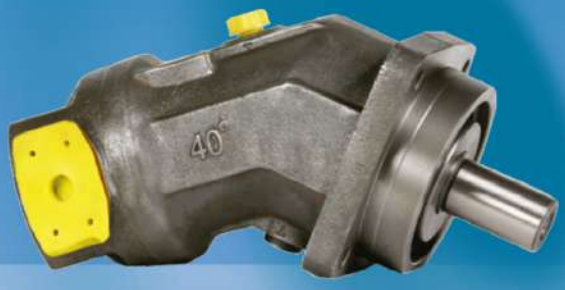
VARAK
HYDRAULICS

FIXED DISPLACEMENT PUMP



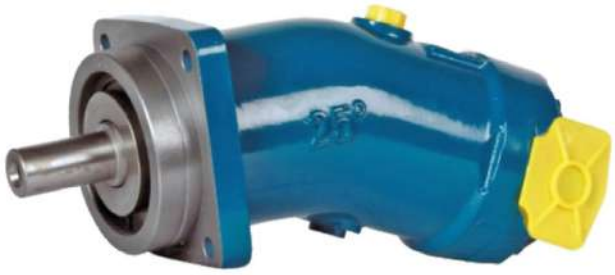
DETAIL CATALOGUE

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

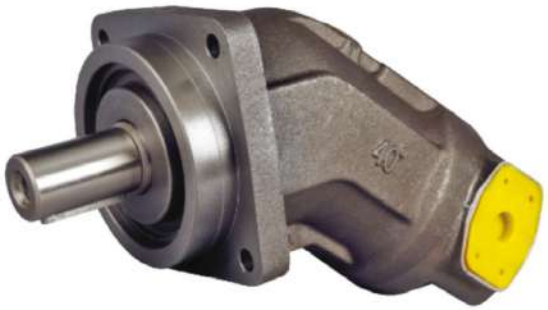
Size	10-160	200-500
Pump operation in closed circuit and motor operation	1. metric threads	1. Flange
	2. SAE Flange	
Pump operation in open circuit	3. Flage	1. Flange
	4. metric threads	

VARAK HYDRAULICS

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

VARAK HYDRAULICS

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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