GENERAL
CATALOGUE
2024

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IRAN HYDRAULIC INDUSTRIES

HYDRAULIC VANE, PISTON AND GEAR PUMPS

IRANIAN HYDRAULIC INDUSTRIES
IDEAL TARA
A DIVISION OF PIROUZ GROUP

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Iran Hydraulic Industries

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Hydraulic Industreis

Iran Hydraulic Industries (IHI) is a member of the **Pirouz Automotive Parts Development Group**. It began its operations in 1986 with the goal of acquiring the technology for manufacturing hydraulic pumps. Currently, ***IHI*** is the only producer hydraulic vane pumps in the Middle East region, as well as fixed-displacement axial piston pumps. To distribute its products and provide after-sales services, ***IHI*** has an extensive network of active representatives throughout the country. Additionally, since 2005, to meet customer demands and complete its sales portfolio, ***IHI*** has been importing hydraulic equipment from top foreign manufacturers. As a member of the industrial community of the country, the company has endeavored to fill the gap in hydraulic equipment by selecting high-quality products at reasonable prices.

IHI's products are widely used in various industries, some of which are listed below:

1. Steel manufacturing plants, including steel melting, pipe making, rolling, and profiling
2. Oil, gas, and petrochemical industries, along with related industries
3. Refractory products factories, brick making, mosaic, tile, and ceramics
4. Marine industries and fishing vessels
5. Construction machinery, mining, drilling, etc.
6. Agricultural machinery and related industries
7. Municipal service machinery
8. Rubber and plastic industries
9. Machinery manufacturing plants for plastic injection, hydraulic presses, shears, guillotines, die casting, etc.

Iran Hydraulic Industries Company strives to achieve the highest production standards and benchmarks by adhering to the following principles:

- Customer orientation
- Utilization of the most modern production methods
- Innovation and updating existing knowledge
- Using machines with the highest level of technology
- Continuous presence in domestic and international markets

Iran Hydraulic Industries

IRANIAN HYDRAULIC INDUSTRIES
IDEAL TARA

Hydraulic Vane (Cartridge) Pumps

Advantages of Hydraulic Vane (Cartridge) Pumps

Hydraulic Vane pumps have a long lifespan, versatile functionality, and high efficiency.

Low noise is another characteristic of these pumps, making them desirable in many industries.

Easy and quick repair and compact size are additional advantages of these pumps.

The overall efficiency of vane pumps is about 90%, with a noise level of 62 db.

These pumps can operate at constant pressures of 175 bar (2500 psi) and at peak pressure of 210 bar (3000 psi).

They are suitable for standard hydraulic oils and chemically-based oils (phosphate ester).

The best performance of these pumps is from 600 rpm to 1800 rpm.

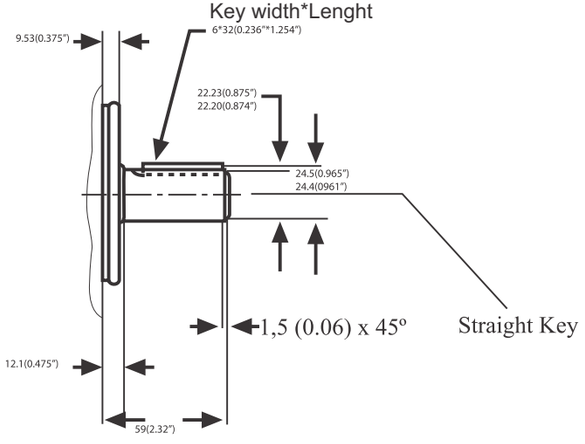
The litrage in single suction pumps ranges from 5 to 60 gallons, and in double suction pumps, the total capacity ranges from 13 to 98 gallons.

They come with an SAE standard mounting flange.

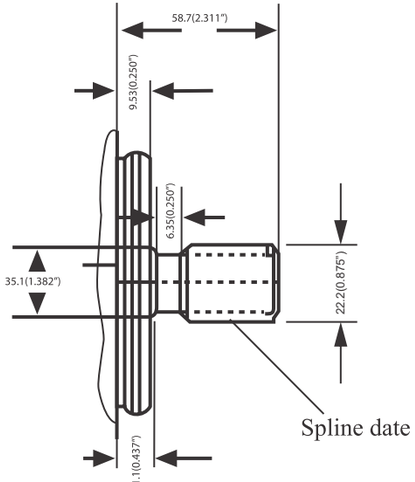
20V/VQ

Technical Specifications

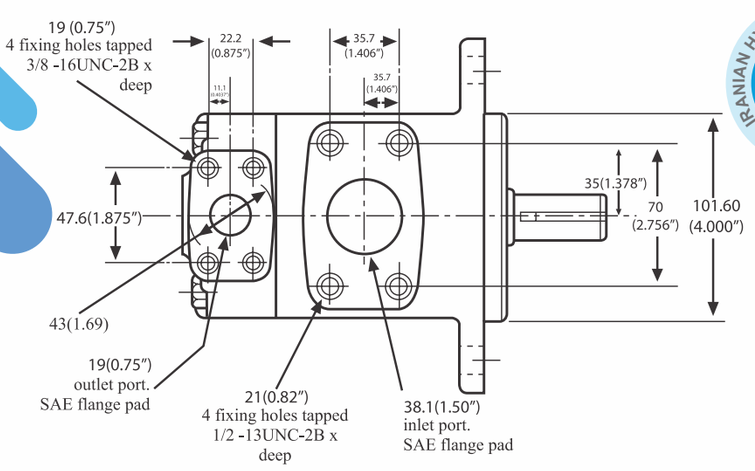
Hydraulic Vane Pump - 20V/VQ Series

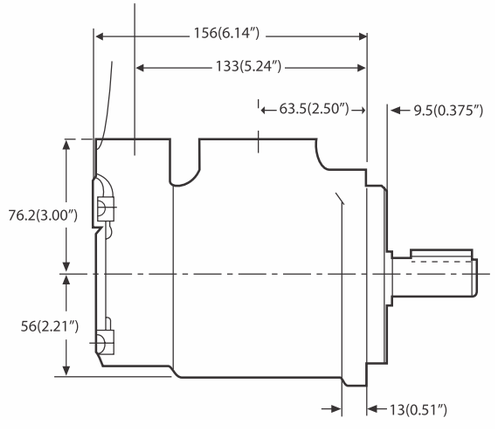


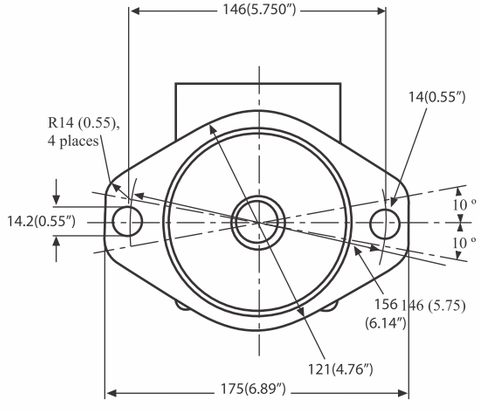
Straight Key Shaft



Splined Shaft (13spl)





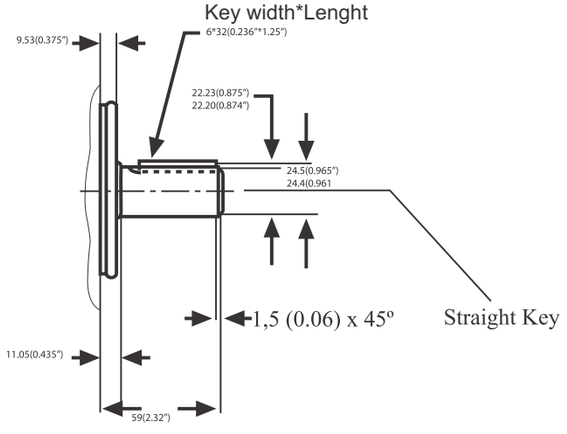


20 V	The flow rate and power consumption of hydraulic vane pumps at 1500 RPM with ISO (VG) hydraulic oil at 40°c and a viscosity of 68 cSt.							
	Displacement cm^3/rev	7 bar		70 bar		140 bar		175 bar	
		L/min	kw	L/min	kw	L/min	kw	L/min	kw
20V5	18	25	0.56	23	4	22	7	20	9
20V8	27	39	0.57	36	5	35	10	33	12
20V11	36	53	1.1	50	7	47	14	55	17
20V12	39	56	1.2	54	8	52	15	—	—
20V14	45	66	1.2	64	9	60	17	—	—

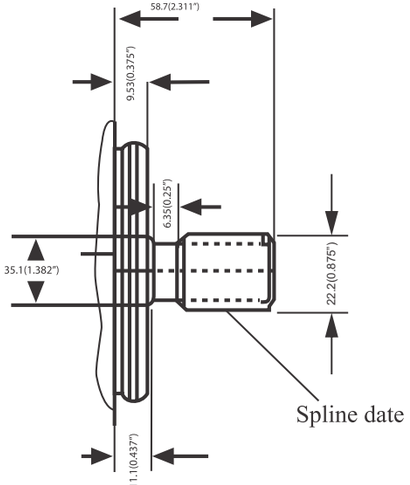
25V/VQ

Technical Specifications

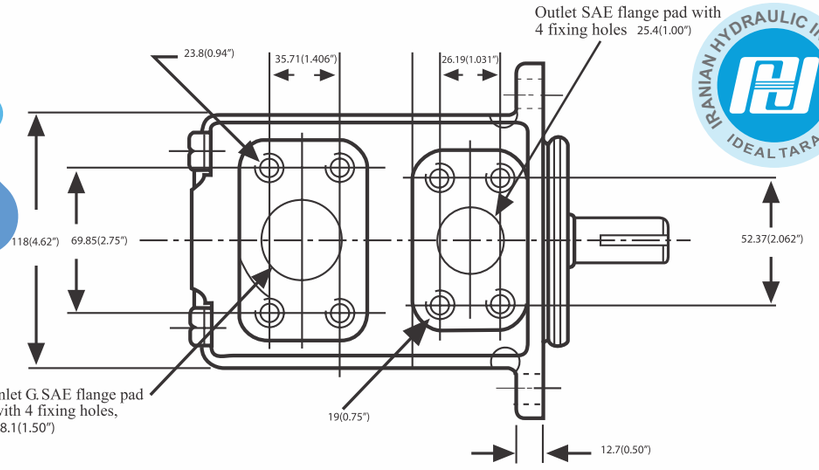
Hydraulic Vane Pump - 25V/VQ Series

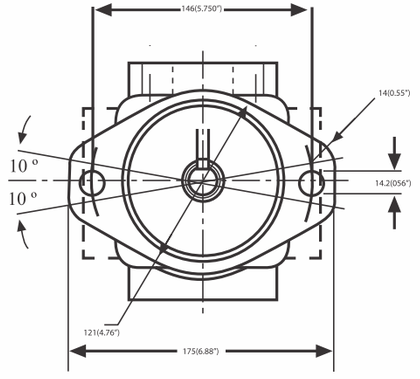


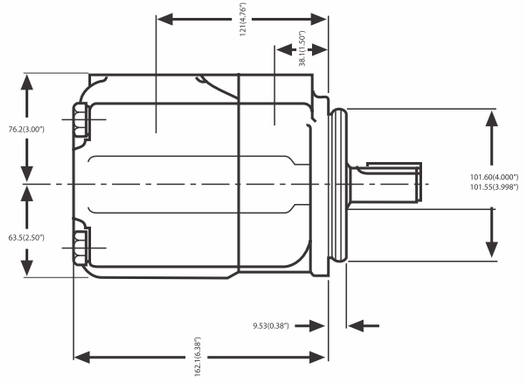
Straight Key Shaft



Splined Shaft (13spl)





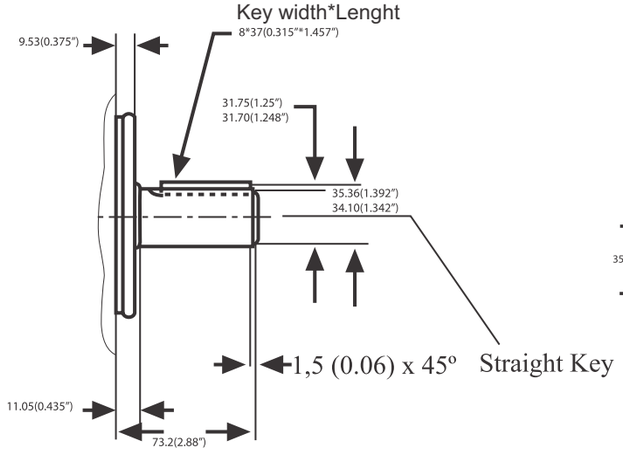


25 V	The flow rate and power consumption of hydraulic vane pumps at 1500 RPM with ISO (VG) hydraulic oil at 40°c and a viscosity of 68 cSt.							
Displacement cm^3/rev	7 bar		70 bar		140 bar		175 bar	
	L/min	kw	L/min	kw	L/min	kw	L/min	kw
25V8	26	38	1.2	36.7	5	35.3	10	32	11.5
25V10	32	48	1.3	45.7	6	44	12	40	14.5
25V12	38	57	1.4	54	7	52	15	47	17
25V14	44	66	1.5	61	9	57	17	56	20
25V17	53	80	1.7	75	10	71	21	68	24
25V19	61	91.8	1.7	86	12	81	24	78	29
25V21	66	99	1.8	94	13	90	26	88	32

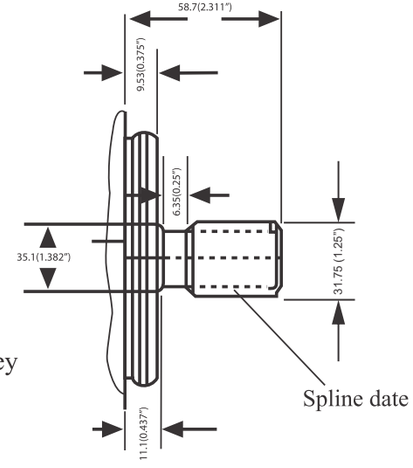
35V/VQ

Technical Specifications

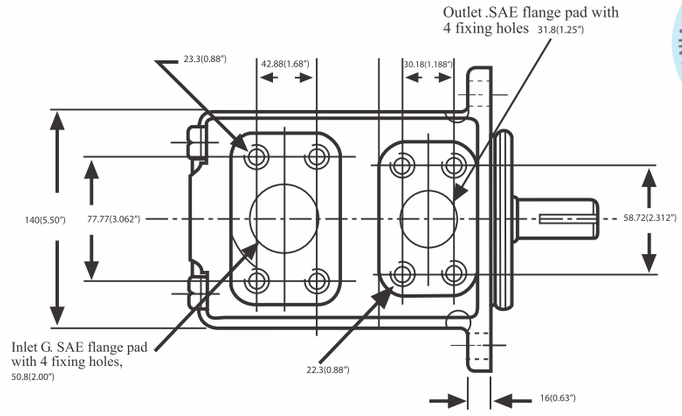
Hydraulic Vane Pump - 35V/VQ Series

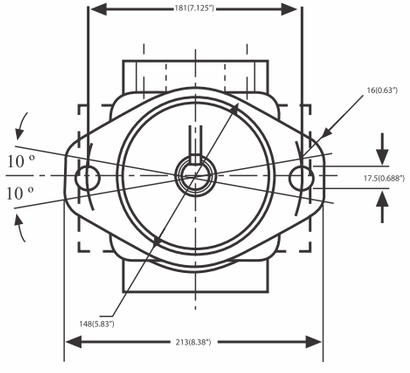


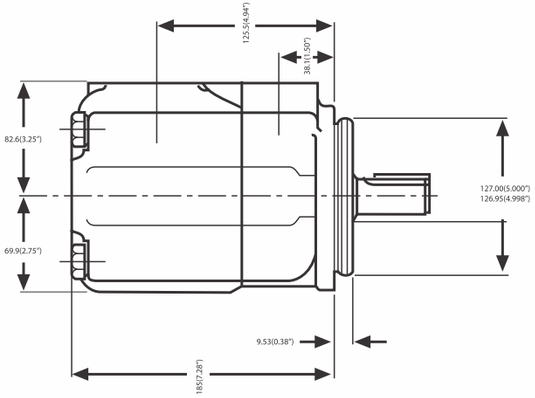
Straight Key Shaft



Splined Shaft (14spl)





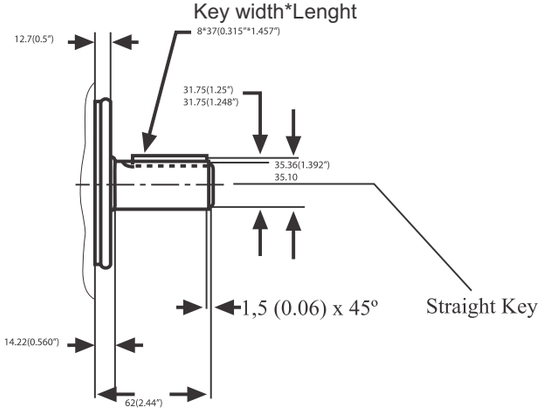


35 V	The flow rate and power consumption of hydraulic vane pumps at 1500 RPM with ISO (VG) hydraulic oil at 40°c and a viscosity of 68 cSt.							
	Displacement cm^3/rev	7 bar		70 bar		140 bar		175 bar	
		L/min	kw	L/min	kw	L/min	kw	L/min	kw
35V17	55	82	2.2	78	13	74	21.5	66	26
35V25	78	124	2.6	118	17	112	32	100	36
35V30	94	141	2.7	134	18	128	35	122	44
35V35	110	165	3.0	158	21	150	42	145	52
35V38	120	180	3.0	171	23	163	45	156	55

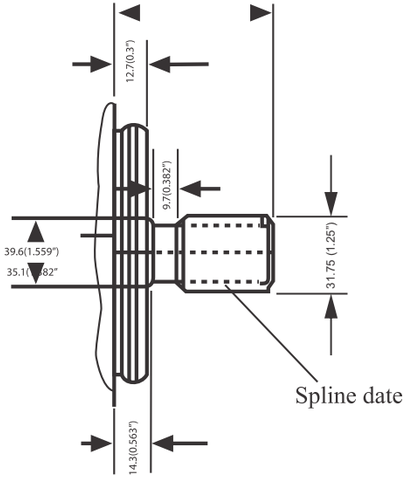
45V/VQ

Technical Specifications

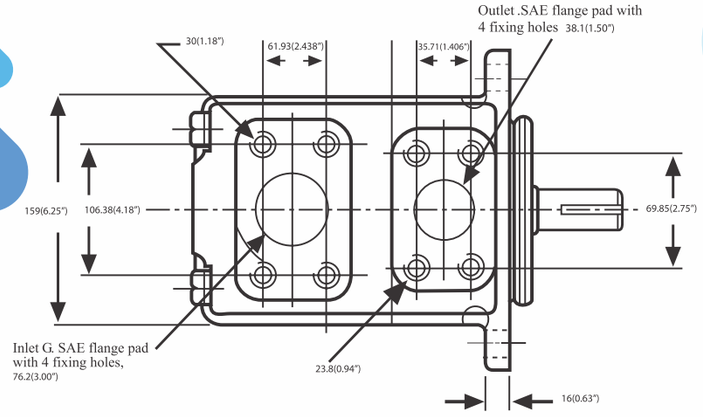
Hydraulic Vane Pump - 45V/VQ Series

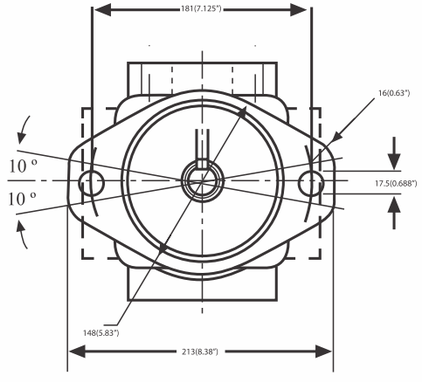


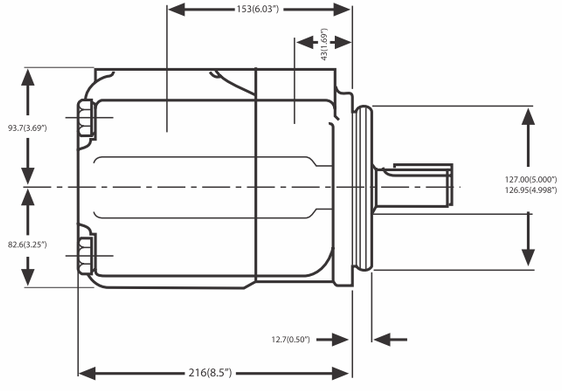
Straight Key Shaft



Splined Shaft (13spl)





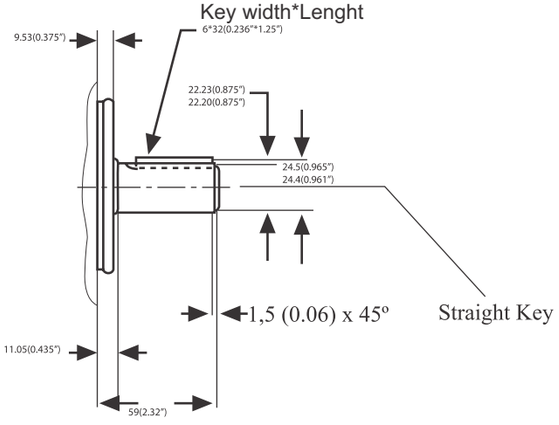


45 V	The flow rate and power consumption of hydraulic vane pumps at 1500 RPM with ISO (VG) hydraulic oil at 40°c and a viscosity of 68 cSt.							
Displacement cm^3/rev	7 bar		70 bar		140 bar		175 bar	
	L/min	kw	L/min	kw	L/min	kw	L/min	kw
45V42	138	198	2.8	187	25	177	51	166	62
45V50	162	236	3.7	222	31	242	60	198	72
45V57	184	269	4.3	255	34	245	67	231	77
45V60	193	284	4.6	269	35	258	70	244	86

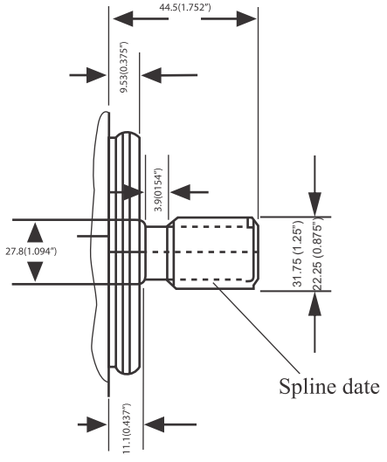
2520V/VQ

Technical Specifications

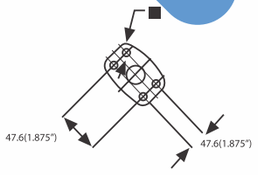
Hydraulic Vane Pump - 2520V/VQ Series



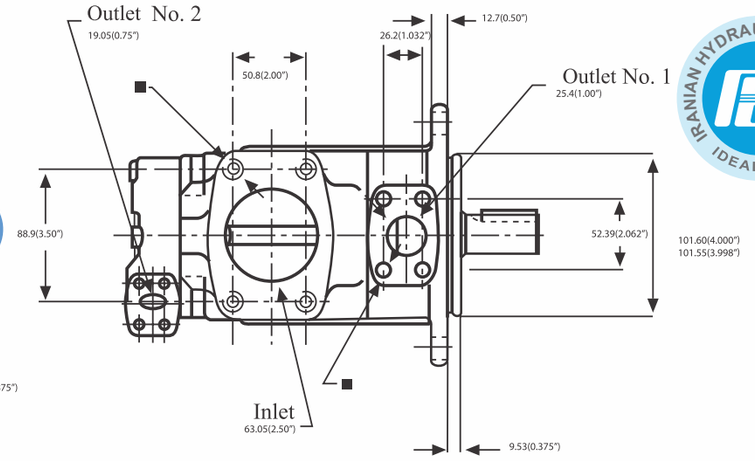
Straight Key Shaft

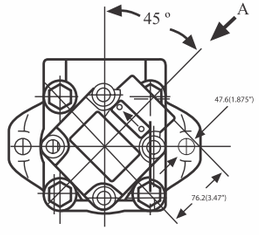


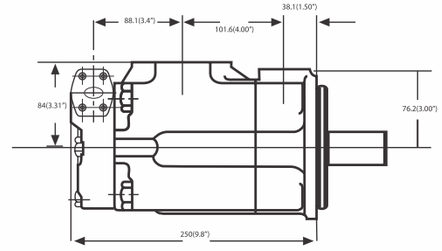
Splined Shaft (13,14spl)

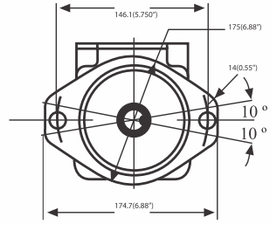


View on arrow A







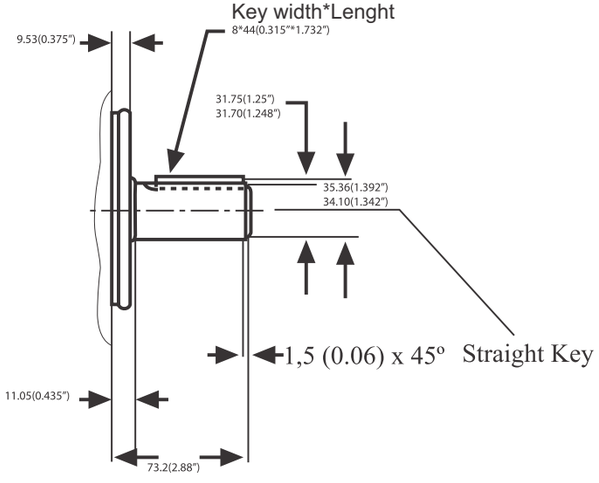


2520 V	The flow rate and power consumption of hydraulic vane pumps at 1500 RPM with ISO (VG) hydraulic oil at 40°c and a viscosity of 68 cSt.							
Displacement cm^3/rev	7 bar		70 bar		140 bar		175 bar	
	L/min	kw	L/min	kw	L/min	kw	L/min	kw
25V8	26	38	1.2	36.7	5	35.3	10	32	11.5
25V10	32	48	1.3	45.7	6	44	12	40	14.5
25V12	38	57	1.4	54	7	52	15	47	17
25V14	44	66	1.5	61	9	57	17	56	20
25V17	53	80	1.7	75	10	71	21	68	24
25V19	61	91.8	1.7	86	12	81	24	78	29
25V21	66	99	1.8	94	13	90	26	88	32
20V5	18	25	0.56	23	4	22	7	20	9
20V8	27	39	0.57	36	5	35	10	33	12
20V11	36	53	1.1	50	7	47	14	55	17
20V12	39	56	1.2	54	8	52	15	—	—
20V14	45	66	1.2	64	9	60	17	—	—

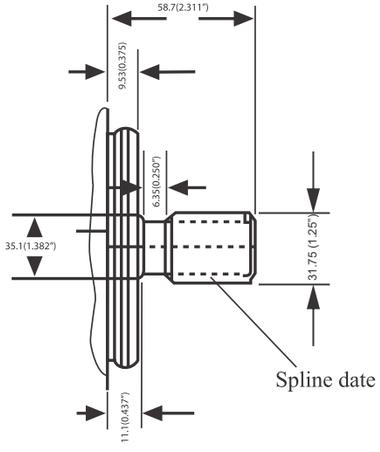
3520V/VQ

Technical Specifications

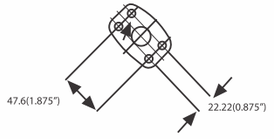
Hydraulic Vane Pump - 3520V/VQ Series

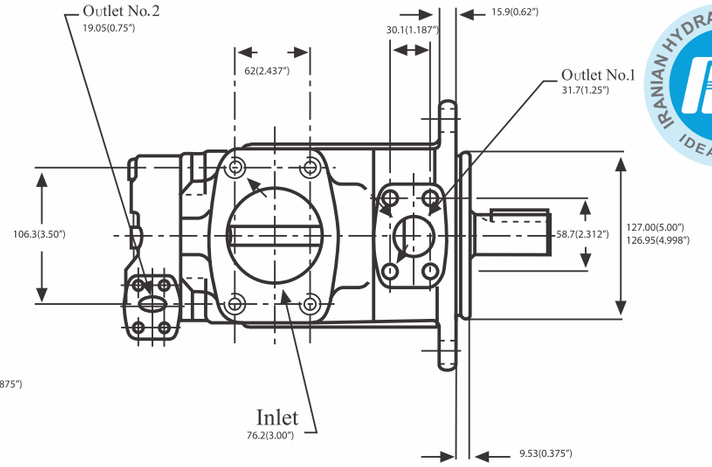


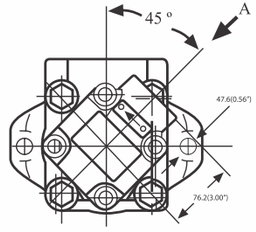
Straight Key Shaft

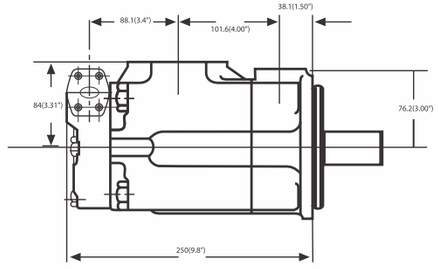


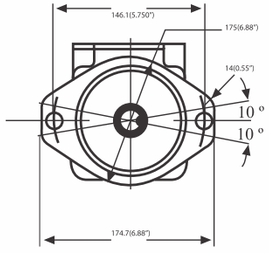
Splined Shaft (14spl)









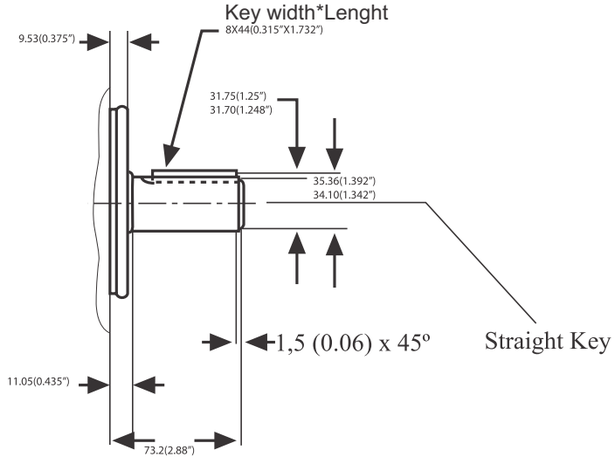


3520 V	The flow rate and power consumption of hydraulic vane pumps at 1500 RPM with ISO (VG) hydraulic oil at 40°c and a viscosity of 68 cSt.								
	Displacement cm^3/rev	7 bar		70 bar		140 bar		175 bar	
		L/min	kw	L/min	kw	L/min	kw	L/min	kw
35V17	55	82	2.2	78	13	74	21.5	66	26
35V25	78	124	2.6	118	17	112	32	100	36
35V30	94	141	2.7	134	18	128	35	122	44
35V35	110	165	3.0	158	21	150	42	145	52
35V38	120	180	3.0	171	23	163	45	156	55
20V5	18	25	0.56	23	4	22	7	20	9
20V8	27	39	0.57	36	5	35	10	33	12
20V11	36	53	1.1	50	7	47	14	55	17
20V12	39	56	1.2	54	8	52	15	—	—
20V14	45	66	1.2	64	9	60	17	—	—

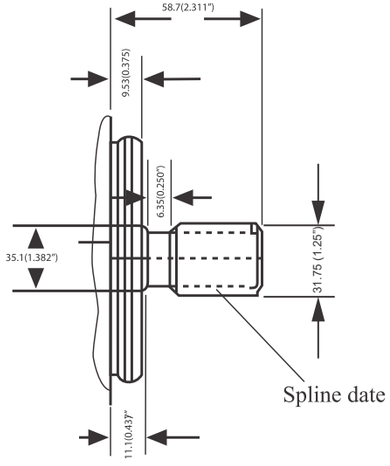
3525V/VQ

Technical Specifications

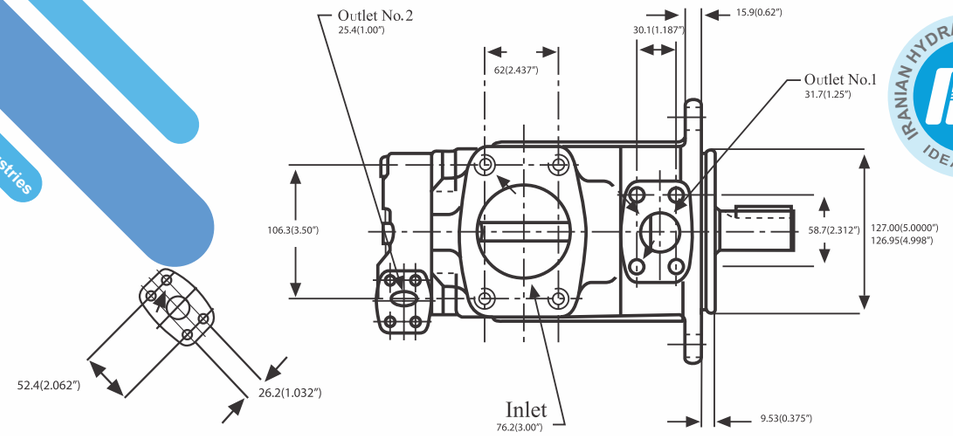
Hydraulic Vane Pump - 3525V/VQ Series

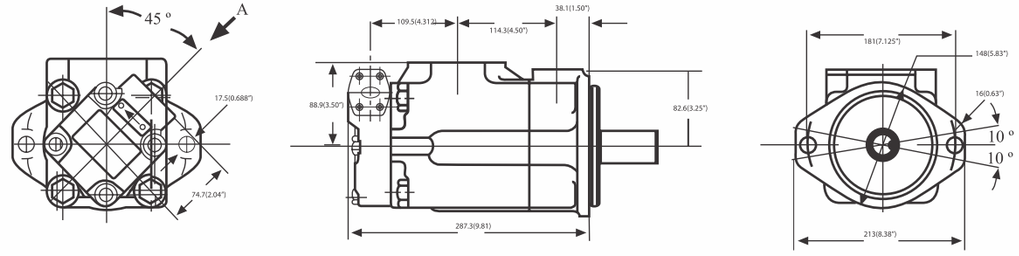


Straight Key Shaft



Splined Shaft (14spl)



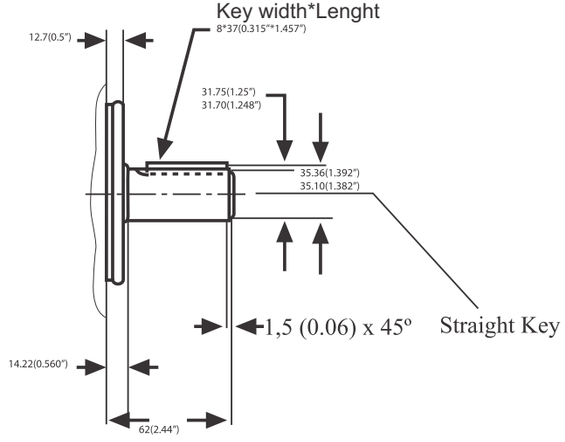


3525 V	The flow rate and power consumption of hydraulic vane pumps at 1500 RPM with ISO (VG) hydraulic oil at 40ºc and a viscosity of 68 cSt.							
	Displacement cm^3/rev	7 bar		70 bar		140 bar		175 bar	
		L/min	kw	L/min	kw	L/min	kw	L/min	kw
35V17	55	82	2.2	78	13	74	21.5	66	26
35V25	78	124	2.6	118	17	112	32	100	36
35V30	94	141	2.7	134	18	128	35	122	44
35V35	110	165	3.0	158	21	150	42	145	52
35V38	120	180	3.0	171	23	163	45	156	55
25V8	26	38	1.2	36.7	5	35.3	10	32	11.5
25V10	32	48	1.3	45.7	6	44	12	40	14.5
25V12	38	57	1.4	54	7	52	15	47	17
25V14	44	66	1.5	61	9	57	17	56	20
25V17	53	80	1.7	75	10	71	21	68	24
25V19	61	91.8	1.7	86	12	81	24	78	29
25V21	66	99	1.8	94	13	90	26	88	32

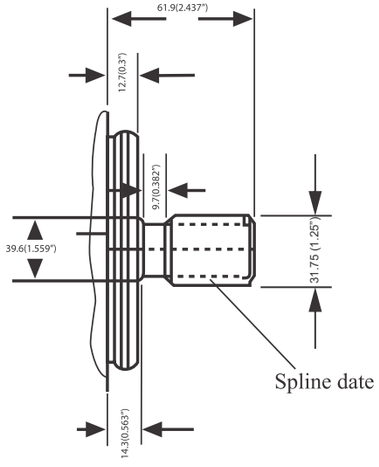
4525V/VQ

Technical Specifications

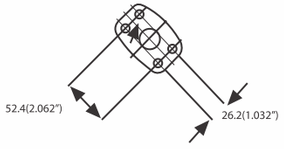
Hydraulic Vane Pump - 4525V/VQ Series

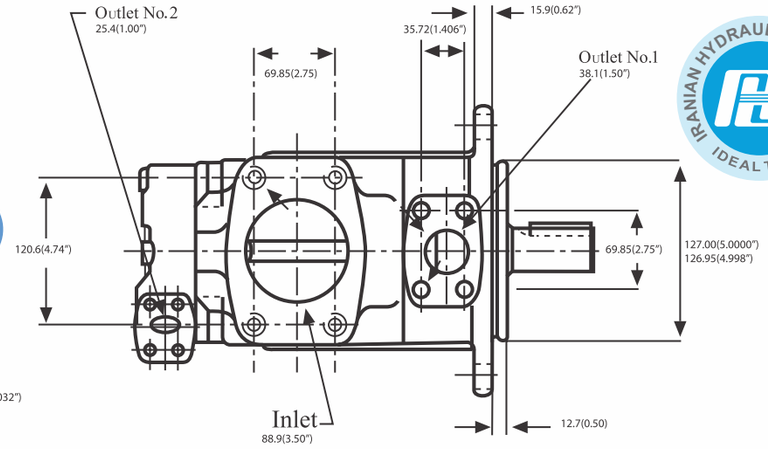


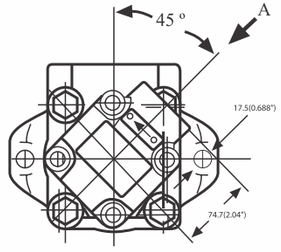
Straight Key Shaft

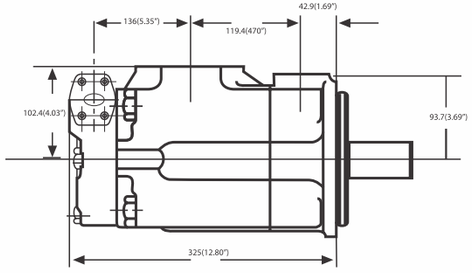


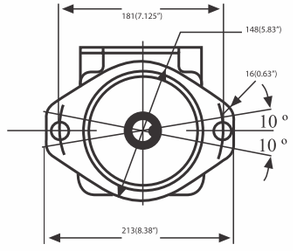
Splined Shaft (14spl)









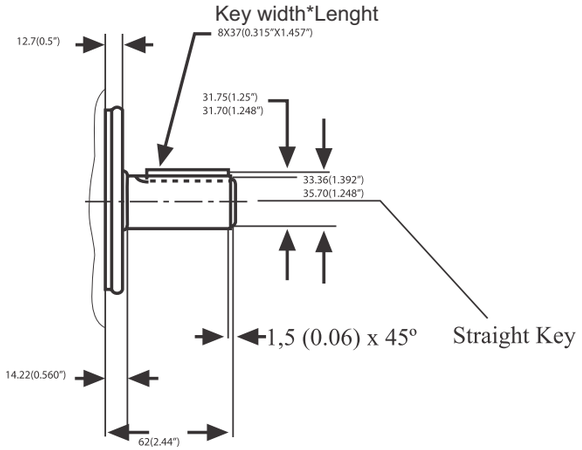


4525 V	The flow rate and power consumption of hydraulic vane pumps at 1500 RPM with ISO (VG) hydraulic oil at 40°c and a viscosity of 68 cSt.							
	Displacement cm^3/rev	7 bar		70 bar		140 bar		175 bar	
		L/min	kw	L/min	kw	L/min	kw	L/min	kw
45V42	138	198	2.8	187	25	177	51	166	62
45V50	162	236	3.7	222	31	242	60	198	72
45V57	184	269	4.3	255	34	245	67	231	77
45V60	193	284	4.6	269	35	258	70	244	86
25V8	26	38	1.2	36.7	5	35.3	10	32	11.5
25V10	32	48	1.3	45.7	6	44	12	40	14.5
25V12	38	57	1.4	54	7	52	15	47	17
25V14	44	66	1.5	61	9	57	17	56	20
25V17	53	80	1.7	75	10	71	21	68	24
25V19	61	91.8	1.7	86	12	81	24	78	29
25V21	66	99	1.8	94	13	90	26	88	32

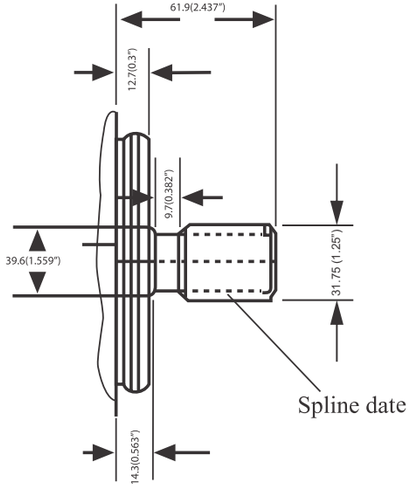
4535V/VQ

Technical Specifications

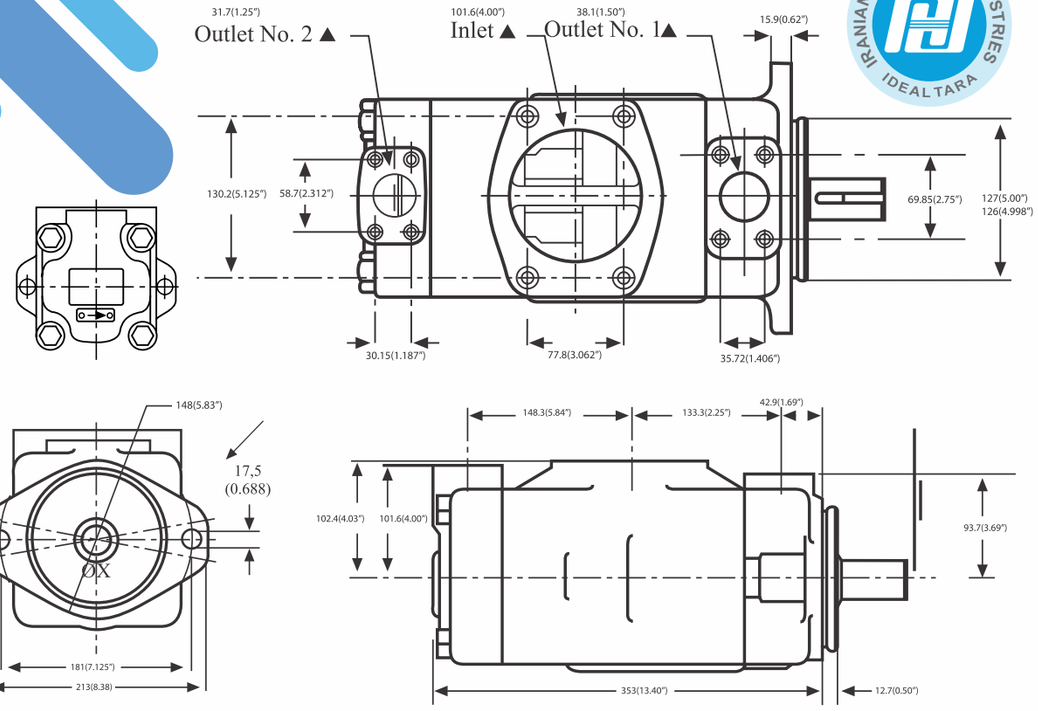
Hydraulic Vane Pump - 4535V/VQ Series



Straight Key Shaft



Splined Shaft (14spl)



4535 V	The flow rate and power consumption of hydraulic vane pumps at 1500 RPM with ISO (VG) hydraulic oil at 40°c and a viscosity of 68 cSt.							
Displacement cm^3/rev	7 bar		70 bar		140 bar		175 bar	
	L/min	kw	L/min	kw	L/min	kw	L/min	kw
45V42	138	198	2.8	187	25	177	51	166	62
45V50	162	236	3.7	222	31	242	60	198	72
45V57	184	269	4.3	255	34	245	67	231	77
45V60	193	284	4.6	269	35	258	70	244	86
35V17	55	82	2.2	78	13	74	21.5	66	26
35V25	78	124	2.6	118	17	112	32	100	36
35V30	94	141	2.7	134	18	128	35	122	44
35V35	110	165	3.0	158	21	150	42	145	52
35V38	120	180	3.0	171	23	163	45	156	55

Fishing Pump

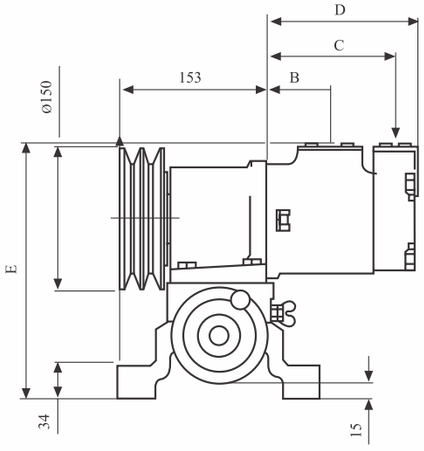
Technical Specifications

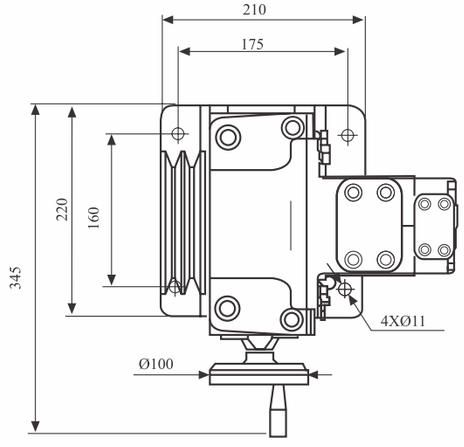
Hydraulic Vane Pump for Fishing Vessels

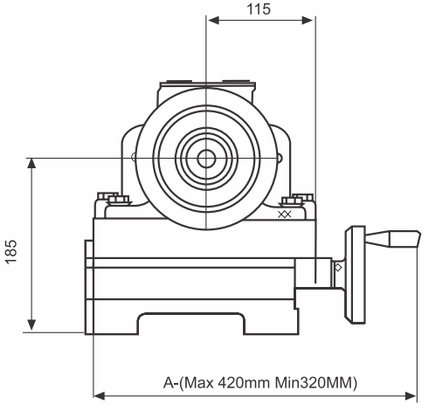
20V/VQ- 25V/VQ Series

The vane pumps of 20V and 25V series, along with a clutch coupling and a sliding table, collectively known as the fish pump, are widely used in fishing vessels. Their main applications are in hauling fishing nets and ice crushers on these vessels.

The advantages of this pump over other types (such as gear pumps) include its long lifespan, ease and speed of parts replacement, and reasonable cost. All parts used in the 20V and 25V pumps in this group are interchangeable and can be ordered in the same manner.



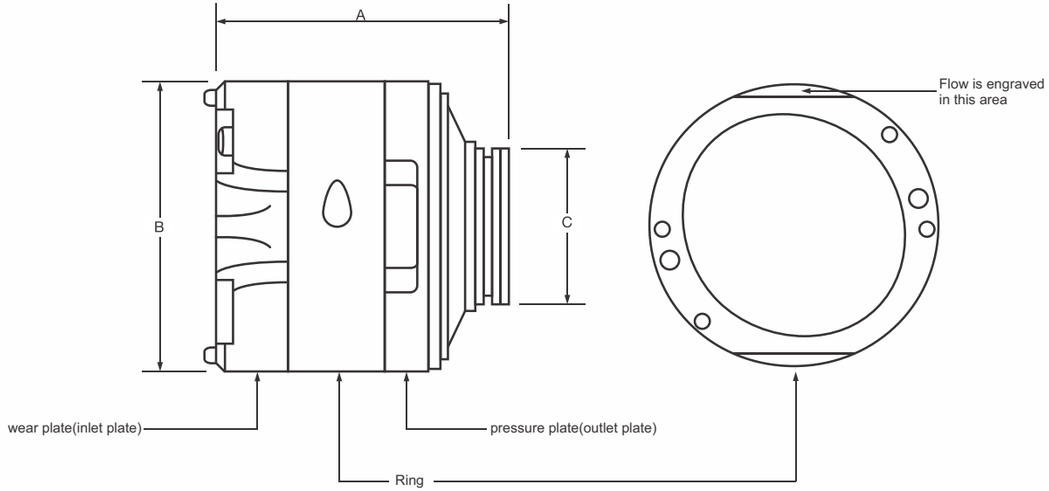




MODEL	TYPE	B	C	D	E
MP5, MP8, MP11, MP12, MP14	20 V	76.5	132.5	152	262
MP8, MP10, MP12, MP14, MP17, MP19, MP21	25 V	121	38	176	261

Cartridge Identification

Cartridge kit Dimension and Flow



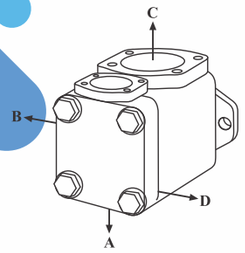
DIMS.	20V/VQ SERIES	25V/VQ SERIES	35V/VQ SERIES	45V/VQ SERIES
A	3.22"(81.8mm)	3.92"(99.6mm)	4.66"(118.2mm)	5.53"(140mm)
B	3.25"(82.5mm)	3.81"(96.7mm)	4.50"(114.1mm)	5.25"(133.1mm)
C	1.86"(47.1mm)	2.05"(52.1mm)	2.84"(72.1mm)	3.16"(80.3mm)
Weight	(2.3 kgs)	(3.8 kgs)	(6.4 kgs)	(10.2 kgs)

V Series Cartridges

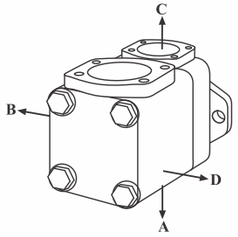
VQ Series Cartridges

Ordering Method

Single Hydraulic Vane Pumps



20V



25V, 35V, 45V

(F3) | 25V | 21 | I | A | L

Example: Pump 25V series with a capacity of 21 gallons, straight key shaft, inlet and outlet angle of 180 degrees, counterclockwise rotation.

For phosphate ester fluids and their compounds, as well as corrosive fluids like Water Glycol, the code (F3) is used. For standard hydraulic oils, this code is omitted.

The direction of pump rotation
Left-hand rotation L
Right-hand rotation R

Pump series 20V, 25V, 35V, 45V

End port configuration: (looking at the pump from the end)
A: 180 degrees relative to the inlet port
C: inlet and outlet ports are aligned
B: outlet port 90 degrees counterclockwise (CCW)
D: outlet port 90 degrees clockwise (CW)

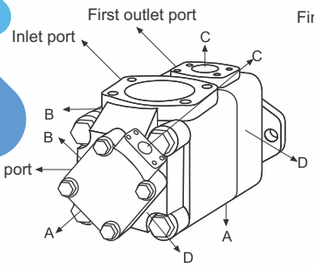
Size and capacity of the pump in gallons

Type of shaft
Straghit key shaft
Spline date shaft
HD (86)

Pump Series	Capacity (Gallons)						
20V	5	8	11	12	14	-	-
25V	8	10	12	14	17	19	21
35V	17	25	30	35	38	-	-
45V	42	50	57	60	-	-	-

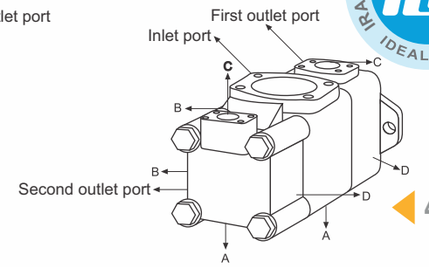
Ordering Method

Double Hydraulic Vane Pumps



2520V, 3520V
3525V, 4525V

First outlet port



4535V

(F3) | 3525V | 38 | 21 | I | CC | R

Example:
Double pump 3525V, large cartridge 38 gallons, small cartridge 21 gallons, straight key shaft, key angled at 45 degrees to the inlet, clockwise direction, small housing angle 0 degrees to the inlet, counterclockwise right-hand rotation.

For phosphate ester fluids and their compounds, as well as corrosive fluids like Water Glycol, the code (F3) is used. For standard hydraulic oils, this code is omitted.

The direction of pump rotation
Left-hand rotation
Right-hand rotation

Pump Series: 2520V . 3520V
3525V . 4525V . 4535V

The inlet and outlet angle
(based on the table below)

Capacity of the big hydraulic pump cartridge in gallons

Capacity of the small hydraulic pump cartridge in gallons

Type of shaft
Straight key shaft
Spline dat shaft
HD (86)

Table of Inlet and Outlet Angles	2520V, 3520V, 3525V, 4520V, 4525V		4535V
Second Outlet Port Angle Relative to the Inlet Port (Central Port)	A - 135°	Counterclockwise Relative to the Inlet	A - 180°
	B - 45°	Counterclockwise Relative to the Inlet	B - 90°
	C - 45°	Clockwise Relative to the Inlet	C - 0°
	D - 135°	Clockwise Relative to the Inlet	D - 90°
Position of the First Outlet Port Angle Relative to the Inlet Port	A - 180°	Relative to the Inlet	A - 180°
	B - 90°	Counterclockwise Relative to the Inlet	B - 90°
	C - 0°	Relative to the Inlet	C - 0°
	D - 90°	Clockwise Relative to the Inlet	D - 180°

Pump Series	Capacity (Gallons)						
20V	5	8	11	12	14	-	-
25V	8	10	12	14	17	19	21
35V	17	25	30	35	38	-	-
45V	42	50	57	60	-	-	-

Parts List

Hydraulic Vane Pumps

One of the advantages of the products of ***IHI*** is the availability of separate parts of hydraulic pumps.

Cartridge: V & VQ Series

Ring

Flanche

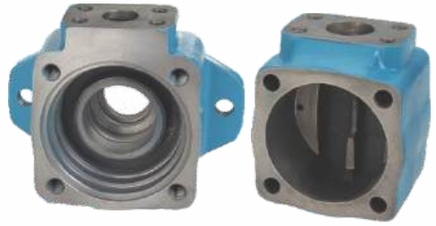
Parts List

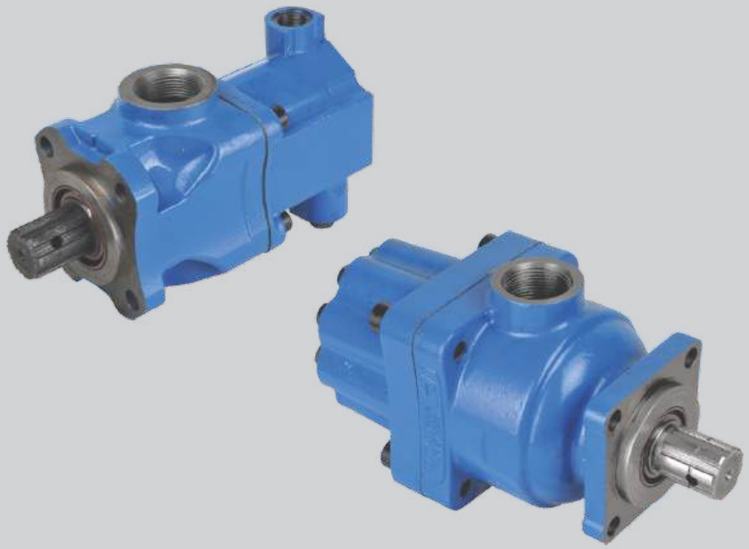
Hydraulic Vane Pumps

Shafts:
Spline date
Straight key
HD

Pressure and wear insoles

Separate pump shells





Iran Hydraulic Industries

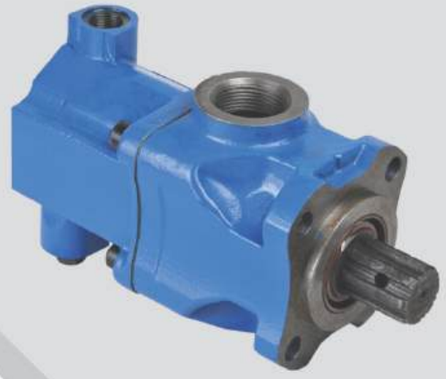
IRANIAN HYDRAULIC INDUSTRIES
IDEAL TARA

6 Piston & 9 Piston Hydraulic Pumps

Another product from Iran Hydraulic Industries Co. ***(IHI)*** is the hydraulic axial piston pumps. These pumps are used in a wide range of machinery. Due to the alignment of the pistons' movement with the shaft axis, there is no lateral load on the pistons, resulting in a longer lifespan compared to other similar hydraulic pumps.

The constant pressure of these pumps is 250 bar, with a peak pressure of up to 300 bar. These pumps are used in tractors, agricultural machinery, municipal service vehicles, small dump trucks, cranes, fishing vessels, and etc.

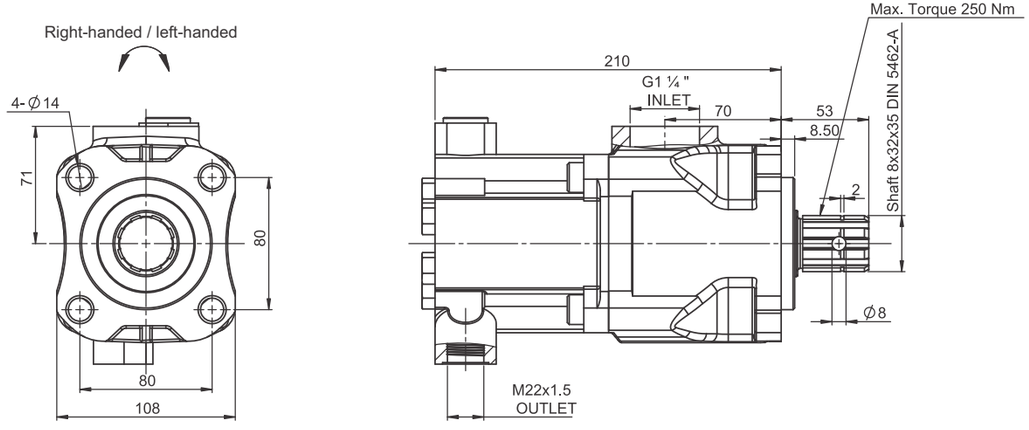
These pumps are manufactured in two models, with 6 and 9 pistons.

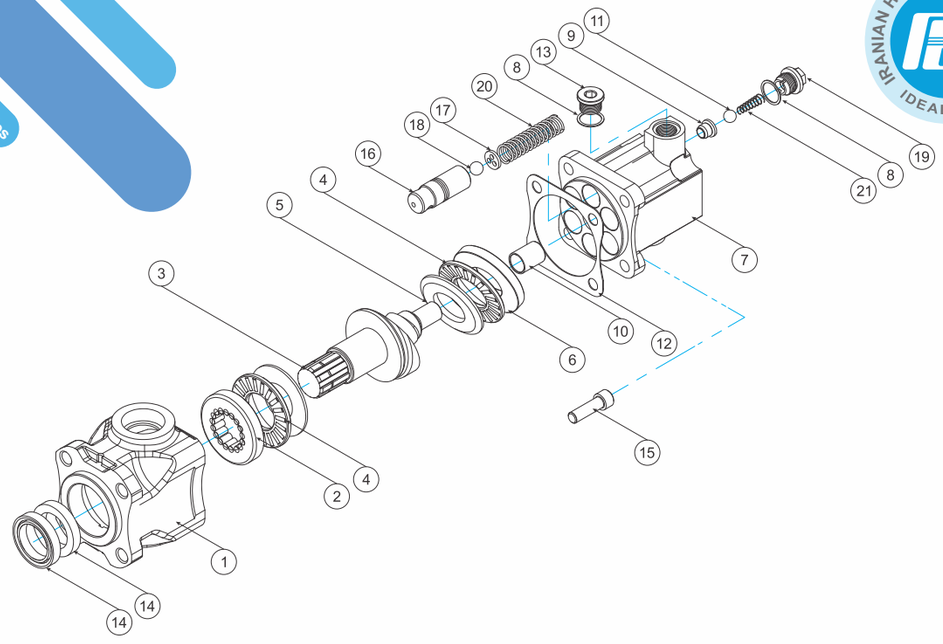


P6

Technical Specifications

Hydraulic Axial Piston Pump - 6 Piston Series





Cover .1	Bearing .4	Body .7	Bush .10	Blind Plug .13	Piston .16	Blind Plug .19
Bearing .2	Bearing Washer .5	Washer .8	Ball .11	Seal .14	Washer .17	Spring .20
Casting Crank .3	Bearing .6	Thimble .9	Gasket .12	Bolt .15	Ball .18	Spring .21

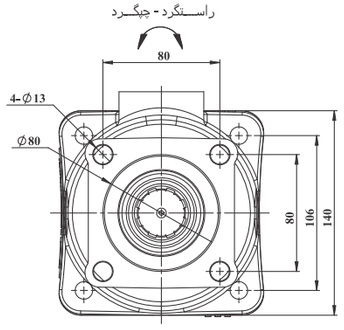
6 piston axial hydraulic pump technical information table

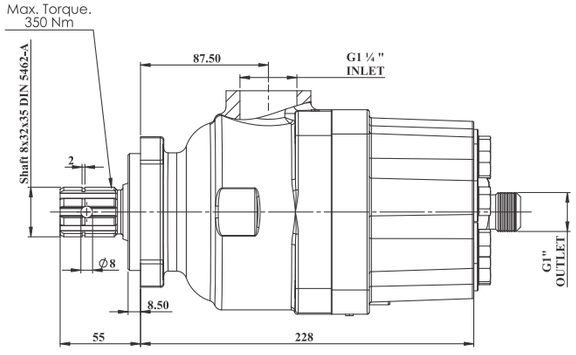
1	2	3			4	5	6	7	8	9	
Displacement	Weight	Pressure bar/Psi			Inlet pressure (suction)	Min & Max Revolution	Viscosity	Min & Max Temperature	Noise	The right filter Standard NAS 1638, ISO 4406	
		constant	Intermittent for 20 seconds	Instantaneous of 6 seconds						>200 bar	≤200 bar
L/M 1000RPM	Kg				bar	Rev	Cst	C°	d B		
52	13	200/ 2900	270/ 3915	300/ 4350	1/ 3	300/ 1800	12/ 100	35/ 65	80/ 90	10µm	25µm
Oil Inlet / R= 1¼ Oil Outlet / R= 1					Direction Right \ Left						

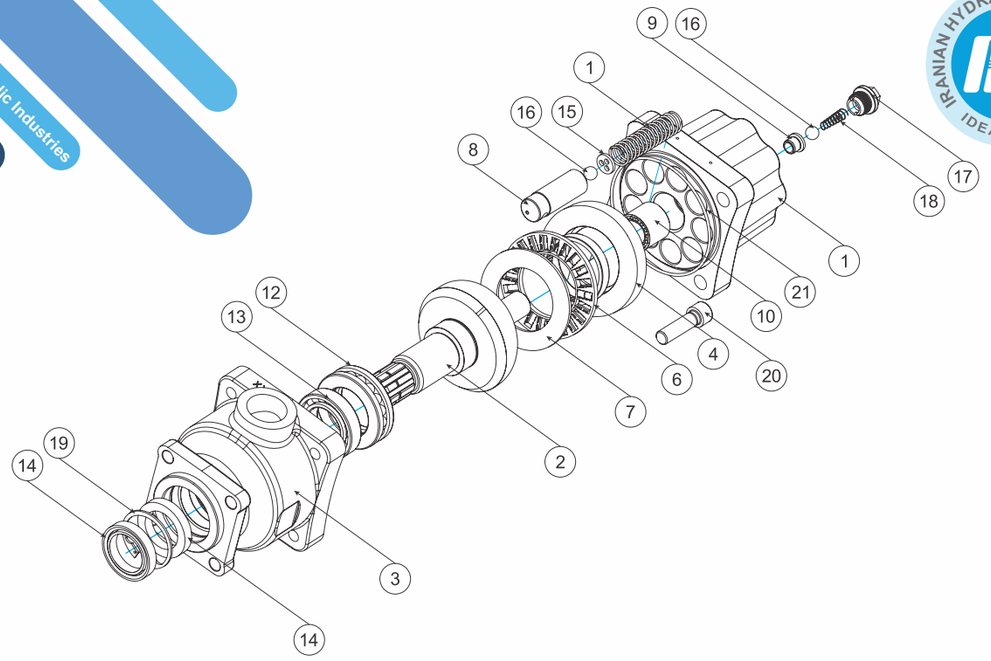
P9

Technical Specifications

Hydraulic Axial Piston Pump - 9 Piston Series







Body .1	Bush Bearing .4	Bearing Washer .7	Bearing .10	Bearing .13	Ball .16	Segment .19
Casting Crank .2	Bearing .5	Piston .8	Spring .11	Seal .14	Blind Plug .17	Bolt .20
Cover .3	Bearing .6	Thimble .9	Bearing .12	Washer .15	Spring .18	O Ring .21

9 piston axial hydraulic pump technical information table

1	2	3			4	5	6	7	8	9	
Displacement	Weight	Pressure bar/Psi			Inlet pressure (suction)	Min & Max Revolution	Viscosity	Min & Max Temperature	Noise	The right filter Standard NAS 1638, ISO 4406	
		constant	Intermittent for 20 seconds	Instantaneous of 6 seconds						>200 bar	≤200 bar
L/M 1000RPM	Kg				bar	Rev	Cst	C°	d B		
81.1	19	200/ 2900	270/ 3915	300/ 4350	1/ 3	300/ 1800	12/ 100	35/ 65	80/ 90	10µm	25µm
Oil Inlet / R= 1¼ Oil Outlet / R= 1					Direction Right \ Left						

Gear Pumps, Hydromotors and Flow Dividers

IHI hydraulic pumps and motors are particularly well suited to mobile equipment applications; they are designed for extreme duty cycles, and continuous heavy-duty operation. Whilst the equipment is of a simple yet rugged design, it is manufactured to extremely precise tolerances.

Pumps are available in capacities ranging from 11 cc› rev to 200 cc› rev for each gear section. Several sections can be combined into one assembly. A wide selection of SAE and ANSI mounting flanges and drive shafts are available for all drive units. Pipe thread, O-ring seal, and split flange ports are available in both metric and SAE standards.

• IHI's full range of gear set products comply with the international standard, ensuring the metallurgical elements of Molybdenum and Nickel are present in the base material for premium quality requirements necessary in hydraulic gear pump applications.

Multiple pump units: Several pump sections can be combined in a single drive to eliminate multiple drive P.T.O units.

Precision matched gears: All gears are manufactured from high alloy forged bars, surfaces are precision finished and each gear pair is matched for maximum efficiency. The deep 10-tooth pattern gives maximum output per revolution whilst ensuring low pulsation frequency.

Bearings: Heavy duty roller bearings are utilized on all gear journals to reduce wear caused by contamination.

Motors: are available with capacities ranging from 0.75kw to 75kw. Basically similar in design to pumps, they are engineered for extreme heavy duty applications, with high efficiency characteristic.

Motor speed is in direct proportion to the volume of oil delivered to the inlet port and output torque is in proportion to the pressure supplied to the motor. All other equipment required to match our pumps and motors is readily available.

INTERCHANGEABILITY

IHI hydraulic equipment is directly interchangeable with the other internationally recognized SAE pumps and motors.

IHI equipment is sold in component form but units can be assembled and tested to meet your particular requirements.

Bearing

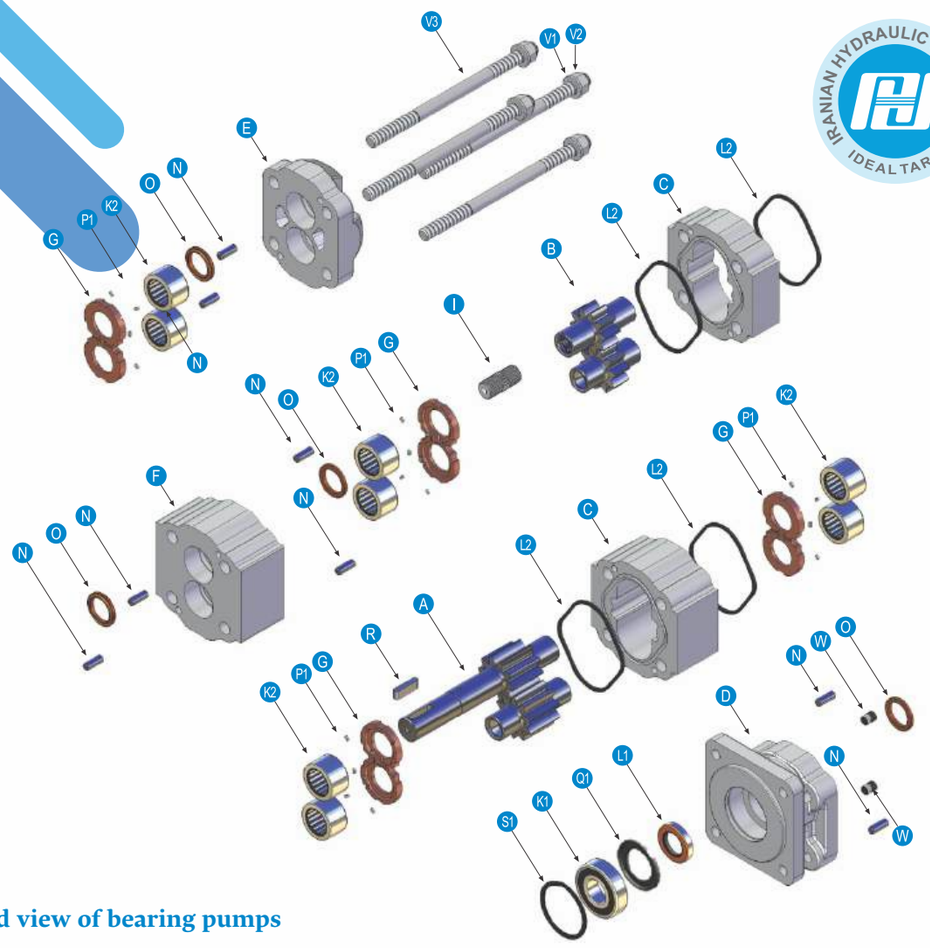
Hydraulic Gear Pump - Bearing Series

120, 125, 131, 151, 176

- Pump
- Motor
- Flow divider

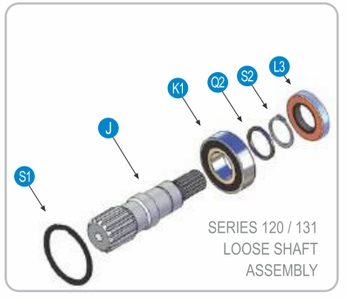
Maximum rpm	2400 rpm
Maximum pressure	205 bar (3000psi)
Displacement in each revolution	16cc/rev - 200cc/rev

Comparative table of technical codes				
Manufacturer	Series			
IHI	120	131	151	176
Commercial	20	30	50	75
Permco	1500	3000	5000	7500

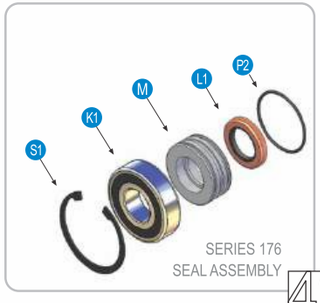


Exploded view of bearing pumps

A Integral gear set	L Seals
B Continental gear set	M Retainer
C Gear housing	N Dowel pin
D Shaft end cover	O Ring seal
E Port end cover	P O-ring
F Bearing carrier	Q Spacer
G Thrust plate	R Keys
I Connecting shaft	S Snap ring
J Continental shaft	V Bolt and nut
K Bearing	W Direction adjustment screw



SERIES 120 / 131
LOOSE SHAFT
ASSEMBLY



SERIES 176
SEAL ASSEMBLY

Iran Hydraulic Industries

IRANIAN HYDRAULIC INDUSTRIES IDEAL TARA

Specification table

Pump, Motor, Flow-divider Bearing Series

Manufactured in South Africa

	DASH SIZE / GEAR WIDTH	CODE -05 0.50"(1/2")	-07 0.75"(3/4")	-10 1.00"(1")	-12 1.25"(11/4")	-15 1.50"(11/2")	-17 1.75"(13/4")	-20 2.00"(2")	-22 2.25"(21/4")	-25 2.50"(21/2")	-27 2.75"(23/4")	-30 3.00"(3")
120	Gear Housing Width	1.25"(11/4")	1.50"(11.2")	1.75"(13/4")	2.00"(2")	2.25"(21/4")	2.50"(21/2")	2.75"(23/4")				
	cc/rev	16.00	24.10	32.20	40.30	48.30	56.40	64.50				
	Lpm (at 1000rpm)	16.00	24.10	32.20	40.30	48.30	56.40	64.50				
	cu in (cu in/rev)	0.99	1.48	1.97	2.46	2.96	3.45	3.94				
	US gpm (at 1000rpm)	4.23	6.37	8.51	10.65	12.76	14.90	17.04				
	Max Pressure (bar)	205	205	205	205	205	170	170				
	Max Pressure (psi)	3000	3000	3000	3000	3000	2500	2500				
	Max Speed (rpm)	2400	2400	2400	2400	2400	2400	2400				
	Pump Weight (kg)	10.80	11.30	11.80	12.50	13.20	13.80	14.70				
	Additional sect add (kg)	9.50	9.90	10.40	10.90	11.30	11.80	12.70				
125	Gear Housing Width	1.25"(11/4")	1.50"(11.2")	1.75"(13/4")	2.00"(2")	2.25"(21/4")	2.50"(21/2")	2.75"(23/4")	3.00"(3")	3.25"(31/4")		
	cc/rev	20.80	31.20	41.70	52.10	62.60	73.00	83.50	94.00	104.40		
	Lpm (at 1000rpm)	20.80	31.20	41.70	52.10	62.60	73.00	83.50	94.00	104.40		
	cu in (cu in/rev)	1.28	1.91	2.55	3.19	3.82	4.46	5.10	5.74	6.38		
	US gpm (at 1000rpm)	5.50	8.24	11.02	13.76	16.54	19.29	22.06	24.84	27.58		
	Max Pressure (bar)	170	170	170	170	170	153	153	138	138		
	Max Pressure (psi)	2500	2500	2500	2500	2500	2250	2250	2000	2000		
	Max Speed (rpm)	2400	2400	2400	2400	2400	2400	2400	2400	2400		
	Pump Weight (kg)	17.00	17.00	17.00	17.50	18.00	19.00	19.50	22.00	22.50		
	Additional sect add (kg)	17.00	17.00	17.00	17.50	18.00	19.00	19.50	22.00	22.50		
130 131	Gear Housing Width	1.25"(11/4")	1.50"(11.2")	1.75"(13/4")	2.00"(2")	2.25"(21/4")	2.50"(21/2")	2.75"(23/4")	3.00"(3")	3.25"(31/4")		
	cc/rev	16.00	24.10	32.20	40.30	48.30	56.40	64.50	72.60	80.00		
	Lpm (at 1000rpm)	16.00	24.10	32.20	40.30	48.30	56.40	64.50	72.60	80.00		
	cu in (cu in/rev)	0.99	1.48	1.97	2.46	2.96	3.45	3.94	4.43	4.92		
	US gpm (at 1000rpm)	4.23	6.37	8.51	10.65	12.76	14.90	17.04	19.18	21.14		
	Max Pressure (bar)	170/205	170/205	170/205	170/205	170/205	153/170	153/170	138/153	138/153		
	Max Pressure (psi)	2500/3000	2500/3000	2500/3000	2500/3000	2500/3000	2250/2500	2250/2500	2000/2250	2000/2250		
	Max Speed (rpm)	2400	2400	2400	2400	2400	2400	2400	2400	2400		
	Pump Weight (kg)	15.00	15.00	15.00	15.50	16.00	16.50	17.00	17.50	18.00		
	Additional sect add (kg)	12.00	12.00	12.00	12.50	13.00	14.00	14.50	15.00	15.50		
150 151	Gear Housing Width	1.25"(11/4")	1.50"(11.2")	1.75"(13/4")	2.00"(2")	2.25"(21/4")	2.50"(21/2")	2.75"(23/4")	3.00"(3")	3.25"(31/4")		
	cc/rev	20.80	31.20	41.70	52.10	62.60	73.00	83.50	94.00	104.40		
	Lpm (at 1000rpm)	20.80	31.20	41.70	52.10	62.60	73.00	83.50	94.00	104.40		
	cu in (cu in/rev)	1.28	1.91	2.55	3.19	3.82	4.46	5.10	5.74	6.38		
	US gpm (at 1000rpm)	5.50	8.24	11.02	13.76	16.54	19.29	22.06	24.84	7.58		
	Max Pressure (bar)	170/205	170/205	170/205	170/205	170/205	153/170	153/170	138/153	138/153		
	Max Pressure (psi)	2500/3000	2500/3000	2500/3000	2500/3000	2500/3000	2250/2500	2250/2500	2000/2250	2000/2250		
	Max Speed (rpm)	2400	2400	2400	2400	2400	2400	2400	2400	2400		
	Pump Weight (kg)	17.00	17.00	17.00	17.50	18.00	19.00	19.50	22.00	22.50		
	Additional sect add (kg)	17.00	17.00	17.00	17.50	18.00	19.00	19.50	22.00	22.50		
175 176	Gear Housing Width		1.75"(13/4")	2.00"(2")	2.25"(21/4")	2.50"(21/2")	2.75"(23/4")	3.00"(3")	3.25"(31/4")	3.50"(31/2")	3.75"(33/4")	4.00"(4")
	cc/rev		50.30	67.10	84.00	100.60	117.50	134.30	151.00	168.00	184.50	200.00
	Lpm (at 1000rpm)		50.30	67.10	84.00	100.60	117.50	134.30	151.00	168.00	184.50	200.00
	cu in (cu in/rev)		3.07	4.09	5.13	6.14	7.17	8.20	9.21	10.25	11.28	12.30
	US gpm (at 1000rpm)		13.29	17.73	22.19	26.58	31.04	35.48	39.89	44.39	48.75	52.84
	Max Pressure (bar)		170/205	170/205	170/205	170/205	170/205	170/205	153/170	153/170	138/153	138/153
	Max Pressure (psi)		2500/3000	2500/3000	2500/3000	2500/3000	2500/3000	2500/3000	2250/2500	2250/2500	2000/2250	2000/2250
	Max Speed (rpm)		2400	2400	2400	2400	2400	2400	2400	2400	2400	2400
	Pump Weight (kg)		33.00	33.00	34.00	35.00	36.00	37.00	38.00	39.00	40.00	41.00
	Additional sect add (kg)		33.00	33.00	34.00	35.00	36.00	37.00	38.00	39.00	40.00	41.00

Iran Hydraulic Industries

IRANIAN HYDRAULIC INDUSTRIES IDEAL TARA

Hydraulic gear pumps have a wide range of applications in various industries, some of which are listed below:

1. Construction machinery, drilling, mining, and cranes
2. Steel, pipe manufacturing, and iron smelting industries
3. Oil, gas, and petrochemical industries
4. Agricultural machinery
5. Refractory product factories
6. Press machines, guillotines, bending machines, etc.
7. Municipal service machinery such as garbage trucks and many other applications

Bushing

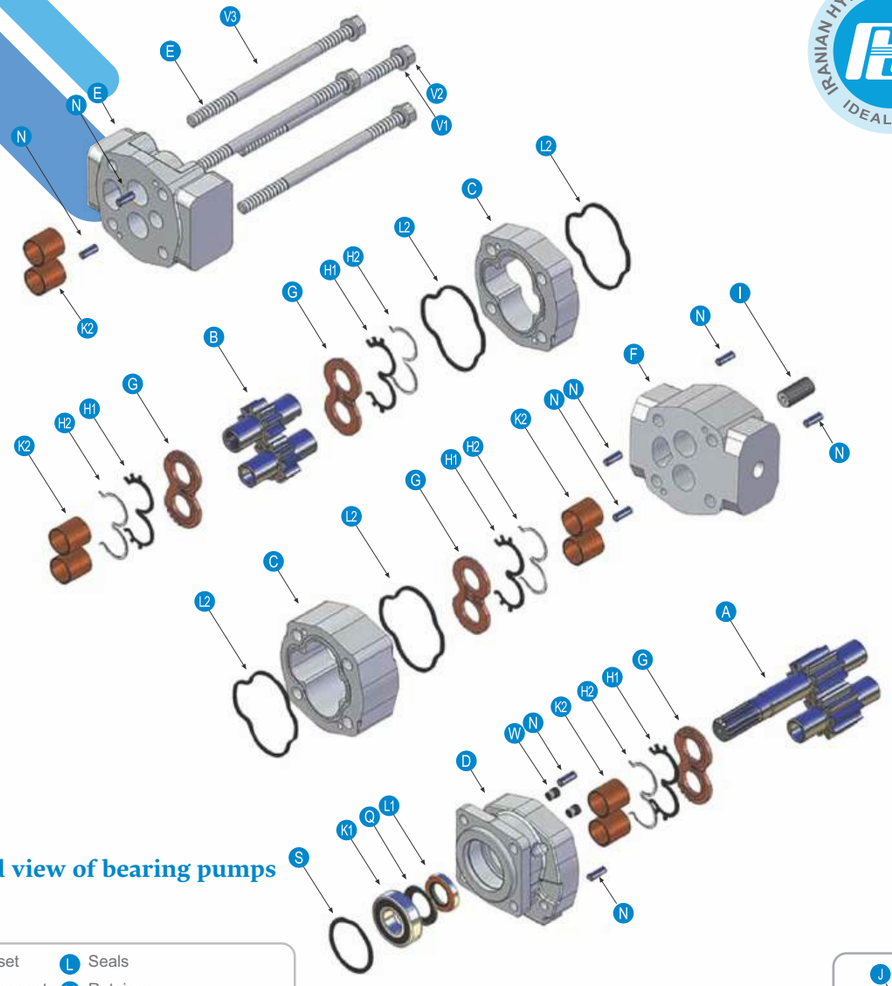
Hydraulic Gear Pump - Bushing Series

215, 230, 250, 265

- Pump
- Motor
- Flow divider

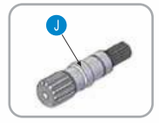
Maximum rpm	3000 rpm
Maximum pressure	240 bar (3500psi)
Displacement in each revolution	10cc/rev - 147cc/rev

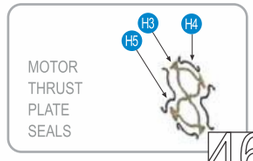
Comparative table of technical codes				
Manufacturer	Series			
IHI	215	230	250	265
Commercial	315	330	350	365
Permco	157	197	257	360



Exploded view of bearing pumps

A	Integral gear set	L	Seals
B	Continental gear set	M	Retainer
C	Gear housing	N	Dowel pin
D	Shaft end cover	O	Ring seal
E	Port end cover	P	O-ring
F	Bearing carrier	Q	Spacer
G	Thrust plate	R	Keys
I	Connecting shaft	S	Snap ring
J	Continental shaft	V	Bolt and nut
K	Bearing	W	Direction adjustment screw





Iran Hydraulic Industries

Specification table

Pump, Motor, Flow-divider
Bushing Series

Manufactured in South Africa

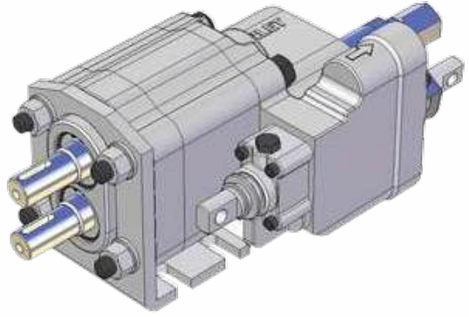
	DASH SIZE / GEAR WIDTH	CODE -05 0.50"(1/2")	-07 0.75"(3/4")	-10 1.00"(1")	-12 1.25"(11/4")	-15 1.50"(11/2")	-17 1.75"(13/4")	-20 2.00"(2")	-22 2.25"(21/4")	-25 2.50"(21/2")
215	Gear Housing Width	0.88"(7/8")	1.13"(11/8")	1.38"(13/8")	1.63"(15/8")	1.88"(17/8")	2.13"(21/8")	2.38"(23/8")		
	cc/rev	10.00	15.00	20.00	25.00	30.00	35.00	40.00		
	Lpm (at 1000rpm)	10.00	15.00	20.00	25.00	30.00	35.00	40.00		
	cu in (cu in/rev)	0.61	0.92	1.22	1.59	1.84	2.15	2.44		
	US gpm (at 1000rpm)	4.23	6.37	8.51	10.65	12.76	14.90	17.04		
	Max Pressure (bar)	240	240	240	240	220	200	170		
	Max Pressure (psi)	3500	3500	3500	3500	3200	2900	2500		
	Max Speed (rpm)	3000	3000	3000	3000	3000	3000	3000		
	Pump Weight (kg)	8.00	8.00	8.00	8.50	9.00	9.50	10.00		
	Additional sect add (kg)	8.00	8.00	8.00	8.50	9.00	9.50	10.00		
230	Gear Housing Width	1.00"(1")	1.25"(11/4")	1.50"(11/2")	1.75"(13/4")	2.00"(2")	2.25"(21/4")	2.50"(21/2")		
	cc/rev	16.00	24.10	32.20	40.30	48.30	56.40	64.50		
	Lpm (at 1000rpm)	16.00	24.10	32.20	40.30	48.30	56.40	64.50		
	cu in (cu in/rev)	0.99	1.48	1.97	2.46	2.96	3.45	3.94		
	US gpm (at 1000rpm)	4.23	6.37	8.51	10.65	12.76	14.90	17.04		
	Max Pressure (bar)	240	240	240	240	240	220	200		
	Max Pressure (psi)	3500	3500	3500	3500	3200	2900	2500		
	Max Speed (rpm)	3000	3000	3000	3000	3000	3000	3000		
	Pump Weight (kg)	16.00	16.00	16.00	16.60	17.20	17.80	18.40		
	Additional sect add (kg)	14.40	14.40	14.40	14.90	15.50	16.00	16.60		
250	Gear Housing Width	1.00"(1")	1.25"(11/4")	1.50"(11/2")	1.75"(13/4")	2.00"(2")	2.25"(21/4")	2.50"(21/2")	2.75"(23/4")	3.00"(3")
	cc/rev	20.80	31.20	41.70	52.10	62.60	73.00	83.50	94.00	104.40
	Lpm (at 1000rpm)	20.80	31.20	41.70	52.10	62.60	73.00	83.50	94.00	104.40
	cu in (cu in/rev)	1.28	1.91	2.55	3.19	3.82	4.46	5.10	5.74	6.38
	US gpm (at 1000rpm)	5.50	8.24	11.02	13.76	16.54	19.29	22.06	24.84	27.58
	Max Pressure (bar)	240	240	240	240	240	220	200	190	170
	Max Pressure (psi)	3500	3500	3500	3500	3500	3250	3000	2750	2500
	Max Speed (rpm)	2400	2400	2400	2400	2400	2400	2400	2400	2400
	Pump Weight (kg)	22.70	22.70	22.70	23.40	24.10	24.80	25.50	26.20	26.90
	Additional sect add (kg)	22.70	22.70	22.70	23.40	24.10	24.80	25.50	26.20	26.90
265	Gear Housing Width		1.25"(11/4")	1.50"(11/2")	1.75"(13/4")	2.00"(2")	2.25"(21/4")	2.50"(21/2")	2.75"(23/4")	3.00"(3")
	cc/rev		44.00	59.00	73.50	88.00	102.00	118.00	132.60	147.00
	Lpm (at 1000rpm)		44.00	59.00	73.50	88.00	102.00	118.00	132.60	147.00
	cu in (cu in/rev)		2.68	3.60	4.49	5.37	6.22	7.20	8.09	8.97
	US gpm (at 1000rpm)		11.62	15.59	19.42	23.25	26.95	31.18	35.03	38.84
	Max Pressure (bar)		240	240	240	240	240	240	220	200
	Max Pressure (psi)		3500	3500	3500	3500	3500	3500	3250	3000
	Max Speed (rpm)		2400	2400	2400	2400	2400	2400	2400	2400
	Pump Weight (kg)		24.90	24.90	26.00	27.10	28.20	29.30	30.40	31.50
	Additional sect add (kg)		22.70	22.70	23.40	24.10	24.80	25.50	26.20	26.90

Iran Hydraulic Industries

Spare parts

Pump, Motor, Flow-divider

PTO Dump Pump



GP 110

GP 110	cc/rev	Lpm (at 1000rpm)	cu in (cu in/rev)	Max Pressure (bar)	Max Pressure (psi)	Max Speed (rpm)	Pump Weight (kg)
15	62.60	62.60	3.82	170	2500	2400	27.8
20	83.50	83.50	5.10	153	2250	2400	29.1
22	94.00	94.00	5.74	138	2000	2400	29.8
25	104.40	104.40	6.38	138	2000	2400	30.2

Hydraulic Pump Equations

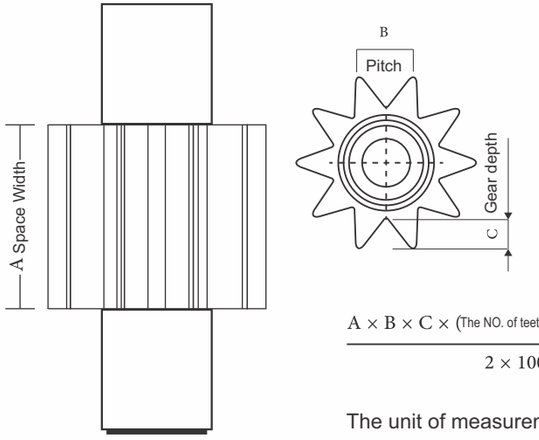
Calculating the power consumption of a pump.

KW: The power consumption of the pump in kilowatts $= \frac{Q \times P}{600} \times 1.2 = KW$

HP: The power consumption of the pump in horsepower $= \frac{Q \times P}{450} \times 1.2 = HP$

Q:The pump flow rate in liters per minute.
P:The operating pressure of the system in bar.

Calculating the literage of a gear pump at 1500 rpm based on the dimensions of the gears



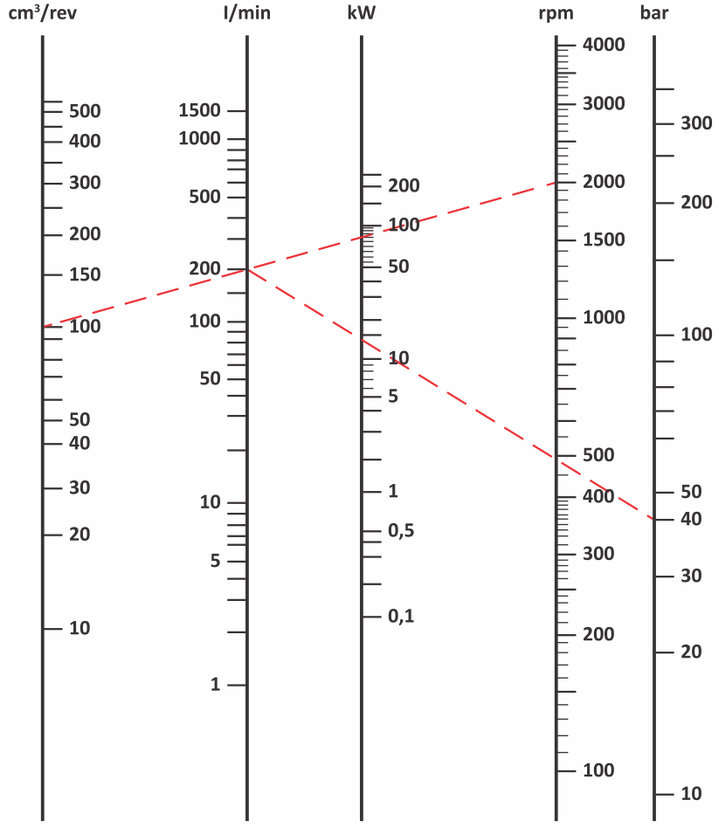
$$\frac{A \times B \times C \times (\text{The NO. of teeth on each of the two gears} - 1)}{2 \times 1000} \times 1.5 = \text{The litrage at 1500 rpm}$$

The unit of measurement for parameters A, B, and C is in millimeters.

Calculating the practical formula for the flow rate of the pump and hydraulic motor at 1500 RPM.

The pump flow rate in liters per minute at 1500 rpm $= (cm^3/rev)$ The displacement volume of oil $\times$ 1.5

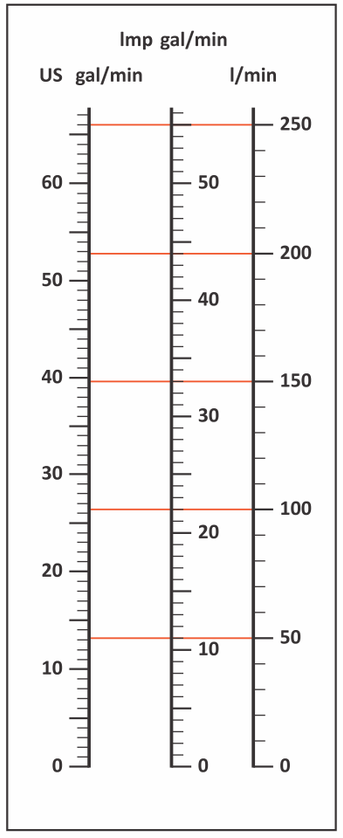
Application diagram for calculating the power consumption of the pump



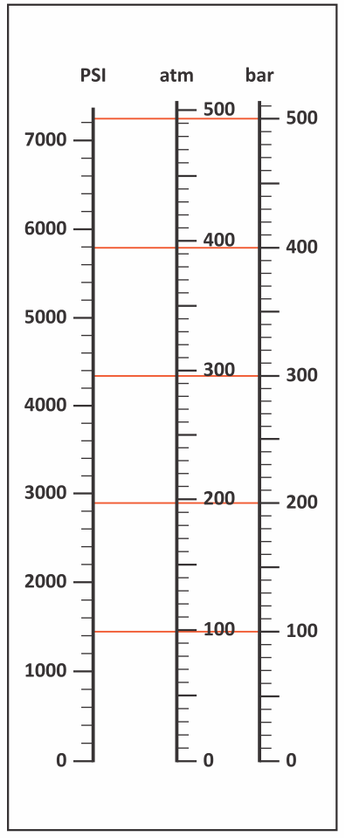
Example: A pump with 2000 rpm and a displacement of 100 cm^3/rev with a pressure of 40 bar will have a flow rate equivalent to 200 lit/m, and an electric motor of 13.33 kw is required.

Conversion table of flow rate, pressure and kilowatt

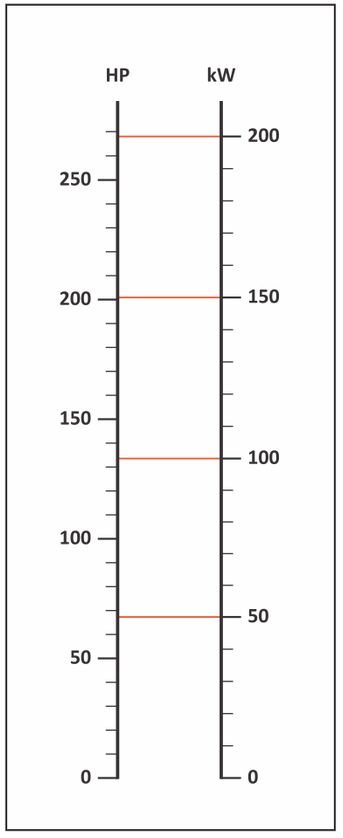
Flow rate



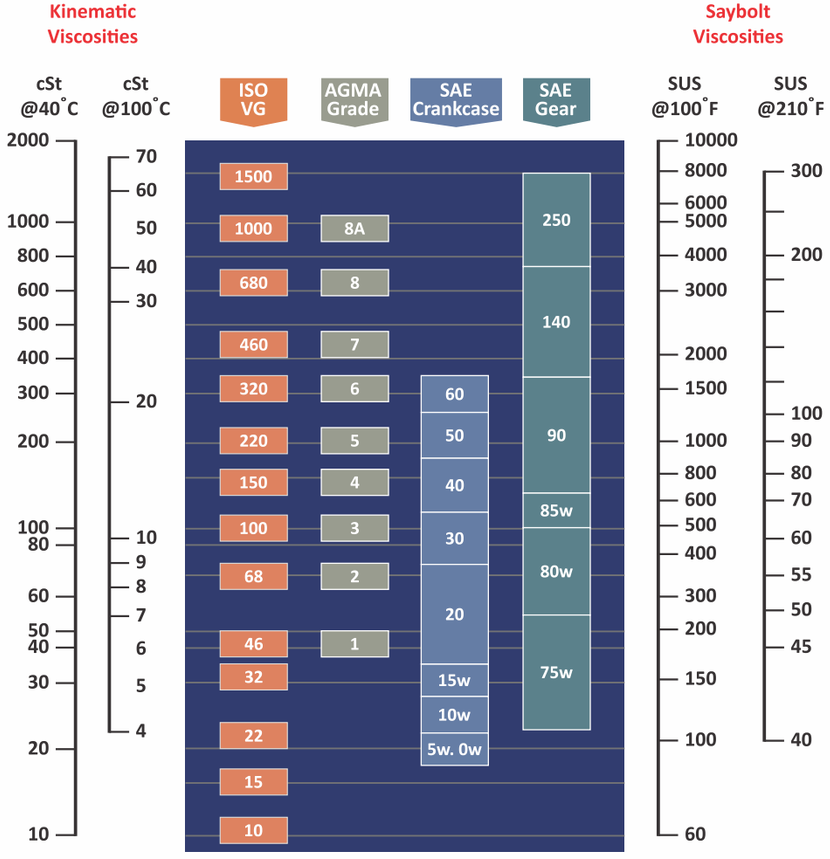
Preassure



Power



Comparative graph of oil viscosity



General Troubleshooting Guide for Hydraulic Systems

Causes of Noise in Hydraulic Systems:

- Incompatible or Dirty Oil Filter: The filter size may not match the pump suction size, or the filter may be dirty.
- Blocked Suction Port: The suction port may be obstructed.
- Loose Pump Body or Housing: The pump body or housing may be loose.
- Improper Sealing of Suction Line: Inadequate sealing can allow air into the system.
- Improper Sealing of Valves and Connections: Air can enter the pump from inadequately sealed tank valves and connections.
- Mismatch Between Hose/Pipe Diameter and Pump Suction: Disparity in size can cause pump vibration.
- Misalignment of Motor Shaft (Uncalibrated Coupling): The motor shaft may not be aligned correctly.
- Excessively Cold or High Viscosity Hydraulic Oil: Cold oil or oil with high viscosity can cause noise.
- Damaged Seals: Seal damage can lead to noise.
- Internal Seal Failure and Leakage: Loss of internal sealing can cause noise.
- Non-Standard Hydraulic Oil Tank: Tank capacity may not be suitable for the pump flow rate.
- Low Oil Level in Tank: Low oil level can lead to noise.

Causes of Unauthorized Pressure Drops in Hydraulic Systems:

- Excessive Internal Leakage: This can occur in pumps, cylinders, hydraulic motors, valves, and check valves.
- Faulty Pressure Adjustment or Control Valves: Incorrectly set or faulty valves can cause pressure drops.
- Low Pump Drive Speed: Insufficient speed can reduce pressure.
- Inappropriate Hydraulic Oil Viscosity: Oil viscosity outside the permissible range can cause pressure drops.
- Inappropriate Valve Selection: Valves may not be suitable for the pump's flow rate and pressure.
- Clogged Oil Path: Blockages in the oil path can reduce pressure.
- Worn Pump Shaft: A worn shaft can cause pressure drops.

Causes of Insufficient Flow in Hydraulic Systems:

- Inappropriate Rotation Speed: Speed may be lower or higher than specified.
- Incorrect Pump Capacity: The pump capacity may not match the actuator speed requirements.
- Faulty Pressure Adjustment or Control Valves: Incorrect settings can cause insufficient flow.
- Inappropriate Hydraulic Oil: High viscosity oil can restrict flow.
- Pump Wear and Tear: Excessive wear can reduce internal flow rate.
- Low Oil Level in Tank: Insufficient oil level can reduce flow.
- Inadequate Pump Suction: Suction filter may be clogged.
- Incorrect Pump Rotation Direction: The pump may be running in reverse.

Causes of Excessive Heat in Hydraulic Systems:

- Excessive System Pressure: Incorrectly set control valves can cause high pressure.
- Constant Pump Pressure: The pump may remain under continuous pressure.
- Internal System Leakage: Leakage in pumps, cylinders, and valves can generate heat.
- Insufficient Oil Tank Capacity: The tank may not hold enough oil for the system.
- Ineffective Cooling System: The cooler may not be working efficiently.
- Excessive Pump Flow Rate: The pump flow rate may exceed system requirements.
- Inappropriate Pressure Line Tubes and Hoses: Lines may not be suitable for the pressure in the system.

Causes of Rapid Component Wear:

- Excessive Hydraulic Oil Wear: Overuse and environmental contamination can degrade oil quality.
- Lack of Proper Filtration: Inadequate filtration can lead to component wear.
- Use of Inappropriate Oil: Incorrect oil type can cause wear.
- High System Pressure: Excessive pressure can accelerate wear.
- Improper Pump Selection: The pump may not be suitable for the system.
- Incorrect Pump Installation: Excessive forces on the pump shaft can cause wear.
- Air Ingress in Pump: Air entering through the suction areas can cause wear.
- Oil Contamination: Contaminated oil can damage system components.
- Cavitation: Cavitation can severely damage components.

Installation, Operation, and Maintenance Instructions for Hydraulic Vane Pumps

As an owner, operator, or hydraulic repair technician, lacking sufficient knowledge of hydraulics can result in significant expenses. Therefore, adhering to the following guidelines can increase the lifespan of the hydraulic system, and consequently, the hydraulic pump, while preventing damage and excessive costs:

- Use appropriate hydraulic oil (ISO VG standard at 40°C and viscosity of 68 cSt).
- Recommended oils include Pars Babak 100, 125, or Behran 68, or their technical equivalents.
- Change the hydraulic oil based on standard intervals, weather conditions, and according to the machine's instructions.
- Ensure the oil tank is thoroughly cleaned before filling, and there is enough oil in the tank.
- Common motor oil 10 available in the market is not suitable for hydraulic systems and will degrade the quality and lifespan of the hydraulic system, especially the hydraulic pump.
- When replenishing oil in the tank, always use the same hydraulic oil as before (the reason for the oil shortage should be investigated).
- Install baffle plates inside the tank to prevent sludge and contamination from moving to the filter and pump.
- Since contamination is the number one enemy of any hydraulic system, ensure no contamination enters the system (contamination can be in the form of solid particles, liquids, or gases).
- In cold weather, do not pressurize the machine before the oil is warmed up. It is better to run the pump without pressure for 10 to 15 minutes until the oil temperature reaches the standard level (the minimum standard temperature is 30°C).
- The best performance of the pump and cartridge is at a temperature between 40°C and 55°C. Therefore, having a cooler and heater to control the temperature and consequently the viscosity in the hydraulic system is essential.
- Ensure the pump suction filter is clean and intact. Its capacity should be 3 to 5 times the flow rate of the pump.

- Ensure that the valves in the system are functional and efficient.
- Installing an oil pressure gauge (manometer) after the pressure control valve in any system is essential for accurate pressure adjustment.
- Always monitor and fix system leaks.
- For installing the pump in the system, ensure proper alignment of the pump shaft, coupling, and drive shaft, then sequentially tighten the connection bolts after fastening.
- After connecting the hoses and before starting the device, fill the pump with the specified hydraulic oil and prime the system.
- Ensure that no air enters the pump through the O-rings of the inlet flange.
- Before pump cartridge assembly in the pump casing, make sure the casing is completely clean. The shaft clearance should not exceed the standard limit.
- Verify the condition of the bearings and seals, then assemble the pump cartridge with attention to the position of the two pins so that they are correctly placed.
- Pay attention to the rotation direction of the cartridge (clockwise or counterclockwise)
- When changing the angle of the pump's inlet and outlet, be cautious of the following:
  a) The cartridge pins do not come out of their positions.
  b) The casing O-rings do not come out of their positions.

- The maximum operating pressure for the cartridge and vane pumps is 175 bar for continuous operation and 210 bar for intermittent operation.
- The suitable operating speed for the drive is a minimum of 600 RPM and a maximum of 1800 RPM.
- Research shows that over 90% of damages in hydraulic systems are due to the use of inappropriate oil, contamination in the hydraulic system, and neglecting the filters.

If you follow all the above guidelines and still encounter issues, you can contact the experts from this company.

Startup Information

Noise Level:

The average noise level at 138 bar (2000 psi) with SAE 10W oil (2000^{cst}) at 50°C (120°F) is specified as follows:

For double pumps, the noise level is approximately 1-3 dB higher than the values in the table above when both output ports are under pressure. This noise level has been tested and prepared according to the NFPA T3.970.12 standard.

	dB(A)		
Model	1200rpm	1500rpm	1800rpm
20V	62	64	66
25V	63	65	67
35V	64	66	69
45V	67	69	71

Recommended Oil:

You can use industrial anti-wear oils or other oils with codes such as SC, SD, SE, SF with a viscosity of 32-68^{cst} at 40°C (140°F). Suitable viscosities for different speeds can be observed in the table provided.

Minimum	13 cst (70 SUS)
Maximum	54 cst (251 SUS)

Minimum	49°c (120°f)
Maximum	65°c (150°f)

Startup Procedure when the System is Cold:

If using SAE 10W oil with a viscosity of 54-860^{cst} (251-4000 SUS), during startup, the speed and pressure should be 50% of the normal operating conditions. When starting the system with oil viscosity higher than 54-860^{cst} (215-4000 SUS), extra caution is needed to warm up the system properly, especially the motors and hydraulic cylinders.

High Temperature:

The oil temperature should never exceed 99°C (210°F) as it drastically reduces the lifespan of the pump and its internal components.

Water-in-Oil Emulsions:

Water-in-oil emulsions can be used, but special care must be taken to control this fluid. Oil-in-water solutions are not recommended.

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Fire-Resistant Fluids:

Phosphate ester fluids can also be used. These fluids are fully compatible with fluorocarbons and silicone elastomers.

Rotation Direction:

The pumps can rotate in either a clockwise or counterclockwise direction. The inlet and outlet ports remain fixed regardless of the rotation direction. However, when the rotation direction is changed, internal pump components must be repositioned.

Air Leakage:

Upon initial startup, if the pump starts with a delay, you should observe air exiting from the pump's outlet port. You can release the air by loosening one of the connections in the pump's output path.

Startup Procedure:

Ensure the oil reservoir and the entire hydraulic circuit are thoroughly clean and free from any foreign particles. Fill the reservoir with filtered oil to a level that avoids turbulence at the suction port. A good practice to ensure circuit cleanliness is to flush the entire system using an auxiliary pump. Before starting the pump, completely fill one of the pump ports with oil. This is especially crucial if the pump is installed above the oil reservoir level.

During the initial startup, release trapped air from the pump by loosening the output port connections or clamps. Ensure all inlet port connections are airtight to prevent air from entering the system. When the pump starts, you should see output flow within a few seconds. If there is no flow, check for any obstructions or devices that might restrict oil flow between the reservoir and the pump's inlet port. Also, inspect for oil leaks at the inlet port.

Make sure the trapped air in the pump is expelled through the outlet port. Once you observe the pump's flow at the outlet port, close the previously loosened outlet port connections. Allow the pump to run without pressure for 5 to 10 minutes to remove all air from the system. If a gauge is installed on the reservoir, ensure the oil remains clear. Add oil to the reservoir as needed to reach the specified level.

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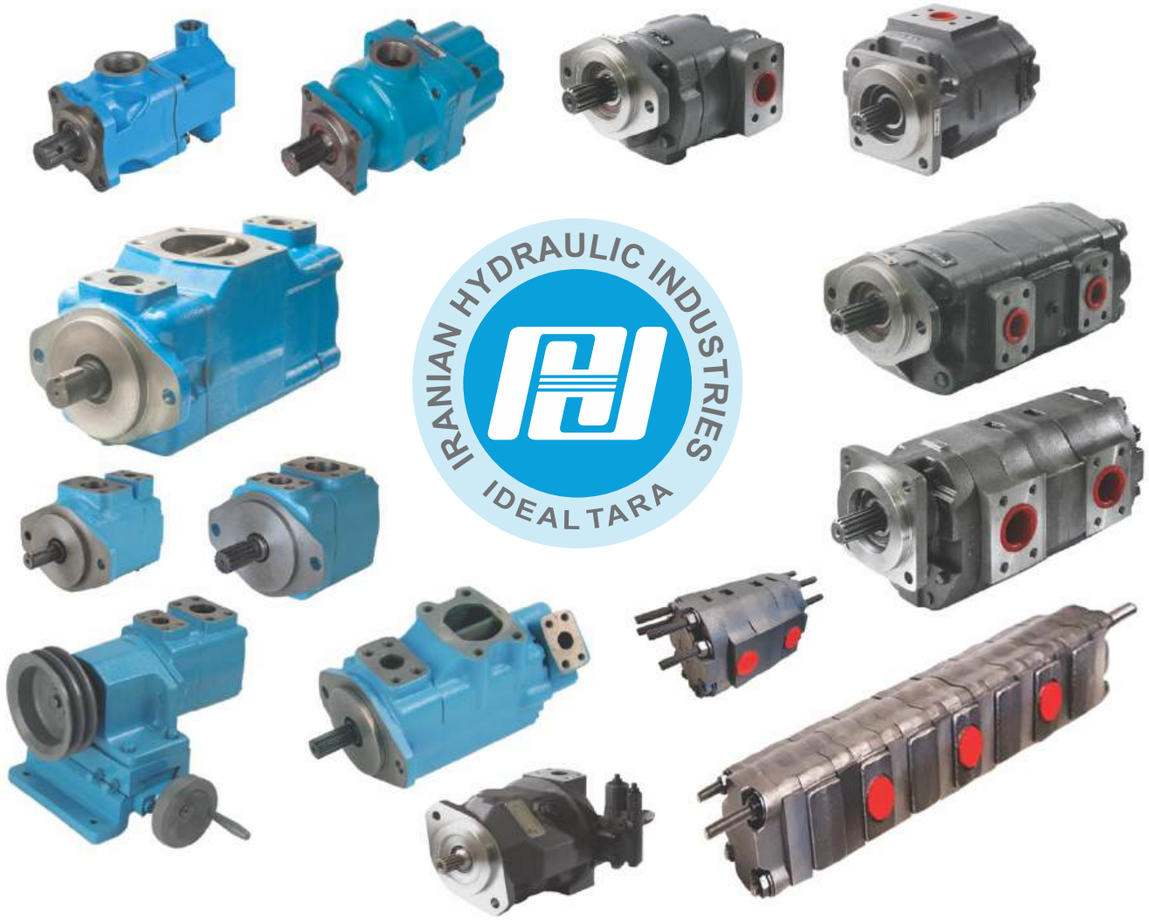

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