VARAK

HYDRAULICS

FIXED DISPLACEMENT PUMP

HI-TECH HYDRAULICS

DETAIL CATALOGUE

VARAK HYDRAULICS

FIXED DISPLACEMENT PISTON PUMP/MOTOR

A2F

Fixed Displacement Pump/Motor
For Open & Closed circuit
Size 10 to 500 ml/r
Maximum pressure : 400 bar

Introduction

Axial piston unit of bent axis design with fixed displacement for use either pump of motor in hydrostatic drivers, in open or closed circuit. If operated as a pump, the flow is proportional to the drive speed and displacement.
If operated as a motor, the output speed is proportional to the swept volume and inversely proportional to displacement. The output torque increases with the pressure drop between the high and low pressure sides.

Features

- **High performance rotary group with well-proven spherical control area with the advantages: self-centring low peripheral speed, high efficiency.**
- **Robust rolling bearings endure long service life.**
- **Drive shaft capable of adopting radial loading.**
- **ISO mounting flange, uniform for fixed displacement pumps/motors and variable motors from size 55**
- **May be used in conjunction with fire-resistant fluids**
- **Low Noises generation.**

Ordering code

Fixed Displacement Pump/Motor = A2F

Displacement (ml/r)

9.4	=10
11.6	=12
22.7	=23
28.1	=28
44.3	=45
54.8	=55
63.0	=63
80.0	=80
107	=107
125	=125
160	=160
200	=200
250	=250
355	=355
500	=500

Port Plate
1,2,3,4
(Below Table)

Shaft end
P = Keyed shaft (GB 1096-79)
Z = Splined shaft DIN 5480
S = Splined shaft GB 3478.1-83

Series
1,2,3,4,5
(Below table)

Direction of rotation (view from shaft end)
R = Clockwise
L = Anti-clockwise
W = Alernating
(Not for pumps in open circuit)

Series		4	2/3	1/2	1/2	2	1/2	2	5							
size		10	12	23	28	45	55	63	80	107	125	160	200	250	355	500
Port plate 1	1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	2				●	●	●	●	●	●	●	●	●	●	●	●
	3					●	●	●	●	●	●	●				
	4	●	●	●	●											

Port plate 1

Size	10-160	200-500
Pump operation in closed circuit and motor operation	1. metric threads	1. Flange
	2. SAE Flange	
Pump operation in open circuit	3. Flage	1. Flange
	4. metric threads	

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FIXED DISPLACEMENT BENT AXIS PISTON PUMP

A2FO

Fixed Displacement Bent Axis piston pump
Size 10 to 180 cc
Nominal pressure: 400 bar
Maximum pressure: 450 bar

Features

- **Fixed displacement pump A2FO of axial piston, bent axis design is made suitable for hydrostatic drives in open circuits.**
- **Suitable for use in mobile or industrial applications.**
- **Output flow is proportional to drive speed and displacement.**
- **The drive sharp bearings are designed to give the service life expected in these areas of operation.**
- **Careful selection of the displacements offered, permit sizes to be matched to practically every application.**
- **Favorable power/weight ratio.**
- **Compact and economical design.**
- **Optimum efficiency.**
- **One piece positions with piston rings.**

Specifications

Size				10	12	16	23	28	32	45	56
Displacement		V_g	cm^3	10.3	12.0	16.0	22.9	28.1	32	45.6	56.1
Max. speed		n_{max} 1)	rpm	3150	3150	3150	2500	2500	2500	2240	2000
Max. perm. speed with increased input pressure P_{abs}		$n_{max.perm.}$ 2)	rpm	6000	6000	6000	4750	4750	4750	4250	3750
Max. perm. output flow at n_{max}		q_{vmax}	l/min	32.4	37.8	50	57	70	80	102	112
Max. power at q_{vmax}	Δp=350 bar	P_{max}	kW	18.9	22	29.2	33	41	47	59.5	65
	Δp=400 bar	P_{max}	KW	21.6	25	34	38	47	53	68	75
Perm. torque	Δp=350 bar	T	Nm	57	67	88	126	156	178	254	312
	Δp=400 bar	T	Nm	65	76	101	145	178	203	290	356
Case volume			L	0.17	0.17	0.17	0.20	0.20	0.20	0.33	0.45
Weight (approx.)		m	kg	6	6	6	9.5	9.5	9.5	13.5	18

Size				63	80	90	107	125	160	180
Displacement		V_g	cm^3	63	80.4	90	106.7	125	160.4	180
Max. speed		n_{max} 1)	rpm	2000	1800	1800	1600	1600	1450	1450
Max. perm. speed with increased input pressure P_{abs}		$n_{max.perm.}$ 2)	rpm	3750	3350	3350	3000	3000	2650	2650
Max. perm. output flow at n_{max}		q_{vmax}	l/min	126	144	162	170	200	232	261
Max. power at q_{vmax}	Δp=350 bar	P_{max}	kW	73.5	84	95	100	117	135	152
	Δp=400 bar	P_{max}	KW	84	96	108	114	133	155	174
Perm. torque	Δp=350 bar	T	Nm	350	445	501	594	696	893	1003
	Δp=400 bar	T	Nm	400	511	572	678	795	1020	1145
Case volume			L	0.45	0.55	0.55	0.8	0.8	1.1	1.1
Weight (approx.)		m	kg	18	23	23	32	32	45	45

1) the values shown are valid for an absolute pressure (P_{abs}) of 1 bar at the suction inlet S and when operated on mineral oil (with a specific mass of 0.88kg/L).
2) by increase of the input pressure (P_{abs} > 1 bar) the rotational speeds can be increased to the max. admissible speeds n_{max} limit (speed limits)

Determining the size:

Flow $q_v = \frac{V_g \times n \times \eta_v}{1000}$ [L/min]

Torque $T = \frac{V_g \times \Delta P}{20\pi \times \eta_{mh}}$ [Nm]

Power $P = \frac{2\pi \times T \times n}{60000} = \frac{q_v \times \Delta P}{600 \times \eta_t}$ [kW]

V_g = Displacement per revolution in mL/r
ΔP = Differential pressure in bar
n = Speed in rpm
η_v = Volumetric efficiency
η_{mh} = Mechanical-hydraulic efficiency
η_t = Overall efficiency

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FIXED DISPLACEMENT BENT AXIS PISTON PUMP

Ordering code

Axial piston unit
Bent axis design, fixed displacement
for use with mineral oil = A2F

Mode of operations
Pump, Open circuit = O

Size (Displacement V mL/rg³)
10, 12, 16, 23, 28, 32, 45, 56, 63, 80, 90, 107, 125, 160, 180

Series = 6

Index = 1

Direction of rotation(View on shaft end)
Clockwise = R
Anti-Clockwise = L

Seals
NBR (nitril- caoutchouc) = P
FKM (fluor- caoutchouc) = V

Shaft end	10	12	16	23	28	32	45	56	63	80	90	107	125	160	180	
Splined shaft DIN 5480	●	●	●	●	●	●	-	●	●	●	●	●	●	●	●	A
	●	●	-	●	●	-	●	●	-	●	-	●	-	●	-	Z
Parallel shaft with key, DIN 6885	●	●	●	●	●	●	-	●	●	●	●	●	●	●	●	B
	●	●	-	●	●	-	●	●	-	●	-	●	-	●	-	P

Flange mounting	10	12	16	23	28	32	45	56	63	80	90	107	125	160	180	
ISO 4-hole	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	B

Service line connections 1)	10	12	16	23	28	32	45	56	63	80	90	107	125	160	180	
A(B) SAE, at side S SAE, at rear	-	-	-	●	●	●	●	●	●	●	●	●	●	●	●	05
A (B) threads at side S threads, at rear	●	●	●	-	-	-	-	-	-	-	-	-	-	-	-	06

▭ = preferred type
● = available
- = not available

1) fastening threads resp.threaded ports are metric

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