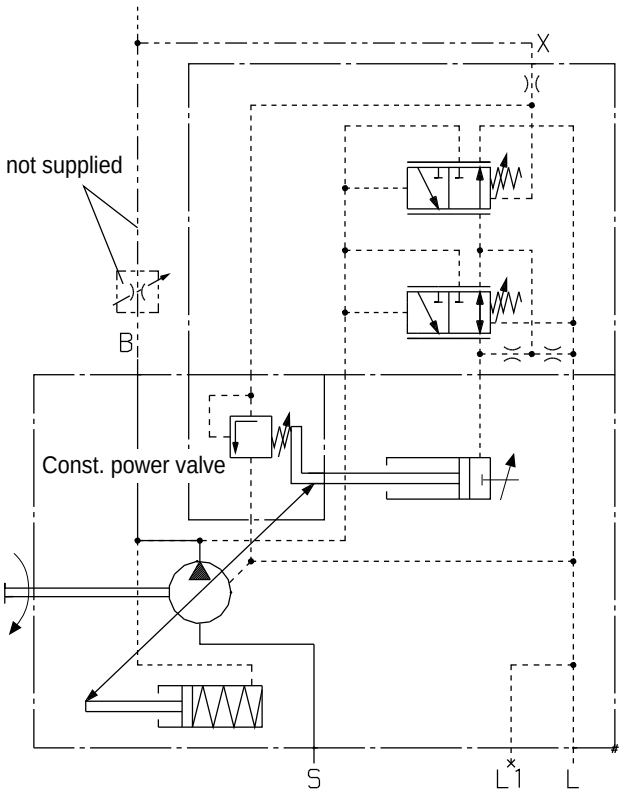
Static Operating Curve



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 ± 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.

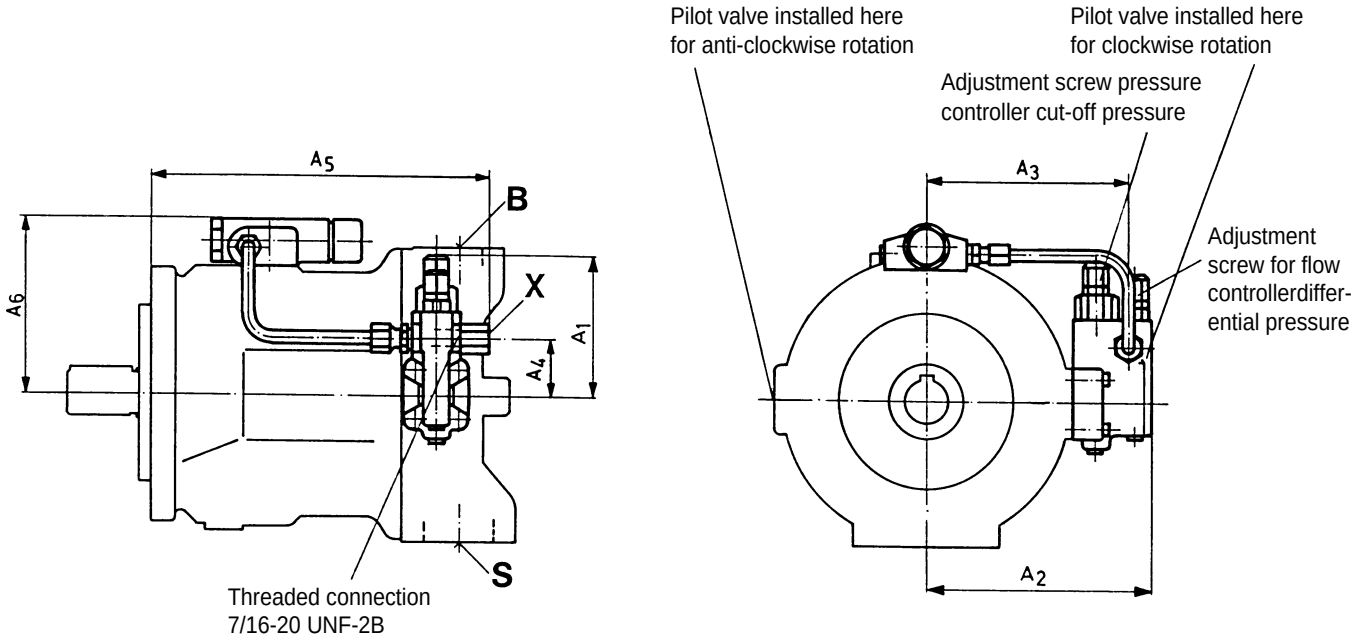


Ports

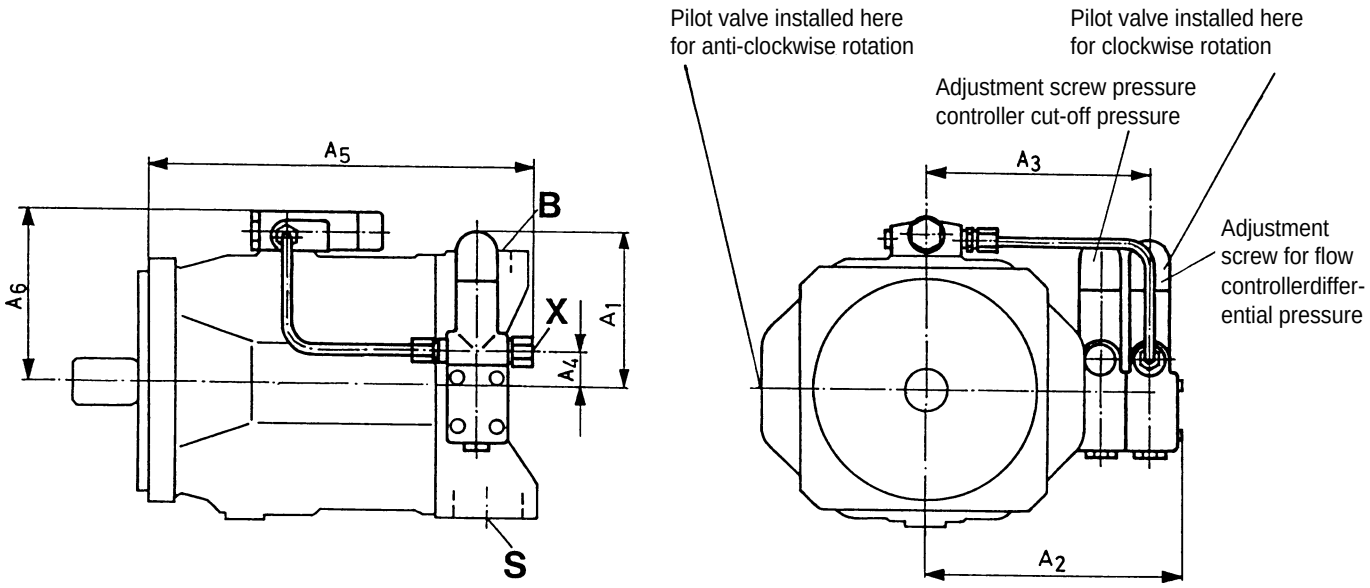
B	Pressure port
S	Suction port
L, L1	Case drain ports (L1 plugged)
X	Pilot pressure port

Unit dimensions
Constant pressure / flow / DFLR

Sizes 28…100



Size 140

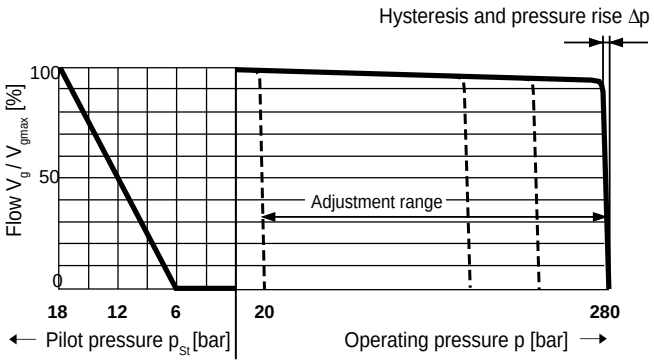


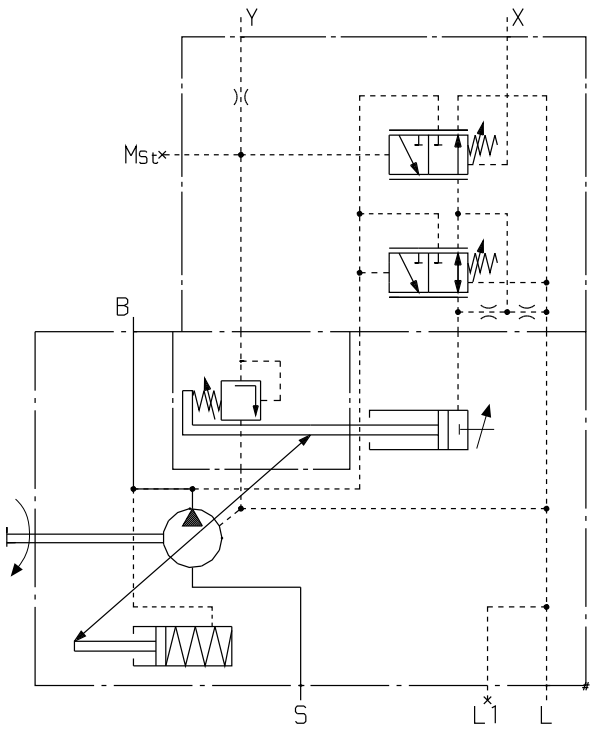
Size	A_1	A_2	A_3	A_4	A_5	A_6	Port X
28	105	135,5	119	40	197	106,5	M14x1,5; 12 deep
45	105	145,5	129	40	212	112	M14x1,5; 12 deep
71	105	159,5	143	40	240	126	M14x1,5; 12 deep
100	105	164,5	148	40	307	129	M14x1,5; 12 deep
140	125	209	183	26	314	139,5	M14x1,5; 12 deep

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 $P_{St\,X}$ 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° C)





Controller data

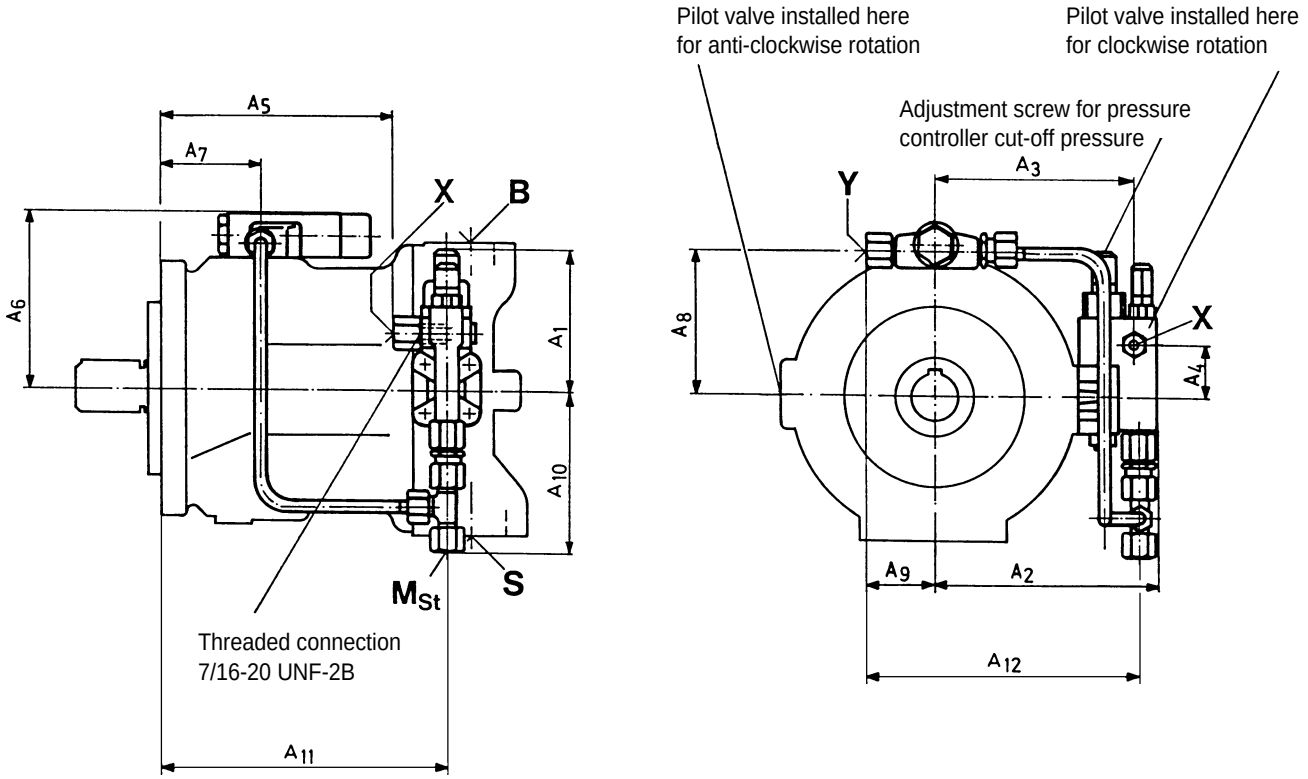
Hysteresis ± 2 % of $V_{g\,max}$
External pilot oil consumption in Y approx. 3 ... 4,5 L/min max.
Pressure rise Δp _____ max. 4 bar
Flow loss at Q_{max} see pages 7 and 8.

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

Sizes 28…100

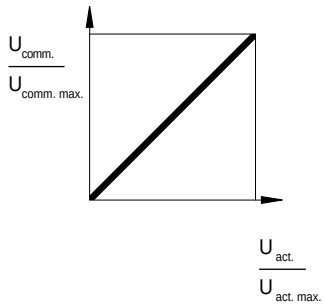


Size	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9	A_{10}	A_{11}	A_{12}	Port X	Port Y	M_{St}
28	105	135,5	119	40	119	106,5	48	86	51	113	158	124	M14x1,5	M14x1,5	Pipe dia ø8x1,5 DIN 2391
45	105	145,5	129	40	134	112	54	91,5	51	113	173	134	M14x1,5	M14x1,5	Pipe dia ø8x1,5 DIN 2391
71	105	159,5	143	40	162	124	69	103,5	51	113	201	148	M14x1,5	M14x1,5	Pipe dia ø8x1,5 DIN 2391
100	105	164,5	148	40	229	129	111	108,5	51	113	268	153	M14x1,5	M14x1,5	Pipe dia ø8x1,5 DIN 2391
140	125	209	183	26	244	139,5	99	119	51	150	268	183	M14x1,5	M14x1,5	Pipe dia ø8x1,5 DIN 2391

FE Electrical flow control

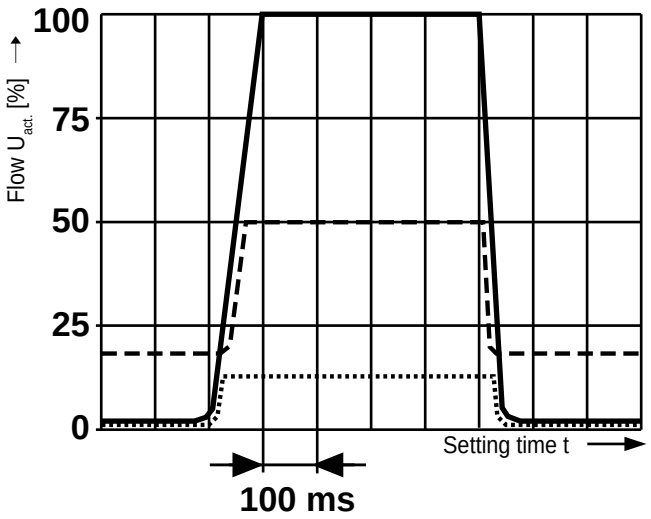
The output flow of the pump is set by an electrically controlled proportional valve.
Flow control is achieved by means of the variable swivel angle of the pump, possible variations in drive speed (e.g. diesel engine speeds) are not taken into consideration.
The swivel angle of the pump is fed back via 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 /amplfier module are used to control pump flow and should be ordered separately.

Static Curve

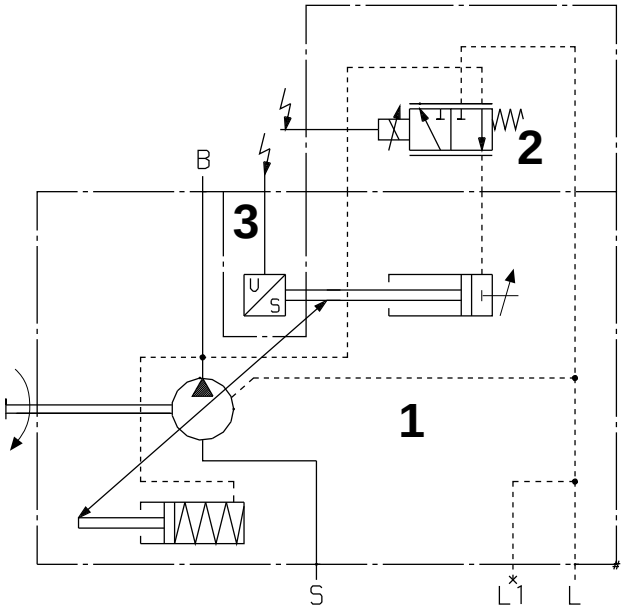


Dynamic curve

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

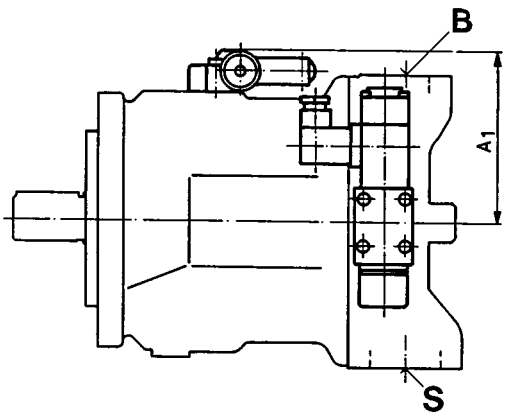
Minimum setting pressure required _____ 20 bar
Pilot oil consumption _____ max. 2,5 L/min approx.
Hysteresis _____ ≤ ± 1 % of $V_{g\,max}$
Repeatability _____ ≤ ± 1 %
Flow loss at Q_{max} see pages 7 and 8.

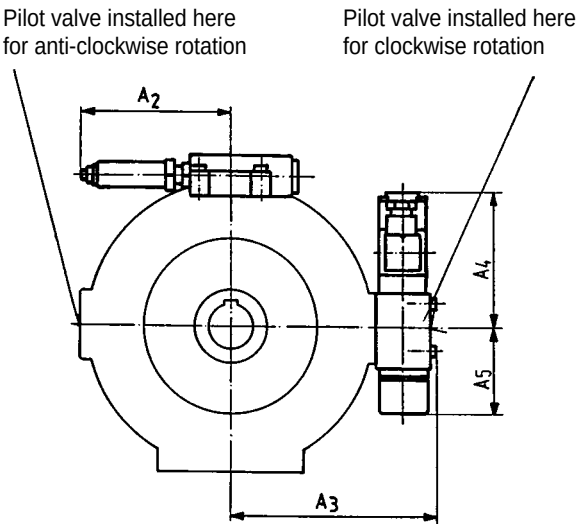
Pilot valve:
Type of voltage _____ DC
Nominal voltage _____ 24 V
Coil resistance at 20° C _____ 12 Ω
Duty _____ 100 %
Ambient temperature _____ ...50° C
Coil temperature _____ ...150° C
Insulation to DIN 40050 _____ IP 65
Insulation class to VDE 0580 _____ F

Inductive positional transducer:
Carrier frequency _____ 1000 Hz...5000 Hz
Inductivity _____ 9.5 mH

Unit dimensions
Electrical flow controller FE

Sizes 28…100





Size	A_1	A_2	A_3	A_4	A_5
28	106	106,5	160	95	61
45	112	106,5	170	95	61
71	124	106,5	184	95	61
100	129	106,5	189	95	61
140	139,5	106,5	227	80	76,5

FED Electrical flow controller with pressure cut-off

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

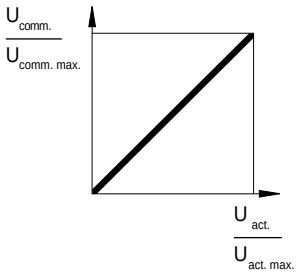
Control of output flow is achieved by varying the swivel angle of the pump. Possible variations in drive speed (e.g. diesel engine speeds) are not taken into consideration.

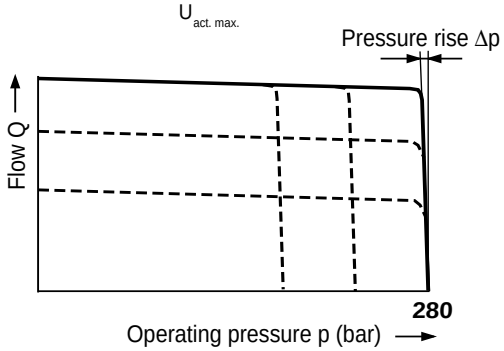
The position of the pump is fed back via an inductive positional transducer to amplifier card VT 5036 (RE 29957) or amplifier module VT 11019 (RE 29763).

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.

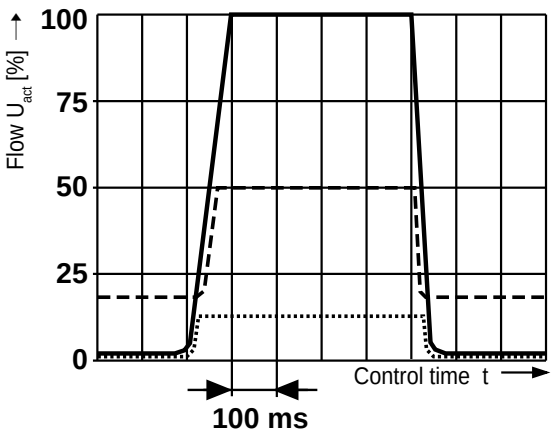
Static curves



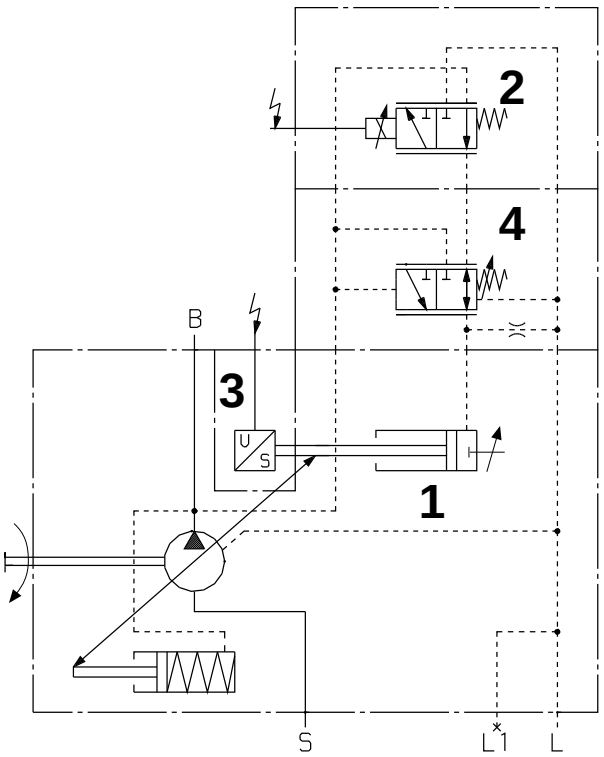


Dynamic curve

Displacement time characteristics
measured: A10VSO 45 FE
Stepped press. signal value against 100 bar (press. relief valve)



_____ 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
4 Sandwich plate valve

Control data

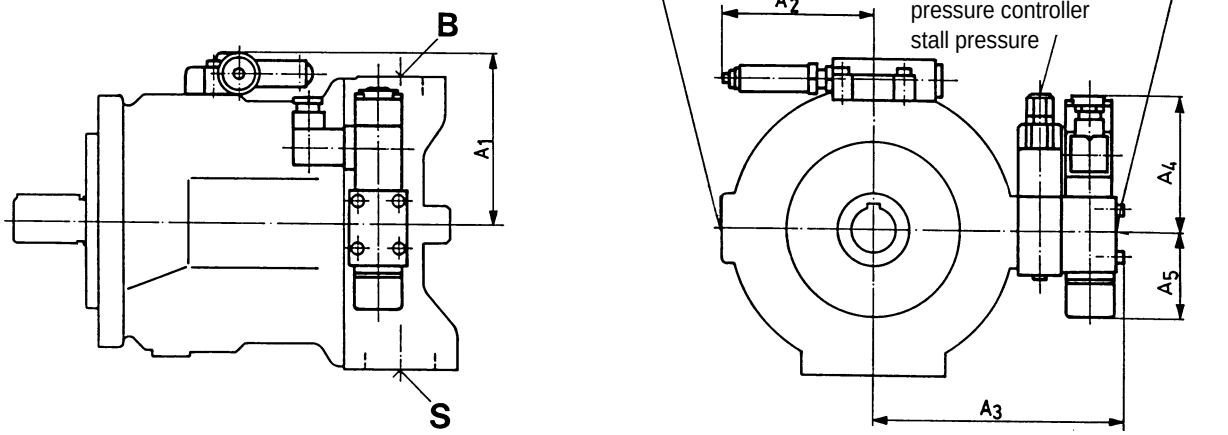
Minimum setting pressure required _____ 20 bar
Pilot oil consumption _____ approx. 3 L/min max.
Δp pressure rise _____ max. 4 bar
Hysteresis _____ ≤ ± 1 % of $V_{g\,max}$
Repeatability _____ ≤ ± 1 %
Flow loss at Q_{max} see pages 7 and 8

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	106	106,5	195	105	61
45	112	106,5	205	105	61
71	124	106,5	219	105	61
100	129	106,5	224	105	61
140	139,5	106,5	262	105	76,5

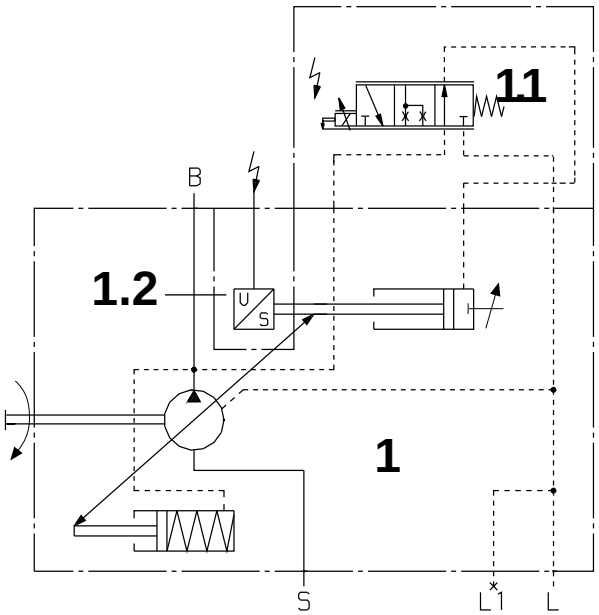
DFE1 Electronic pressure and flow control

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.

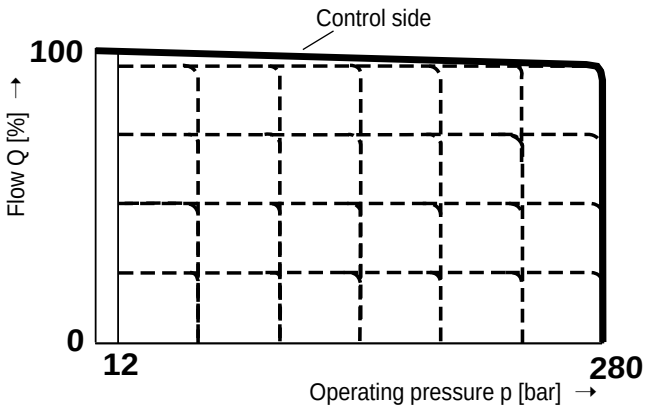
The DFE1 model pump is suitable for control applications in conjunction with analogue amplifier card VT 5041.
The amplifier card and the pressure sensor should be ordered separately.

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

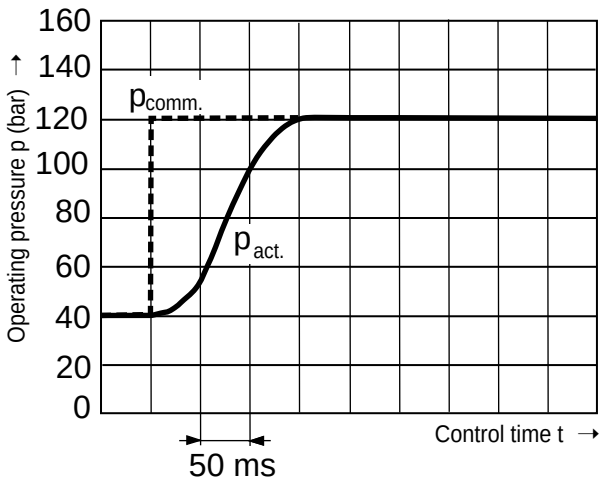
1 A10VSO with hydraulic control device
1.1 Proportional valve
1.2 Inductive positional transducer
Pressure sensors and electronic control items are supplied 'loose' (please order separately as per RE 67016)

Control data

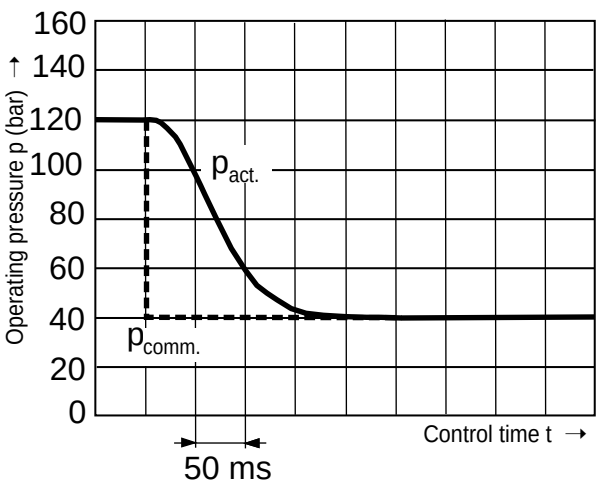
Hysteresis — < 1% of $V_{g\,max}$
Repeatabilityt — < 1%
Pilot oil consumption — approx. 2,5 L/min max.
Loss of flow at Q_{max} see pages 7 and 8.

Dynamic curves

Stepped pressure signal value e.g. 40 bar – 120 bar
DFE1 45 with oil compression volume (5L)

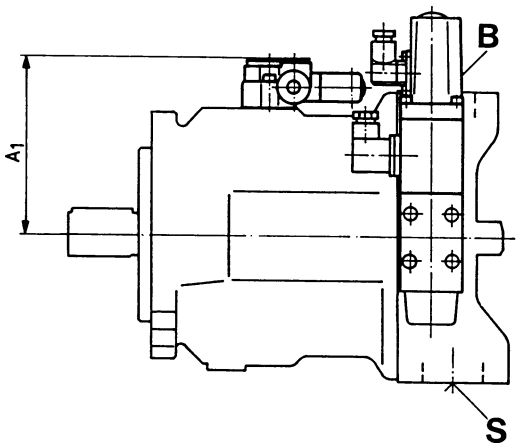


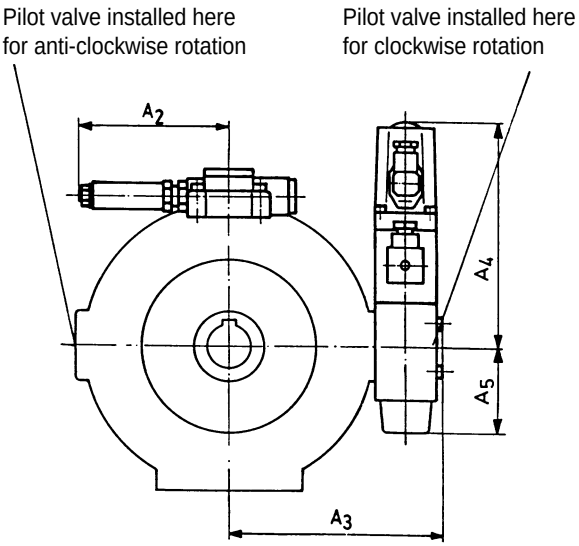
Stepped pressure signal value e.g.120 bar – 40 bar
DFE1 45 with oil compression volume (5L)



Unit dimensions
DFE1 Electronic pressure and flow control

Sizes 28…100





Size	A_1	A_2	A_3	A_4	A_5
28	106	106,5	170,5	158	63
45	112	106,5	180,5	158	63
71	124	106,5	194,5	158	63
100	129	106,5	199,5	158	63
140	139,5	106,5	237,5	143	78

Type list	**short delivery time**						
Ident.-Nr.	**Type**						
936130	A10VSO 28 DFLR	/31R-PPA12N00	25N	945179	A10VSO 71 DFR	/31R-PPA12K27	
936062	A10VSO 28 DFLR	/31R-PPA12N00	35N	942635	A10VSO 71 DFR	/31R-PPA12N00	
936059	A10VSO 28 DFLR	/31R-PPA12N00	100N	947872	A10VSO 71 DFR1	/31R-PPA12K02	
940936	A10VSO 28 DFLR	/31R-PPA12N00	70N	944440	A10VSO 71 DFR1	/31R-PPA12N00	
939026	A10VSO 28 DFLR	/31R-PPA12N00	50N	945133	A10VSO 71 DR	/31R-PPA12N00	
903160	A10VSO 28 DFR	/31R-PPA12N00		947898	A10VSO 71 DRG	/31R-PPA12N00	
926318	A10VSO 28 DFR1	/31R-PPA12K01		936207	A10VSO 100 DFLR	/31R-PPA12N00	140N
910590	A10VSO 28 DFR1	/31R-PPA12N00		936738	A10VSO 100 DFLR	/31R-PPA12N00	200N
907919	A10VSO 18 DR	/31R-PPA12K01		936473	A10VSO 100 DFLR	/31R-PPA12N00	100N
903163	A10VSO 28 DR	/31R-PPA12N00		936790	A10VSO 100 DFLR	/31R-PPA12N00	245N
936910	A10VSO 45 DFLR	/31R-PPA12N00	100N	934823	A10VSO 100 DFLR	/31R-PPA12N00	120N
936912	A10VSO 45 DFLR	/31R-PPA12N00	145N	944032	A10VSO 100 DFLR	/31R-PPA12N00	360N
936739	A10VSO 45 DFLR	/31R-PPA12N00	120N	943468	A10VSO 100 DFLR	/31R-PPA12N00	300N
935975	A10VSO 45 DFLR	/31R-PPA12N00	50N	939643	A10VSO 100 DFR	/31R-PPA12N00	
940582	A10VSO 45 DFLR	/31R-PPA12N00	70N	927083	A10VSO 100 DFR1	/31R-PPA12K02	
909613	A10VSO 45 DFR	/31R-PPA12K01		922744	A10VSO 100 DFR1	/31R-PPA12N00	
911010	A10VSO 45 DFR	/31R-PPA12K26		912007	A10VSO 100 DR	/31R-PPA12N00	
939183	A10VSO 45 DFR	/31R-PPA12N00		936094	A10VSO 140 DFLR	/31R-PPB12N00	300N
927068	A10VSO 45 DFR1	/31R-PPA12K02		935974	A10VSO 140 DFLR	/31R-PPB12N00	200N
908725	A10VSO 45 DFR1	/31R-PPA12N00		941109	A10VSO 140 DFLR	/31R-PPB12N00	365N
907403	A10VSO 45 DR	/31R-PPA12N00		938977	A10VSO 140 DFLR	/31R-PPB12N00	245N
944067	A10VSO 71 DFLR	/31R-PPA12N00	100N	943841	A10VSO 140 DFLR	/31R-PPB12N00	500N
944730	A10VSO 71 DFLR	/31R-PPA12N00	120N	939192	A10VSO 140 DFR	/31R-PPB12N00	
942654	A10VSO 71 DFLR	/31R-PPA12N00	145N	927126	A10VSO 140 DFR1	/31R-PPB12K02	
944502	A10VSO 71 DFLR	/31R-PPA12N00	70N	921546	A10VSO 140 DFR1	/31R-PPB12N00	
948790	A10VSO 71 DFLR	/31R-PPA12N00	200N	922983	A10VSO 140 DR	/31R-PPB12N00	
961216	A10VSO 71 DFLR	/31R-PPA12N00	240N	932852	A10VSO 140 DRG	/31R-PPB12N00	

Through drive

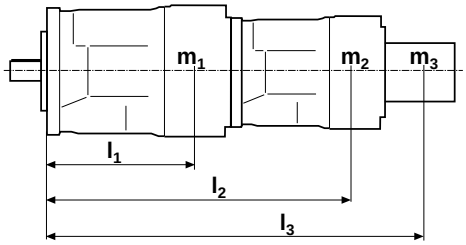
The A10VSO pump can be supplied with through drive in accordance with the type code on page 3.
Code (K01–K59) is used to identify the through drive model.
The following items are included in the supply:

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

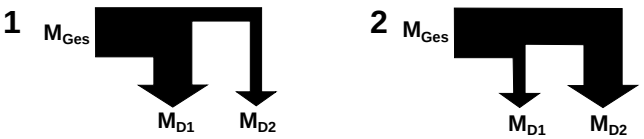


m_1, m_2 [kg] Pump weight
l_1, l_2 [mm] Centre to centre spacing

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

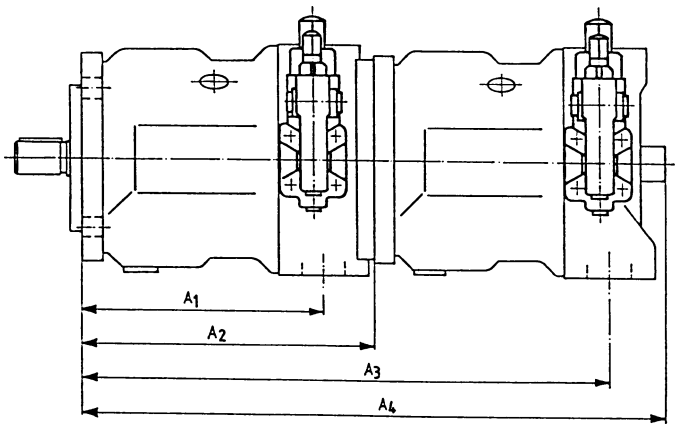
Permissible through drive torque



Size				28	45	71	100	140
Max. perm. total through drive torque at shaft pump 1 (Pump1 + Pump 2)		$M_{vel. max}$	Nm	156	249	392	618	867
1	Permissible through drive torque	M_{D1max}	Nm	125	200	316	445	623
		M_{D2max}	Nm	31	49	76	173	244
2	Permissible through drive torque	M_{D1max}	Nm	31	49	76	173	244
		M_{D2max}	Nm	125	200	316	445	623

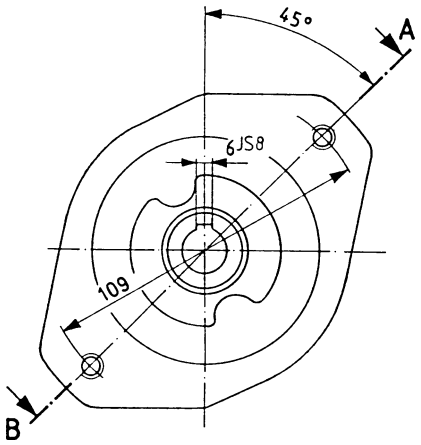
Unit dimensions: combination pumps

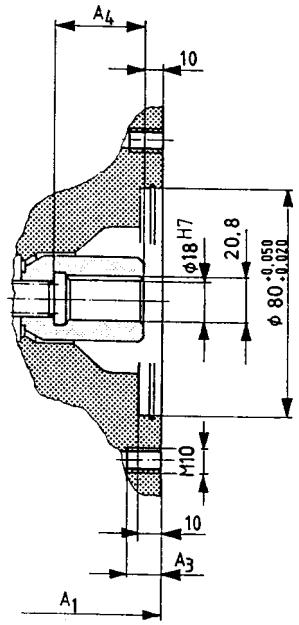
A10VSO + A10VSO



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**

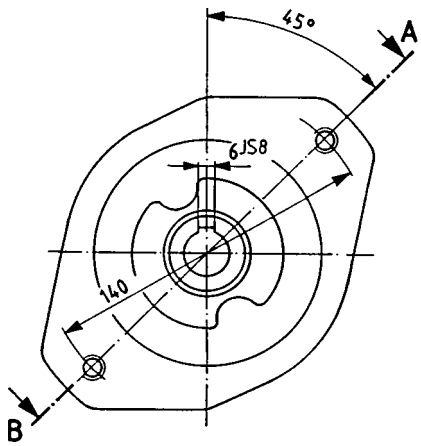


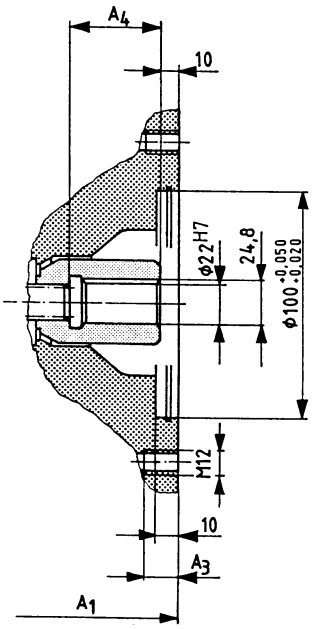


to pump mounting flange

Size	A_1	A_3	A_4
18	182	16	33
28	204	16	37
45	229	16	43
71	267	20	51
100	338	20	55
140	350	20	67

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

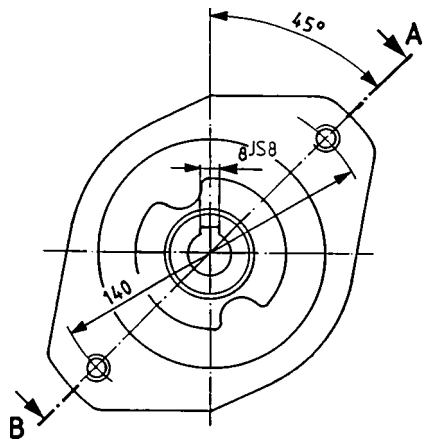


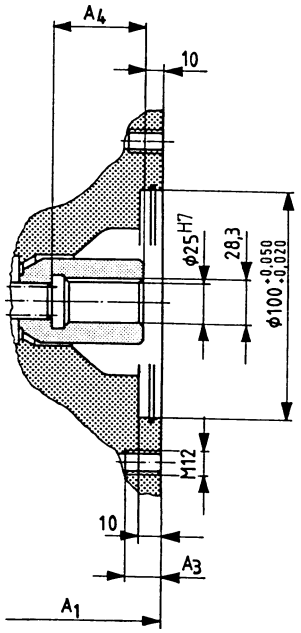


to pump mounting flange

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

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

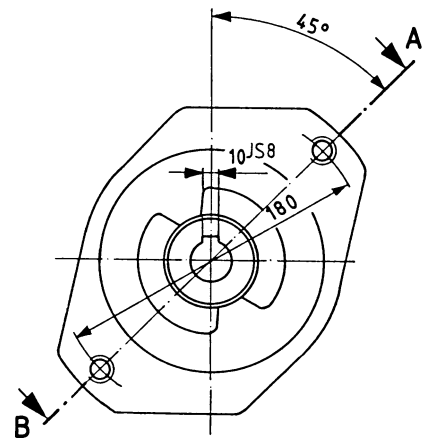


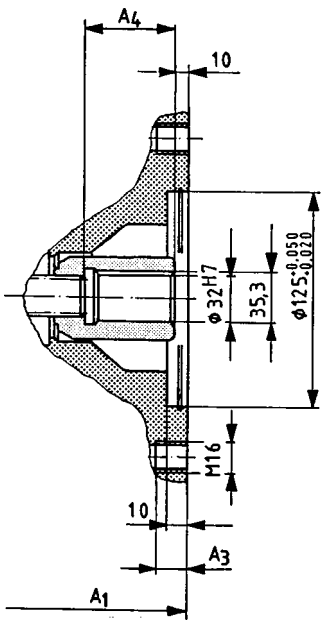


to pump mounting flange

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**

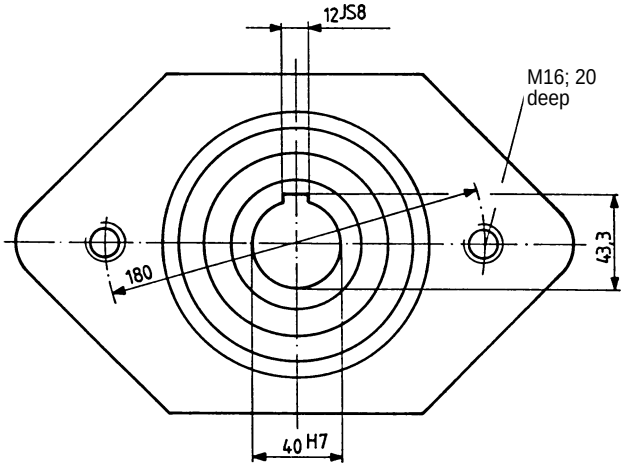


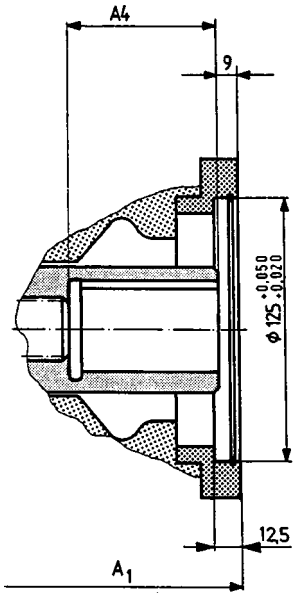


to pump mounting flange

Size	A_1	A_3	A_4
71	267	18	51
100	338	20	54
140	350	24	63

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

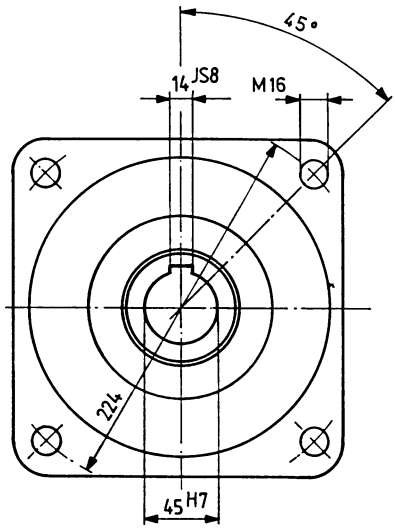


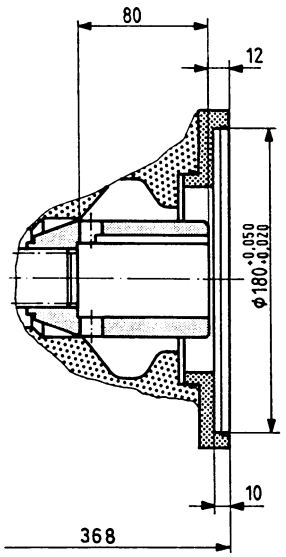


to pump mounting flange

Size	A_1	A_4
100	356	71
140	368	80

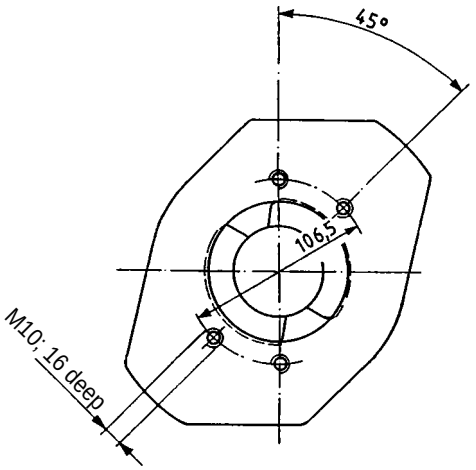
Built-on A10VSO 140;
Order code **K59**

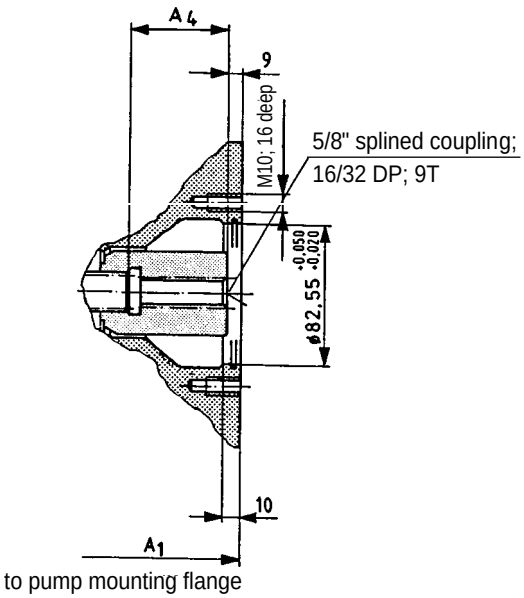




to pump mounting flange

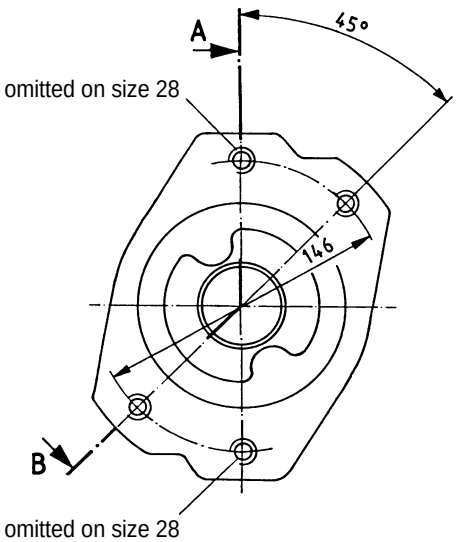
Dimensions
SAE A for built-on gear pump G2
(see RE 10030), order code **K01**

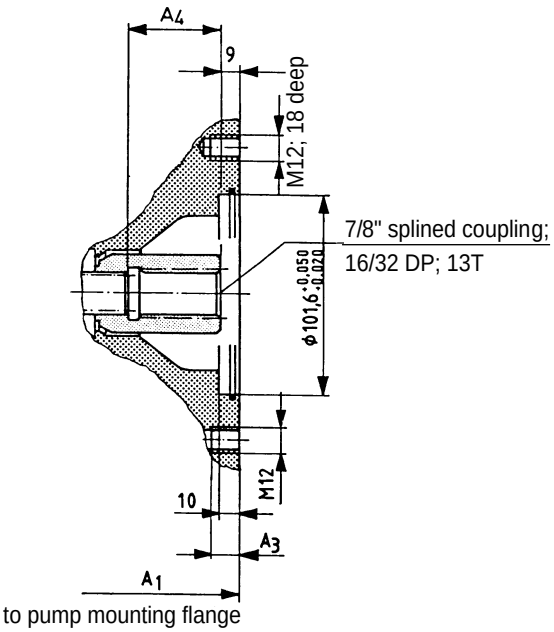




Size	A_1	A_4
18	182	34,3
28	204	38
45	229	44
71	267	52
100	338	56
140	350	68

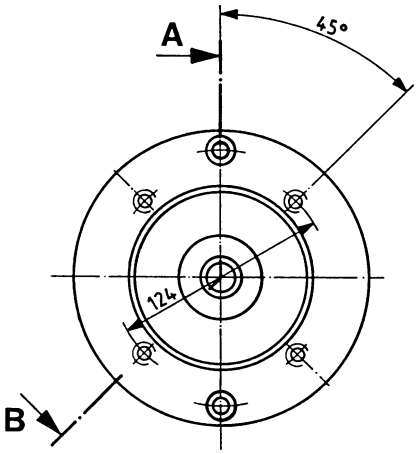
SAE B for built-on G3 (see RE 10039);
Order code **K02**

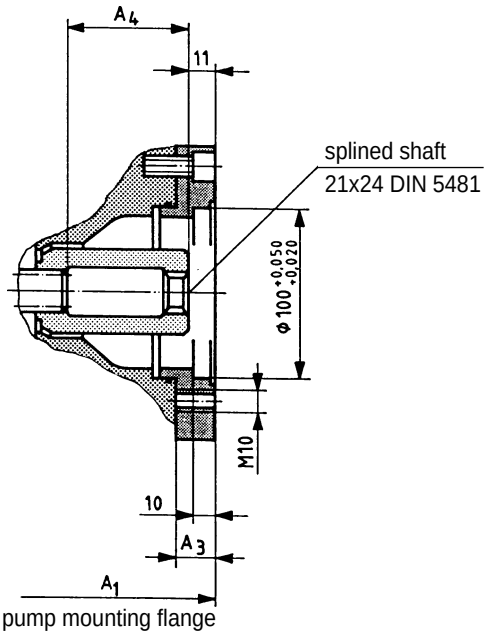




Size	A_1	A_3	A_4
28	204	14	38
45	229	18	44
71	267	20	52
100	338	20	56
140	350	20	68

ISO 100, 4-hole, for built-on internal gear pump GU(1)
(shaft G, see RE10211), order code **K54**
not for new projects, if required please consult us.





On size 28 the fixing holes are offset by 45° for design reasons

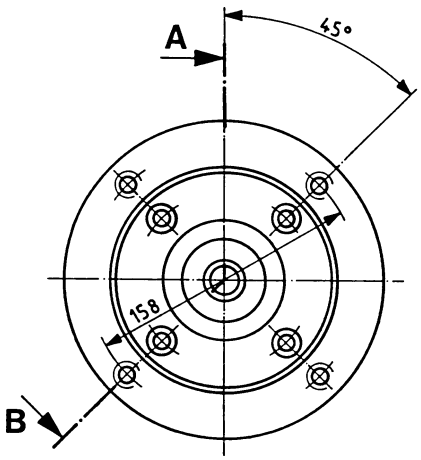
Size	A_1	A_3	A_4
28	226	22	58
45	251	22	65
71	289	22	72
100	360	22	77
140	372	22	86,5

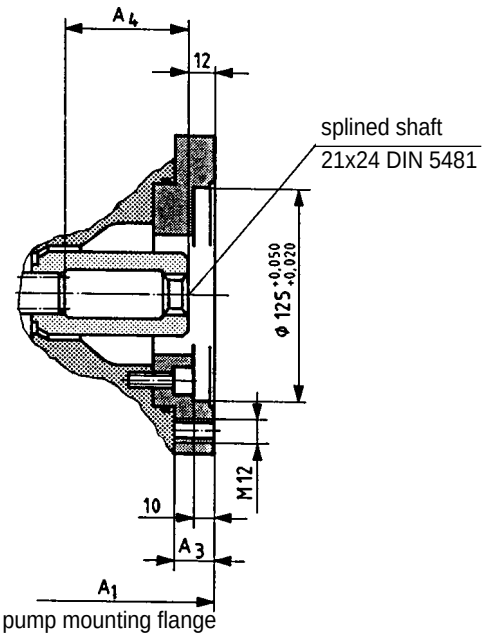
When ordering separately please give the following information:

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.

ISO 125, 4-hole, for built-on internal gear pump GU(2)
(shaft G, see RE 10211), order code **K55.**
Not for new projects; if required please consult us.





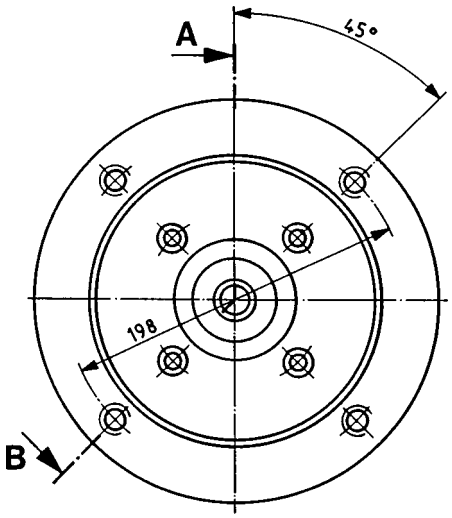
Size	A_1	A_3	A_4
45	262	18	73
71	290	20	72
100	361	23	78
140	372	22	86

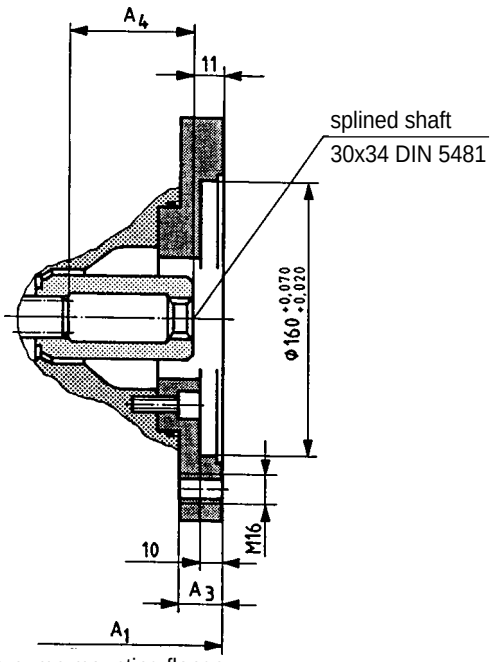
When ordering separately please give the following information:

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.

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.





to pump mounting flange

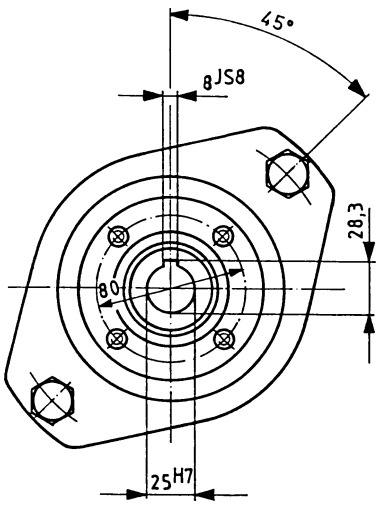
Size	A_1	A_3	A_4
71	291	22	74
100	363	22	79
140	350	22	66

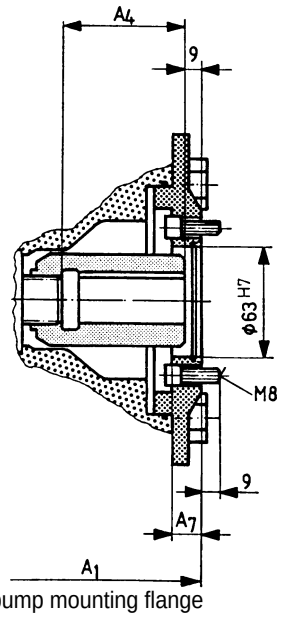
When ordering separately please give the following information:

1 PF2G $\begin{matrix}U\\N\end{matrix}$ $\begin{matrix}1-1X\\2-2X/...RG\ 07\\3-1X\end{matrix}$ $\begin{matrix}M\\V\end{matrix}$ K O

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**





to pump mounting flange

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