

## *INFORMATION*

General Information

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BH\* and V\* single vane pumps

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V\*\*T thru drive single vane pumps

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BH\* y V\* double vane pumps

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Pump with flow regulating & pressure limiting valves  
Oil tanks of 1,5 l. and 1 l. with built-in filter

Pv

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# HYDRAULIC VANE PUMPS

TDZ vane pumps are manufactured in a wide range of displacements, from 2 cc/rev to 236 cc/rev. for single pumps , 377 cc/rev for double pumps and 462 cc/rev. for triple pumps.

All TDZ pumps have a low power to weight ratio, high efficiency, low noise levels, optional inlet and outlet port positions and ease of maintenance.

Ease of maintenance is achieved by the pump design, where the working components are contained within a cartridge which can quickly and easily be replaced without disconnecting the pump from the prime mover or moving it away from the pipe work. TDZ vane pumps are hydraulically balanced, reducing wear and eliminating bearing loads from within the pump.

The option to rotate the outlet port 90 degrees in relation to the inlet port provides flexibility and easy installation.

Depending on the application, there are three versions of the larger single, double and triple vane pumps: low noise industrial models VS and BHS, mobile models VQ and BHQ and multi-purpose models VK and BHP.

Models VS, VK and VQ have UNC threads for the port flanges whilst models BHS, BHQ and BHP have metric threads. On single pumps the outlet port is at the shaft end for models VS, VK, VQ, on models BHS, BHQ and BHP the outlet port is at the cover end. However, all internal components are interchangeable and performance characteristics are the same.

### **PUMPDRIVE**

Direct coaxial drive is recommended via flexible coupling. For indirect drives imposing a radial load on the shaft, consult HIDRAULICA TDZ or your nearest distributor for advice.

### **ROTATION**

The direction of rotation can be reversed by turning the ring, rotor and vanes through 180 degrees.

Direction of rotation is viewed from the shaft end.

### **STARTING**

TDZ vane pumps are self priming, however, if possible, fill the pump with oil before starting or bleed the outlet port while the pump is running to remove any trapped air.

### **FILTRATION**

For satisfactory service life, full flow filtration to provide fluid cleanliness conforming to ISO code 18/15 or better is recommended.

### **HYDRAULIC FLUIDS**

Use antiwear industrial hydraulic oils with a viscosity of 25-49 cST. Automotive crankcase oils SAE 10-SAE20 may also be used depending on the operating temperature. The optimum operating temperature is 50 °C with a maximum of 70 °C. At higher temperatures service life is decreased with degradation of the wearing parts and seals.

For fire resistance fluids, the "F3" version with special seals must be used at reduced pressures and speeds as indicated below.

### **MAXIMUM SPEED RANGES**

With antiwear fluids: 1800 to 2500 rpm (depending on model type. See performance chart).

With synthetic fluids, water glycols and water in oil emulsions, the maximum recommended speed is 1200 rpm.

A special version of the BHP2 pump is available for speeds up to 5000 rpm

Speeds shown are given as a guide only based on the correct fluid and correct suction characteristics as recommended by our Technical Services department.

Long or restricted suction lines can cause cavitation, therefore the maximum running speed must be reduced. Avoid using 90 degree elbows in suction lines, use swept bends where possible. Too viscous a fluid will also cause cavitation.

When using lower displacement pumps within a given pump frame size, speeds slightly higher than those shown in the charts are acceptable.

For antiwear hydraulic fluids and water glycols, the inlet pressure must not exceed 0.2 bar vacuum, for synthetic fluids and water in oil emulsions, the inlet pressure must not exceed 0.1 bar vacuum.

### **MINIMUM SPEED: 600 rpm**

### **MAXIMUM CONSTANT PRESSURE**

Anti-wear Hydraulic Oil: **from 175 to 210 Bar**

Synthetic Oil: **from 175 to 210 Bar**

Water-Glycol emulsions: **160 Bar**

Water-in-oil emulsions: **70 Bar**

This data is for V\*20, V\*25, V\* 35, V\* 45, BH\*4, BH\* 6, BH\*7, double and triple pumps. For other pumps see chart.

The intermittent pressures shown in the table can be maintained for 10% of the time, with a maximum duration of 6 seconds/minute.

### SOUND LEVEL

#### Single Pumps:

VS25 and BHS4: **62 dB (A)**

VS35 and BHS6: **65 dB (A)**

VS45 and BHS7: **71 dB (A)**

#### Double Pumps:

VS43: **68 dB (A)**

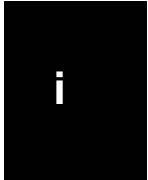
VS63: **69 dB (A)**

VS73: **71 dB (A)**

VS64: **69 dB (A)**

VS74: **71 dB (A)**

VS76: **72 dB (A)**



Sound levels measured with hydraulic oil at 140 Bar, 1500 rpm and a vacuum at pump inlet of 0,17 Bar.

### ADMISSIBLE TORQUES FOR THE AXLES

All the axles available for our simple and motor pumps are sufficient for working at the maximum pressure specified for each model.

However, in the case of double pumps and pumps with crossing axle, if both cartridges/pumps work simultaneously under pressure, the sum of the torques absorbed for each of them may exceed the resistance of the axle.

In practice, the absorbed torque for each cartridge/pump may be calculated with the formula:

$$T = \frac{P \times V}{59}$$

Where:

T = Torque in Nm.

P = Working pressure in Bars.

V = Cubage in cm<sup>3</sup>/rev. or flow in lts/min at 1,000 R.P.M.

In order to choose the most appropriate type of axle, calculate said torque sum under the most unfavourable working conditions and compare them with the torque values admitted for each axle as indicated in table 1.

Analogically, in the crossing axle pumps, the absorbed torque for the second pump will be calculated under the most unfavourable conditions, and it must be checked that it does not exceed the torque values admissible as indicated in table 2 for each connection.

Table 1

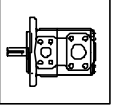
Pump type	Shaft n°	Max. torque Nm
V*42	1	313
V*43	11	313
V*4T	86	392
V*63	1	392
V*64	11	568
V*6T	86	588
V*73	1	588
V*74	11	803
V*76	86	803
V*7T		

Table 2

Rear flange (connection)	Max. torque Nm
A	130
B	315
C	440 (V*6TC) 700 (V*7TC)



**sP**



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# *SINGLE VANE PUMPS*

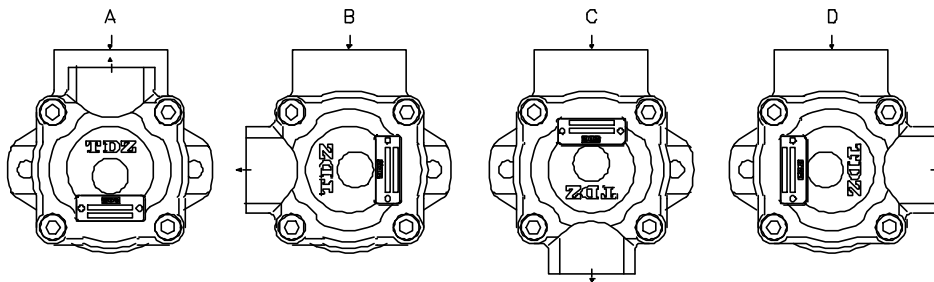
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- BH\* and V\* single vane pumps

## SINGLE VANE PUMP CODE

F3	BHP	4	67	D	1	A	00
F3	VK	25	21	D	1	A	00
1	2	3	4	5	6	7	8

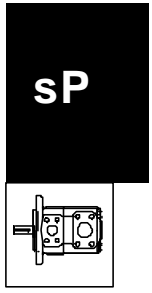
- 1 - "F3" means special seals for fire-resistant fluids. Omit if not required
  
- 2 - **Pump Type:**  
**BHP** = 10 vane pump, mobile and industrial use, metric threads  
**BHS** = 12 vane pump, industrial use (very quiet), metric threads  
**BHQ** = 10 vane pump and bronze plates, mobile use, metric threads  
**VK** = 10 vane pump, mobile and industrial use, UNC threads  
**VS** = 12 vane pump, industrial use (very quiet), UNC threads  
**VQ** = 10 vane pump and bronze plates, mobile use, UNC threads
  
- 3 - **Pumpmodel:** VC10, VC20; 20, 25, 35 and 45 in VK, VS and VQ types  
1, 2 and 3 in BHP types; 4, 6 and 7 in BHP, BHS and BHQ types
  
- 4 - **Flow:** VC VK, VS and VQ in US Gallons per minute at 1200 rpm and 7 Bar.  
BHP, BHS and BHQ in Litres per minute at 1000 rpm and 7 Bar.
  
- 5 - **D** = Right-hand direction of rotation (Clockwise).  
**Y** = Left-hand direction of rotation.  
*(To check the direction of rotation view from the shaft end).*
  
- 6 - **Shaft type:** See on each pump
  
- 7 - **Outlet position from the shaft:**  
A: Outlet in line with inlet  
B: 90° on the right from inlet (Clockwise from inlet)  
C: 180° from inlet  
D: 90° on the left from inlet (90° counterclockwise from inlet)
  
- 8- **Special characteristic**  
Omit if not required  
Example: 02 : BSP  
03 : UNF  
04 : NPT



## SINGLE VANE PUMP CHARACTERISTICS

### TDZ DESIGN VANE PUMPS

TYPE	FLOW			SPEED (rpm)		PRESSURE (Bar)		Nominal power (3)	CONNECTION		WEIGHT (Kgs.)
	Ltrs.at 1000 rpm	US Gal. at 1200 rpm	Reduction (2)	Min.	Max.	Contin.	Intermit.		Inlet	Outlet	
<b>BHP1</b>	2	0,6	0,18	600	2500	150	175	0,5	(4)	(4)	1
	3	0,9	0,18					0,7			
	4,5	1,2	0,36					1			
	5,5	1,7	0,36					1,4			
	6,5	2	0,36					1,6			
<b>BHP2 (1)</b>	7	2,2	0,7	600	2500	150	175	1,8	(4)	(4)	3,6
	8	2,5	1,1					2			
	10	3,2	1,1					2,5			
	12	3,8	1,1					3			
	15	4,7	1,1					3,7			
<b>BHP3</b>	6	2	0,9	600	2500	150	175	1,9	(4)	(4)	7,1
	16	5	1,7					4,3			
	18	6	2,8					5,3			
	25	8	4,5					6,9			
	27	9	4,8					7,6			
	35	11	4,8		8,8						
	38	12	5,4		10,2						
	44	14	6,6		11,9						
	50	16	7,8		13,6						
	2000				100	125					
1500											
<b>BHP4 BHS4 BHQ4</b>	26	8	4,5	600	2500 (BHS)	175	210	6,9	Ø38	Ø26	14,5
	40	12	5,7					10,4			
	45	14	5,7					11,6			
	55	17	5,8					13,8			
	60	19	5,8					14,6			
	67	21	6		16,8						
	80	24	6,2		20,3						
	88*	27*	6,5		22,4						
	1500				125	150					
<b>BHP6 BHS6 BHQ6</b>	66	21	8,6	600	2400 (BHS)	175	210	16,8	Ø60	Ø32	26,3
	81	25	9					20,3			
	97	30	10					24,3			
	112	35	11,4		27,4						
	121	38	11,4		29,3						
	142	45	13,1		33,3						
1500			125	150							
<b>BHP7 BHS7 BHQ7</b>	138	42	15	600	2200 (BHS)	155	175	32,3	Ø75	Ø38	38,3
	148	47	15,7					36,3			
	162	50	14,3					37,9			
	180	57	17,9					43,2			
	193	60	18,6					46,1			
	214	67	22					51,2			
	240	75	26					57,4			



\* 27 gallons (88lts.) cartridge not monted in VQ25 vane pump model.

- (1) There is a version of this pump with built-in flow regulating and pressure limiter valves, ref. **B2V**. If a built-in tank with filter is required, the ref. is **B2VC** (1.5 ltrs. tank) or **B2VA** (1 litre tank).
- (2) **Delivery flow reduction** in Ltrs./min. at 100 Bar. 22 cST of oil viscosity at operating temperature. To calculate the approximate delivery flow at a given pressure and speed, use the following formula with flow reduction and theoretical flow values shown in the chart. Flow reduction values are independent of shaft speed.

$$\text{Approx. output flow (Ltrs./min.)} = \text{Theoretical flow} \times \frac{\text{R.P.M.}}{1000} \times \text{Reduction} \times \frac{\text{Pressure (Bar)}}{100}$$

- (3) **Nominal power** in H.P. at 100 Bar and 1000 RPM (to convert into Kw multiply by 0.735). To obtain the real input power at different pressure and revolutions, use the formula as follows:

$$\text{Real input power} = \text{Input power} \times \frac{\text{R.P.M.}}{1000} \times \frac{\text{Pressure (Bar)}}{100}$$

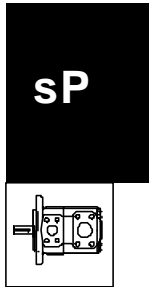
- (4) See options on dimension pages.



## SINGLE VANE PUMP CHARACTERISTICS

### VICKERS DESIGN VANE PUMPS

TYPE	FLOW			SPEED (rpm)		PRESSURE (Bar)		Nominal power (3)	CONNECTION		WEIGHT (Kgs.)
	Lts. at 1000 rpm	US Gal. at 1200 rpm	Reduction (2)	Min.	Max.	Contin.	Intermit.		Inlet	Outlet	
VC10	3	1	0,8	600	4800	155	177	0,7	(4)	(4)	4,5
	6	2	0,9		4500			1,4			
	9	3	1,2		4000			2,1			
	13	4	1,6		3400			2,7			
	16	5	1,7		3200			3,2			
	19	6	1,8		3000	3,7					
	22	7	1,9	2800	140		4,2				
VC20	19	6	2,8	600	3400	155	177	3,9	(4)	(4)	7,3
	22	7	4,2		3000			4,4			
	26	8	4,5		2800			5,1			
	29	9	4,8		2800			5,6			
	36	11	4,8		2500			6,5			
	39	12	5,4		2400	7,5					
	42	13	6,0	2400	140		8,1				
VK20 VQ20	8	2	0,9	600	1800	175	210	1,9	Ø1½"	Ø3/4"	12
	18	5	2,1					4			
	27	8	2,8					6,6			
	29	9	3,5					6,9			
	36	11	4,3					7,3			
	39	12	4,3			7,4					
	46	14	5,3			210	7,6				
VK25 VS25 VQ25	26	8	4,5	600	2500 1800 (VS)	175	210	6,9	Ø1½"	Ø1"	15
	40	12	5,7					10,4			
	45	14	5,7					11,6			
	55	17	5,8					13,8			
	60	19	5,8					14,6			
	67	21	6			16,8					
	80	24	6,2	1500	125	150	20,3				
	88*	27	6,5				21,1				
	66	21	8,6	600	2400 1800 (VS)	175	210	16,8	Ø2"	Ø1¼"	23
	81	25	9					20,3			
	97	30	10					24,3			
	112	35	11,4					27,4			
	121	38	11,4					29,3			
	142	45	13,1			33,3					
VK45 VS45 VQ45	138	42	15	600	2200 1800 (VS)	155	175	32,3	Ø3"	Ø1½"	35,5
	148	47	15,7					36,3			
	162	50	14,3					37,9			
	180	57	17,9					43,2			
	193	60	18,6					46,1			
	214	67	22			51,2					
	240	75	26				57,4				



\* 27 gallons (88lts.) cartridge not monted in VQ25 vane pump model.

- (1) There is a version of this pump with built-in flow regulating and pressure limiter valves, ref. **B2V**. If a built-in tank with filter is required, the ref. is **B2VC** (1.5 ltrs. tank) or **B2VA** (1 litre tank).
- (2) **Delivery flow reduction** in Ltrs./min. at 100 Bar. 22 cST of oil viscosity at operating temperature. To calculate the approximate delivery flow at a given pressure and speed, use the following formula with flow reduction and theoretical flow values shown in the chart. Flow reduction values are independent of shaft speed.

$$\text{Approx. output flow (Ltrs./min.)} = \text{Theoretical flow x } \frac{\text{R.P.M.}}{1000} \text{ — Reduction x } \frac{\text{Pressure (Bar)}}{100}$$

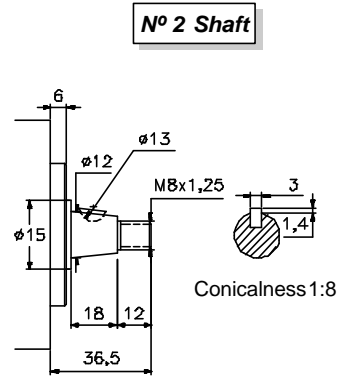
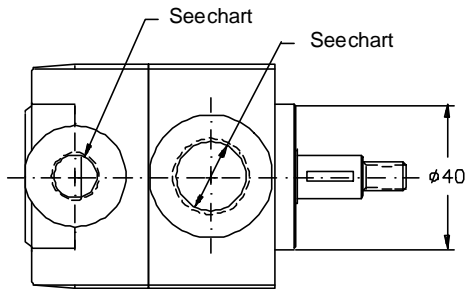
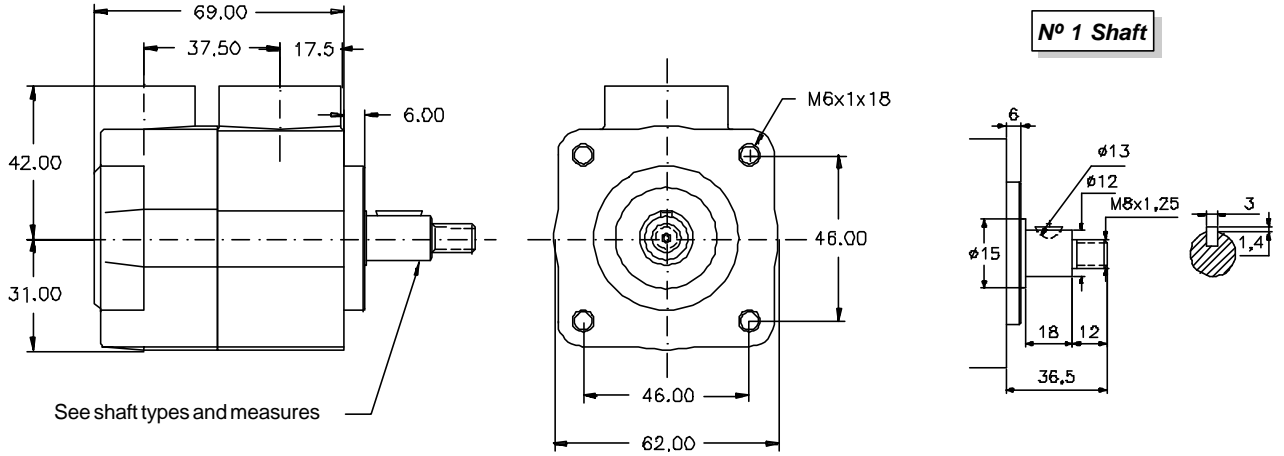
- (3) **Nominal power** in H.P. at 100 Bar and 1000 RPM (to convert into Kw multiply by 0.735). To obtain the real input power at different pressure and revolutions, use the formula as follows:

$$\text{Real input power} = \text{Input power x } \frac{\text{R.P.M.}}{1000} \text{ x } \frac{\text{Pressure (Bar)}}{100}$$

- (4) See options on dimension pages.

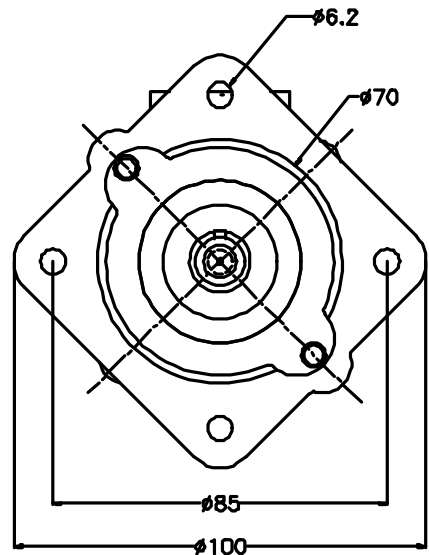
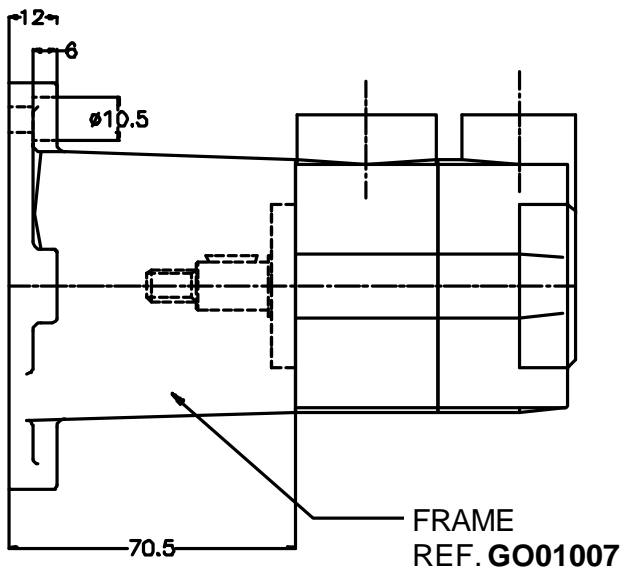
FLOW						SPEED (rpm)		PRES. (Bar)		CONNECTION		WEIGHT (Kgs.)
Lts.at 1000rpm	2	3	4,5	5,5	6,5	Mín.	Máx.	Contin.	Intermit.	Inlet	Outlet	1
Gal.at 1200rpm	0,6	0,9	1,2	1,7	2	600	2500	150	175	1/2" BSP	1/4" BSP	

DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres

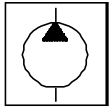


Num.	Inlet	Outlet
01	1/2" BSP	1/4" BSP
02	3/8" BSP	1/4" BSP

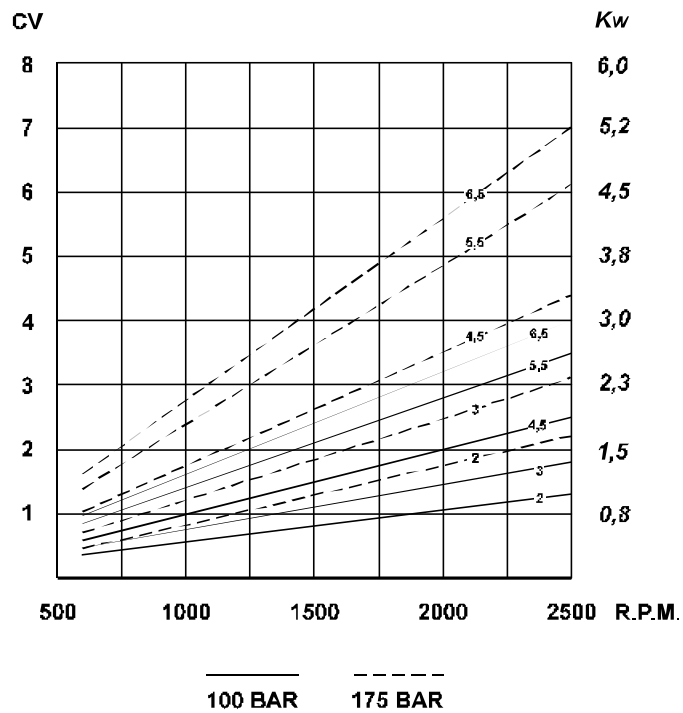
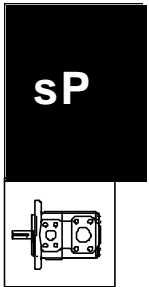
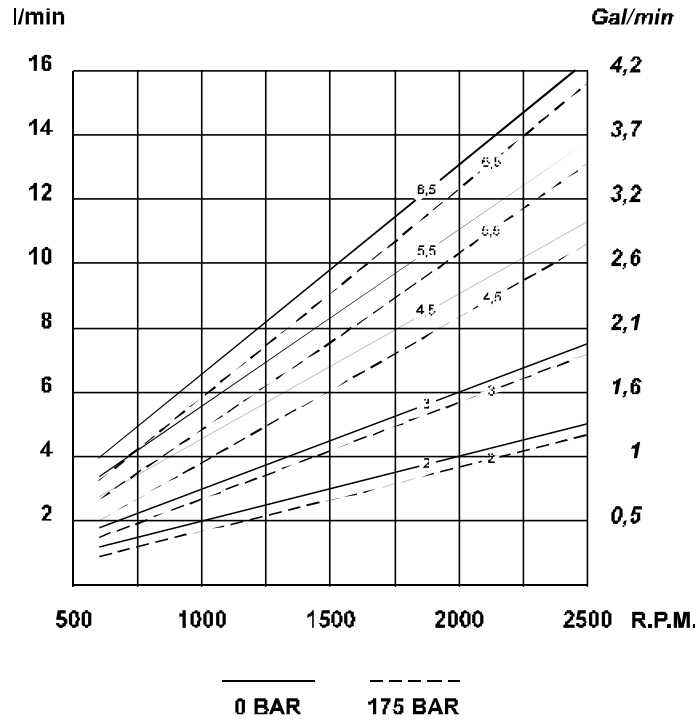
**BHP1 PUMP AND FRAME SET TO CONNECT TO ELECTRIC MOTOR**



# SINGLE VANE PUMP TYPE BHP-1



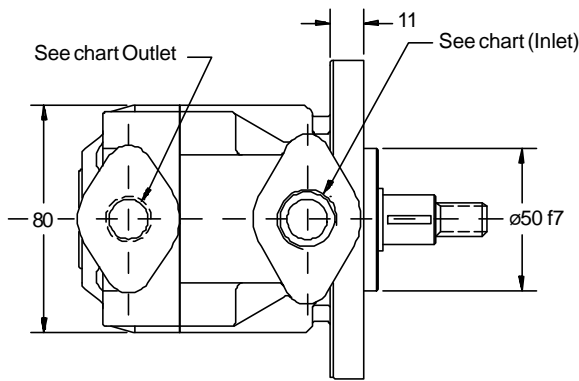
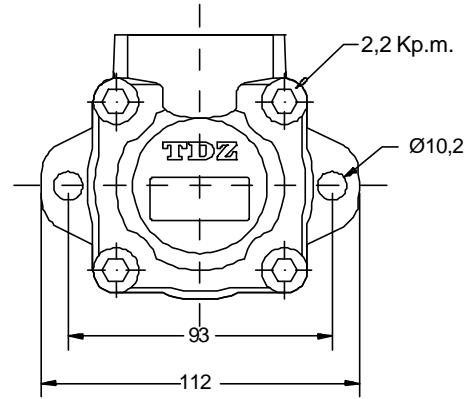
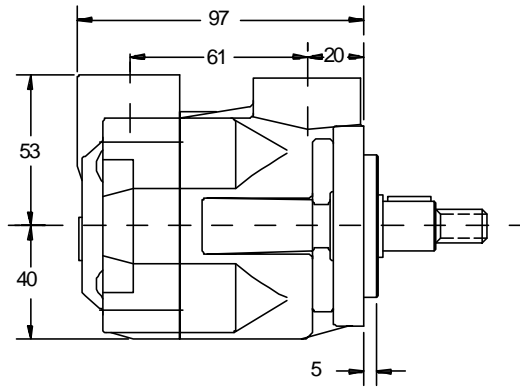
## FLOW AND INPUT POWER DIAGRAMS



	FLOW					SPEED (rpm)		PRES. (Bar)		CONNECTION		WEIGHT (Kgs.)	
	Lts. at 1000 rpm	7	8	10	12	15	Mín.	Máx.	Contin.	Intermit.	Inlet		Outlet
Gal. at 1200 rpm	2,2	2,5	3,2	3,8	4,7		600	2500*	150	175	3/4" BSP	1/2" BSP	3,6

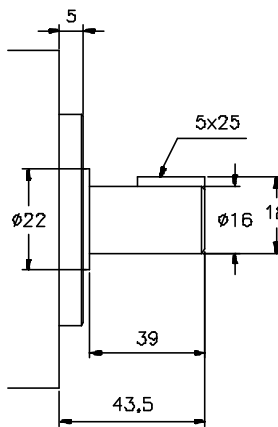
\*For further details see general chart

DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres

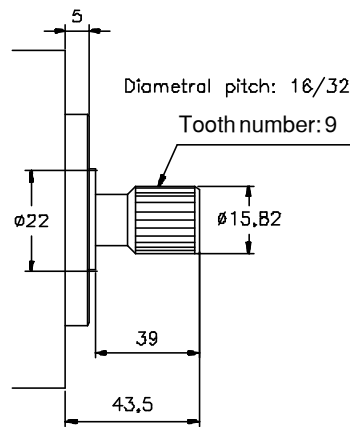


Num.	Inlet	Outlet
02	3/4" BSP	1/2" BSP

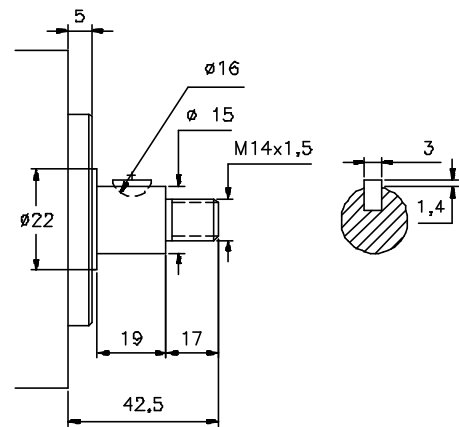
**Nº1 Shaft**



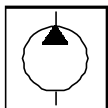
**Nº2 Shaft**



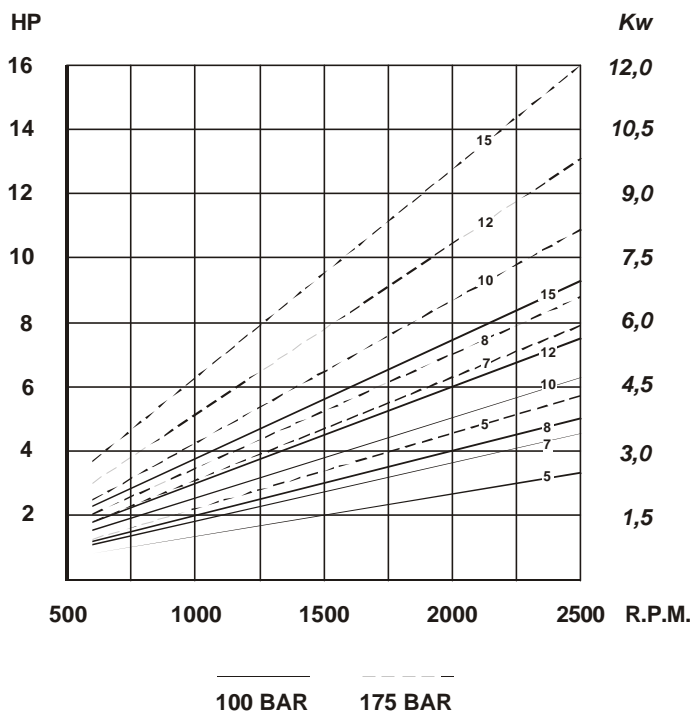
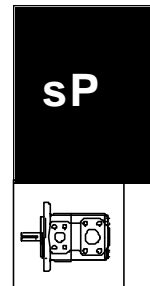
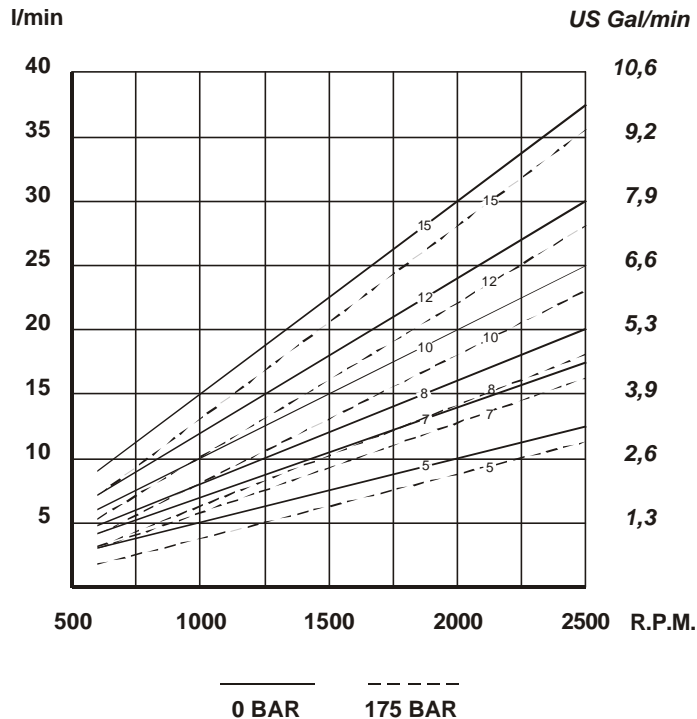
**Nº3 Shaft**



Enquire about other types of shafts



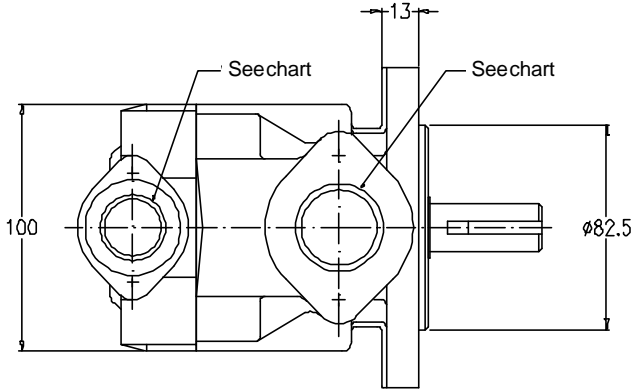
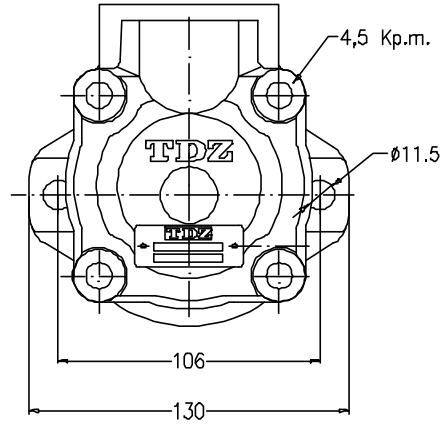
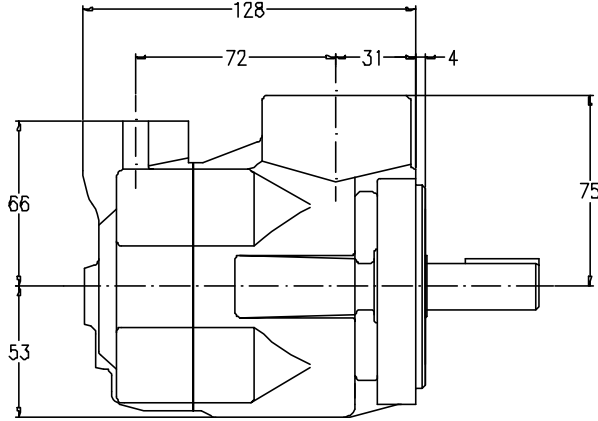
FLOW AND INPUT POWER DIAGRAMS



FLOW									SPEED (rpm)		PRES. (Bar)		CONNECTION		WEIGHT (Kgs.)	
Lts. at 1000 rpm	6	16	18	25	27	35	38	44	50	Min.	Máx.	Contin.	Intermit.	Inlet		Outlet
Gal. at 1200 rpm	2	5	6	8	9	11	12	14	16	600	2500*	150	175	1" BSP	3/4" BSP	7,1

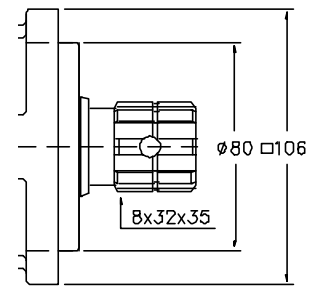
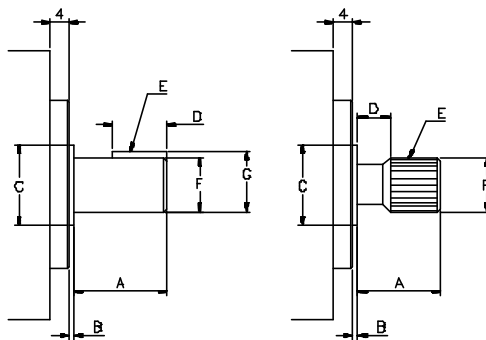
\* For further details see general chart

## DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres



Num.	Inlet	Outlet
01	1" BSP	3/4" BSP
02	1" 1/4 BSP	3/4" BSP
03	1" 5/8 UNF	1" 1/16 UNF
04	1" 1/4 NPT	3/4" NPT

Standard version. (SAE flange)

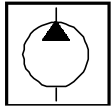


Version for direct mounting in Power Take-Off (ISO flange)

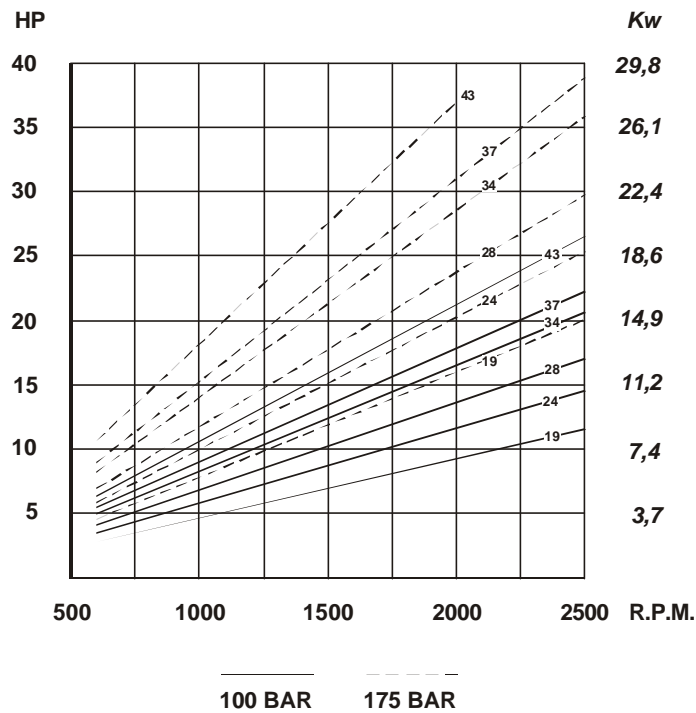
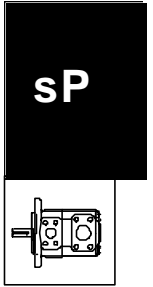
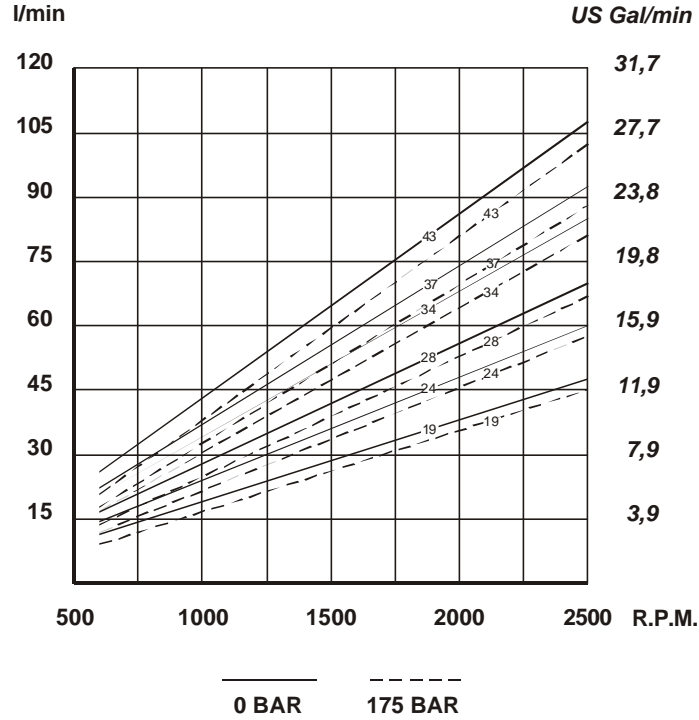
	Parallel shaft	
	Nº 1	Nº 6
A	45	62,5
B	2	1
C	Ø25	Ø25
D	30	41
E	5	4,75
F	Ø19	Ø19
G	21,1	21,1

	Splined shaft		
	Nº 2	Nº 4	Nº 5
A	47	30	24,5
B	1	1	1
C	Ø25	Ø25	Ø25
D	15	4	3,5
F	Ø21,80	Ø17,1	Ø15,82

Shaft	E
Nº 2	Diametral pitch 16/32 Teeth: 13
Nº 4	DIN 5482 B18x15 Teeth: 10
Nº 5	Diametral pitch 16/32 Teeth: 9

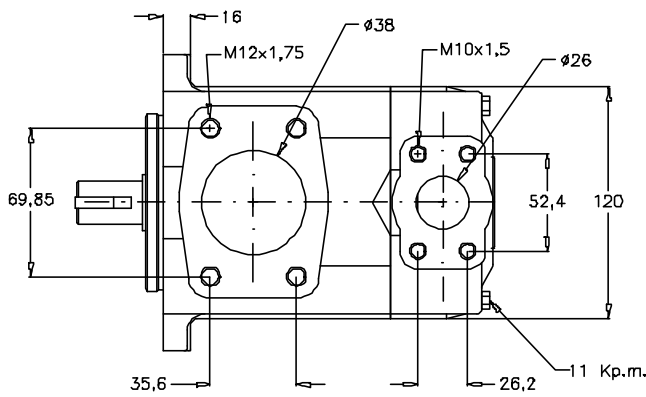
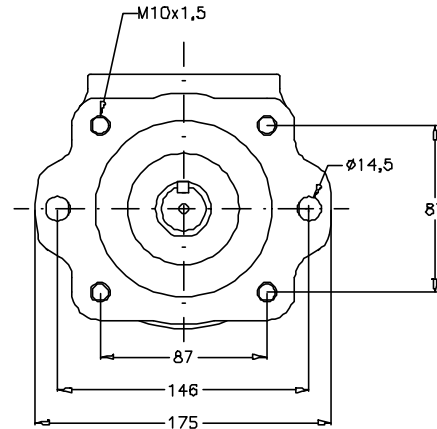
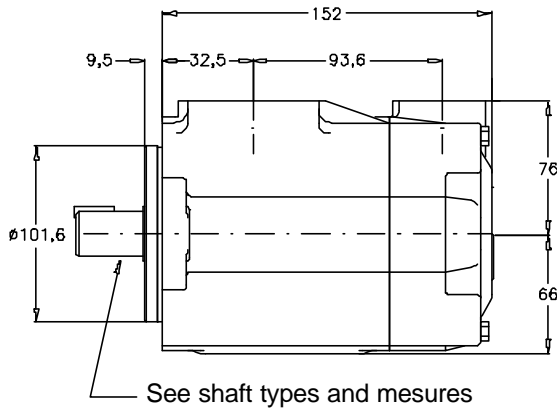


FLOW AND INPUT POWER DIAGRAMS



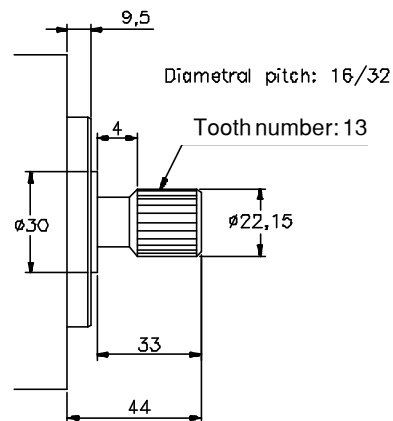
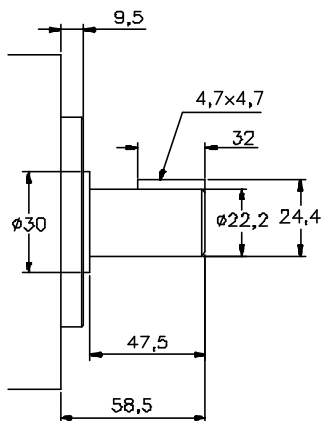
FLOW									SPEED (rpm)		PRES. (Bar)		CONNECTION		WEIGHT (Kgs.)
Lts.at 1000 rpm	26	39	44	54	60	66	80	85	Mín.	Máx.	Contin.	Intermit.	Inlet	Outlet	
Gal.at 1200 rpm	8	12	14	17	19	21	24	27	600	2500	175	210	Ø38	Ø26	14,5

DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres

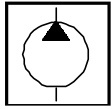


**Nº1 Shaft**

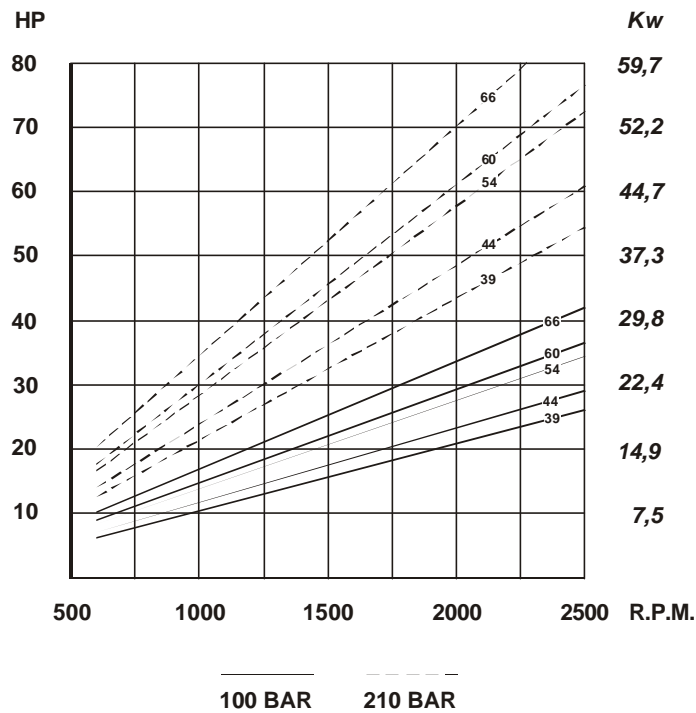
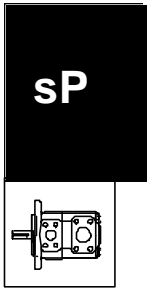
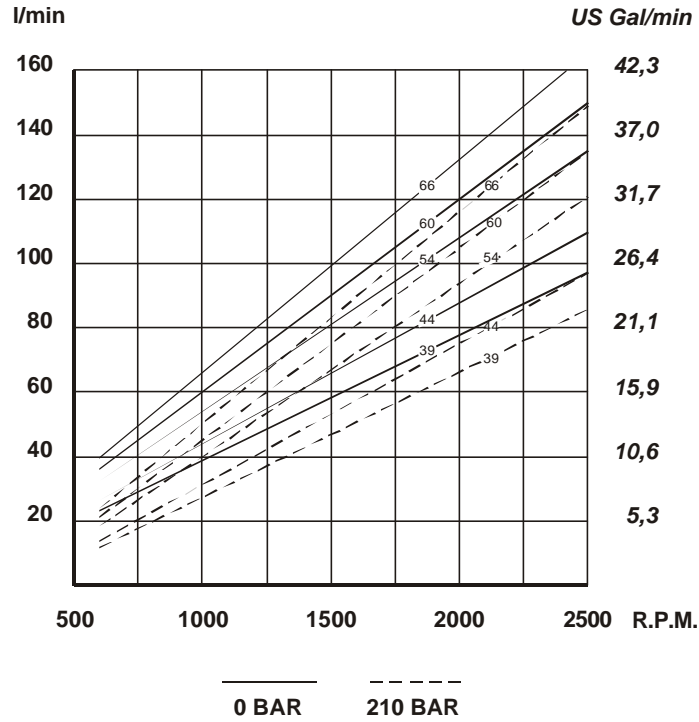
**Nº2 Shaft**



Enquire about other types of shafts

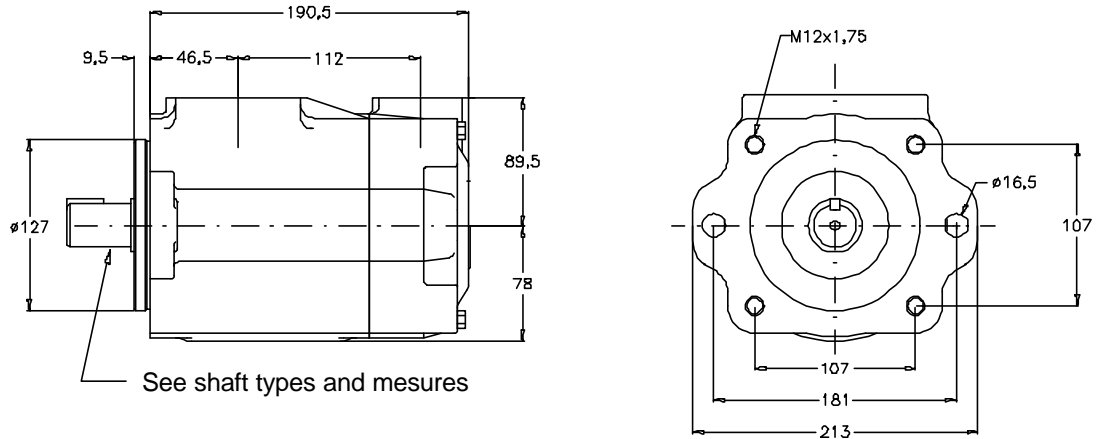


FLOW AND INPUT POWER DIAGRAMS

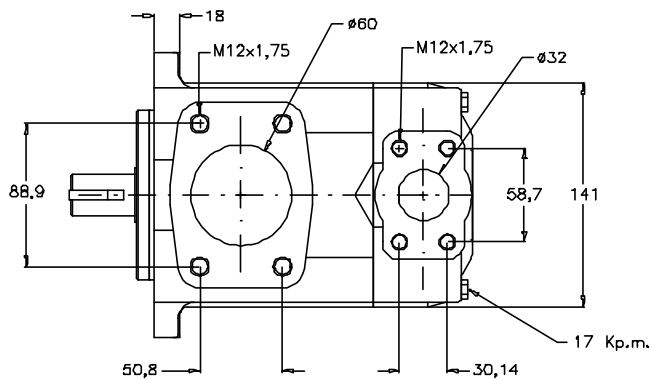


FLOW						SPEED (rpm)		PRES. (Bar)		CONNECTION		WEIGHT (Kgs.)	
Lts. at 1000 rpm	66	81	97	112	121	142	Mín.	Máx.	Contin.	Intermit.	Inlet		Outlet
Gal. at 1200 rpm	21	25	30	35	38	45	600	2400	175	210	Ø60	Ø32	26,3

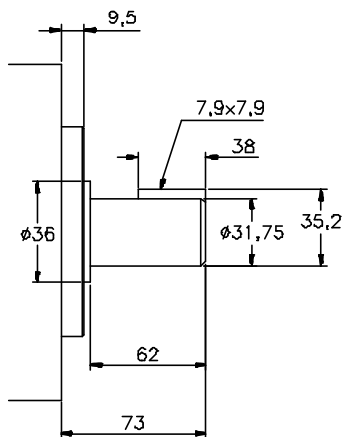
DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres



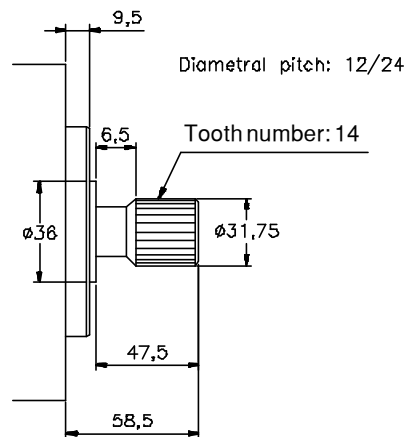
See shaft types and mesures



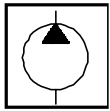
**Nº1 Shaft**



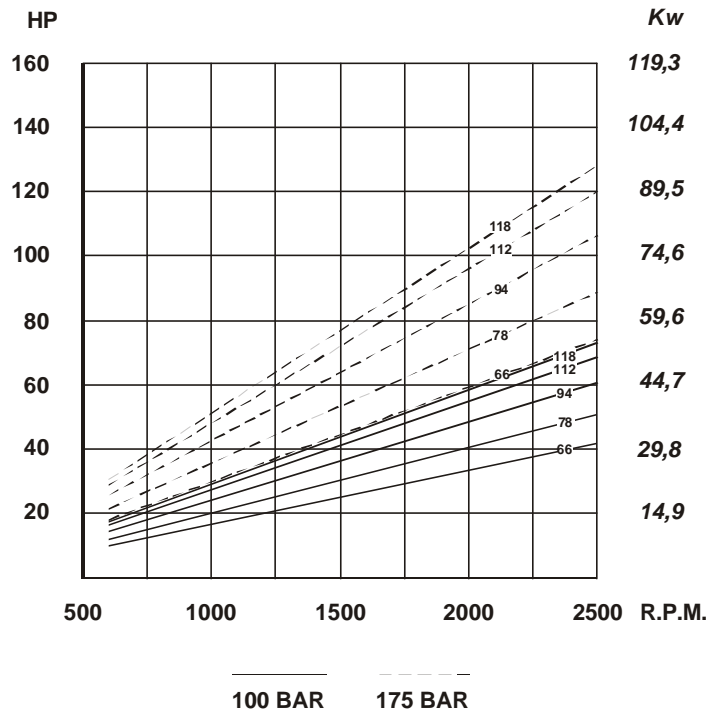
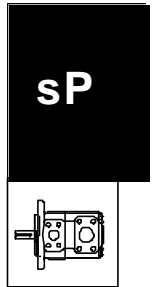
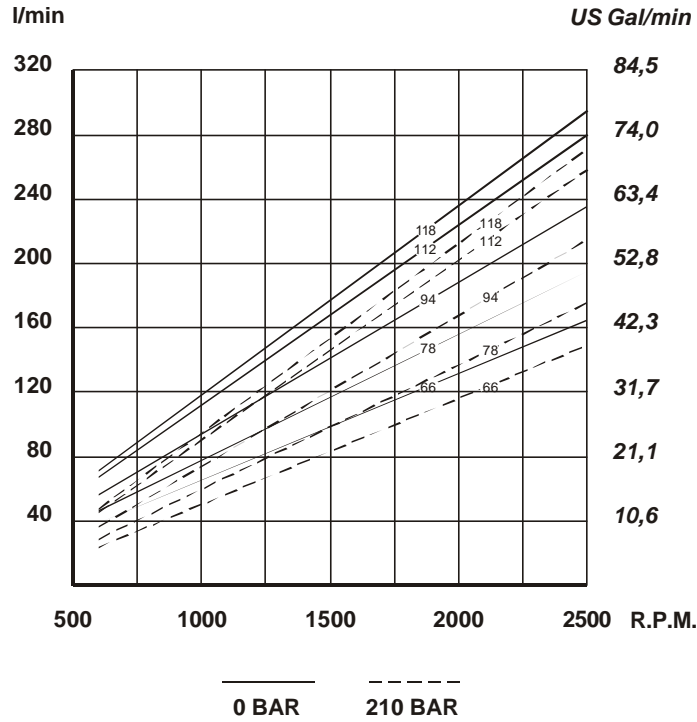
**Nº2 Shaft**



Enquire about other types of shafts



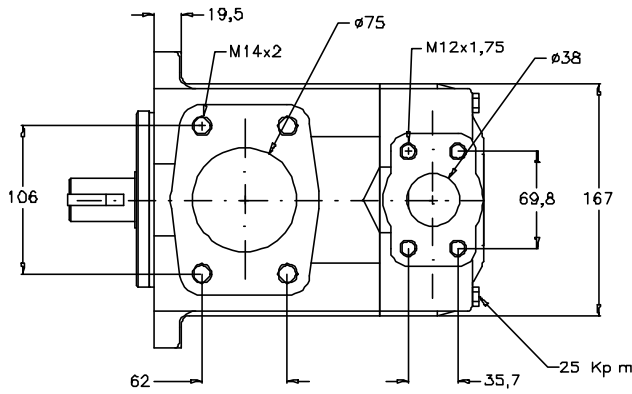
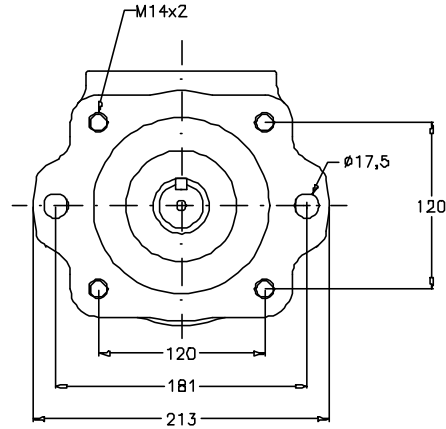
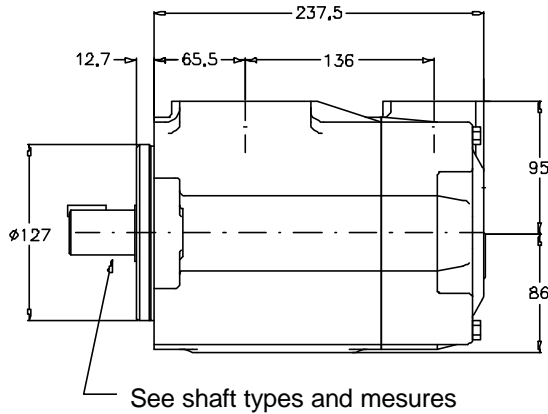
FLOW AND INPUT POWER DIAGRAMS



FLOW	SPEED (rpm)		PRES. (Bar)		CONNECTION		WEIGHT (Kgs.)	
	Lts.at 1000rpm	Gal.at 1200rpm	Mín.	Máx.	Inlet	Outlet		
138 148 162 180 193 214 240	42 47 50 57 60 67 75	600	2200*	155	175	Ø75	Ø38	38,3

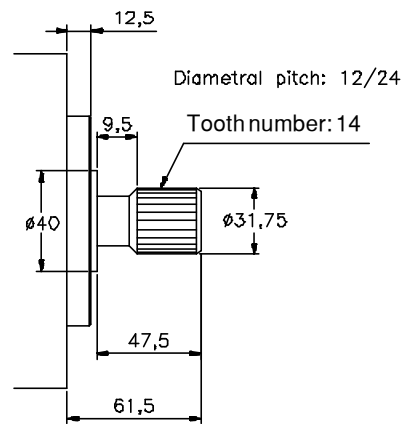
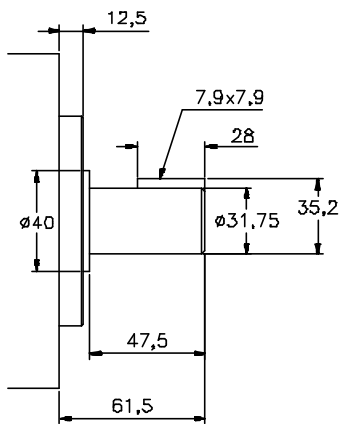
\* For further details see general chart

DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres

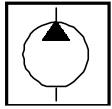


**Nº1 Shaft**

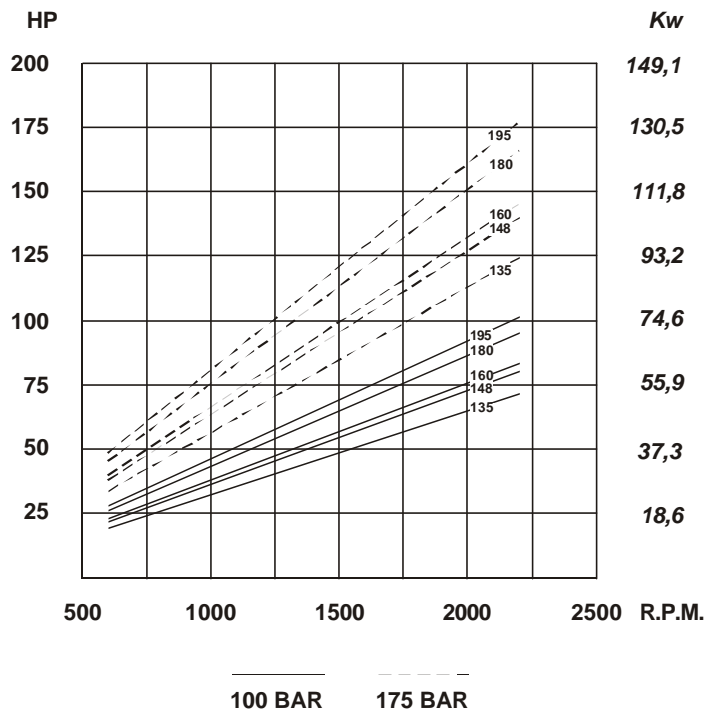
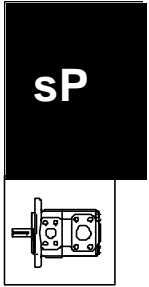
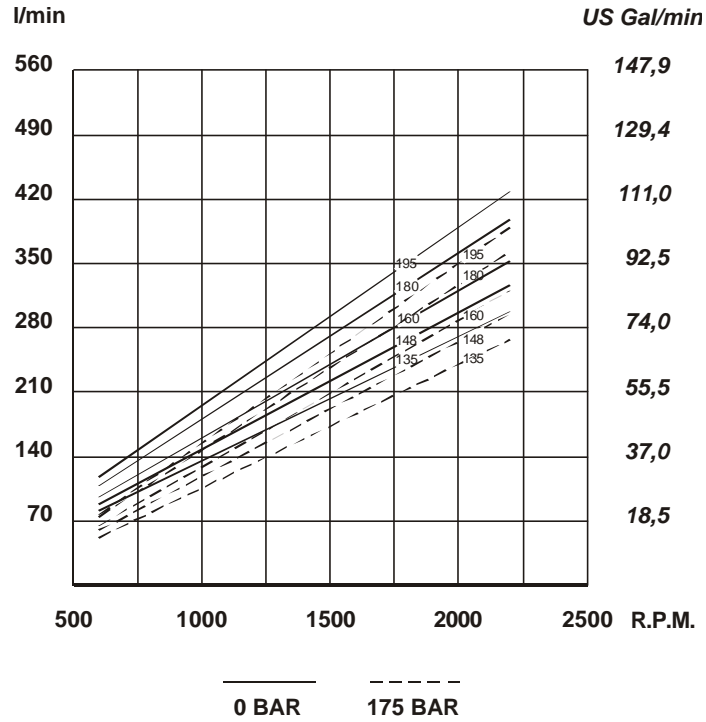
**Nº2 Shaft**



Enquire about other types of shafts

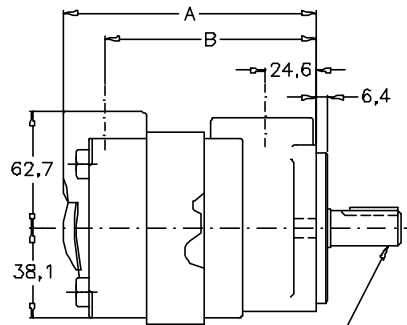
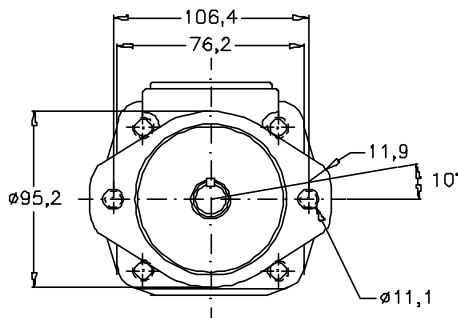


FLOW AND INPUT POWER DIAGRAMS



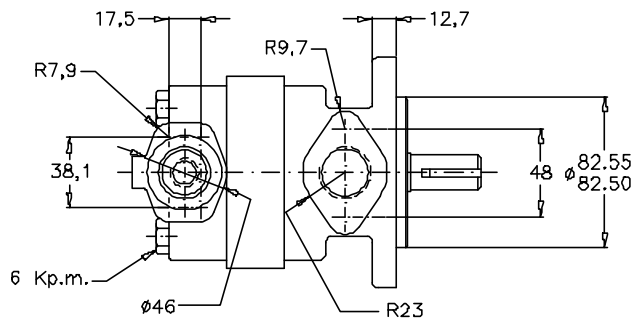
FLOW			SPEED (rpm)		PRESSURE (Bar)		Nominal power (3)	CONNECTION		WEIGHT (Kgs.)
Lts. at 1000 rpm	US Gal. at 1200 rpm	Reduction (2)	Mín.	Máx.	Contin.	Intermit.		Inlet	Outlet	
3	1	0,8	600	4800	155	177	0,7	1" NPT	1/2" NPT	4,5
6	2	0,9		4500						
9	3	1,2		4000						
13	4	1,6		3400						
16	5	1,7		3200						
19	6	1,8		3000						
22	7	1,9		2800			140			

**DIMENSIONS IN MILLIMETRES** 1" = 25.4 millimetres



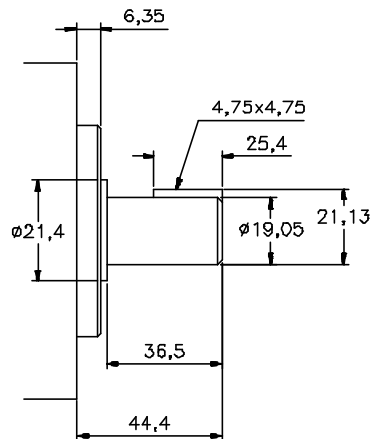
See shaft type and measures

Galon	Dimension	
	A	B
1, 2, 3	115,6	91,9
4, 5	121,9	98,3
6, 7	127	103,4

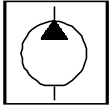


Num.	Inlet	Outlet
02	1" BSP	1/2" BSP
04	1" NPT	1/2" NPT

**Nº1 Shaft**



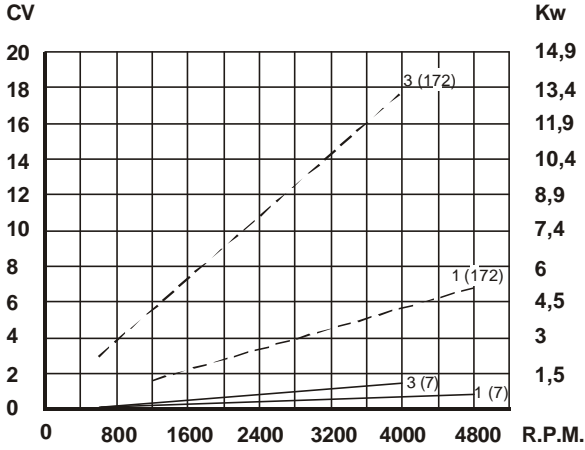
# SINGLE VANE PUMP VC10



## FLOW AND INPUT POWER DIAGRAMS

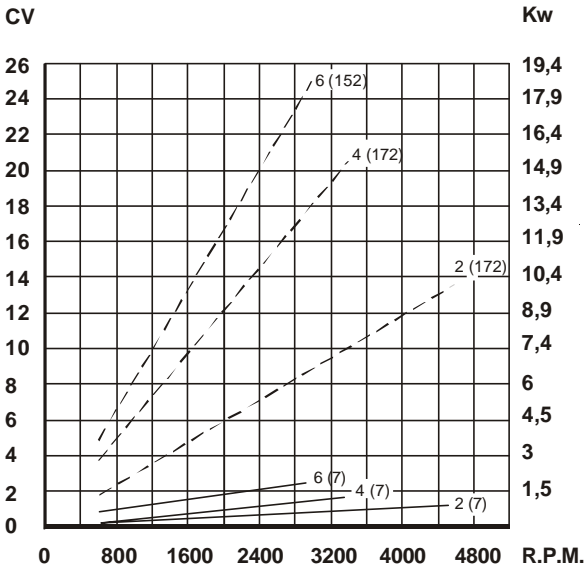
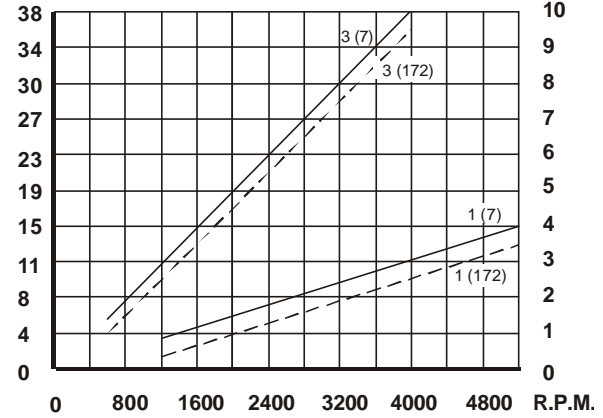
Max. pressure (bar)

Min. pressure (bar)



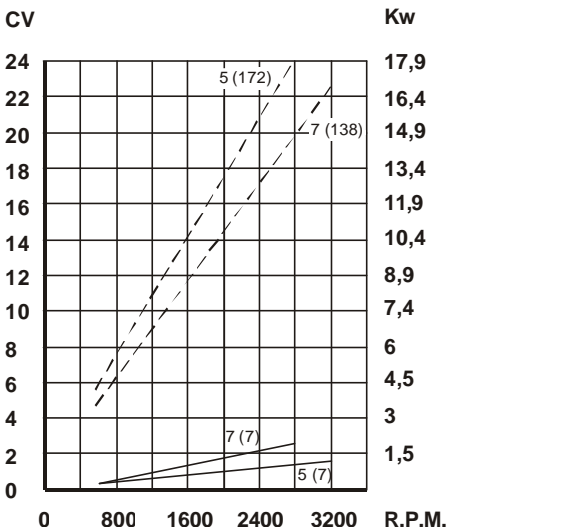
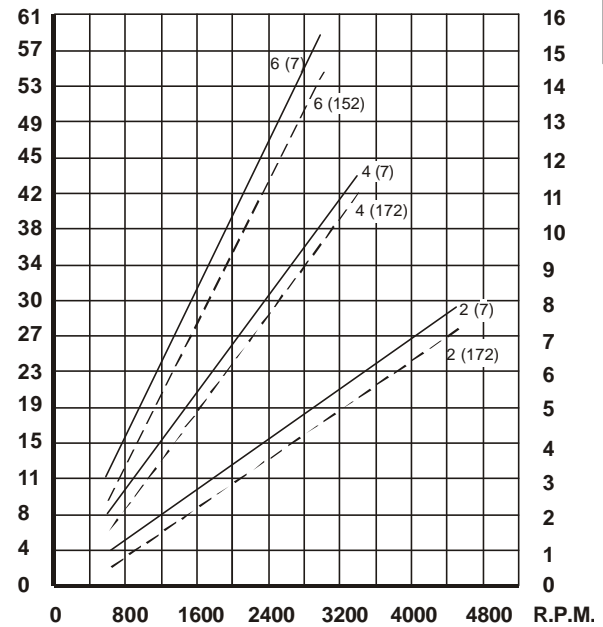
l/min.

Gal./min.



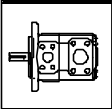
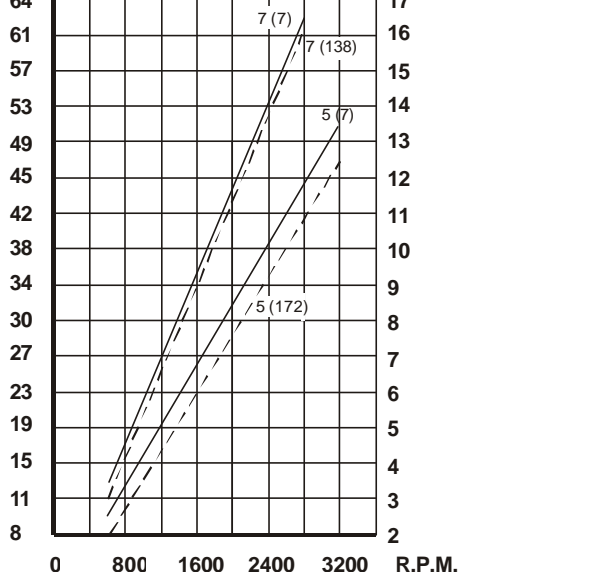
l/min.

Gal./min.



l/min.

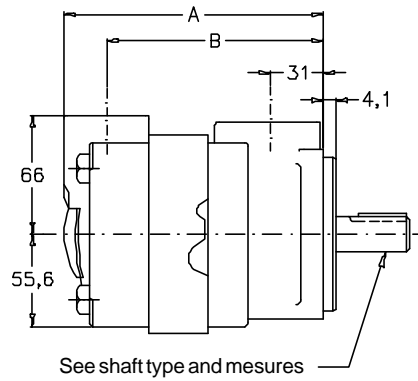
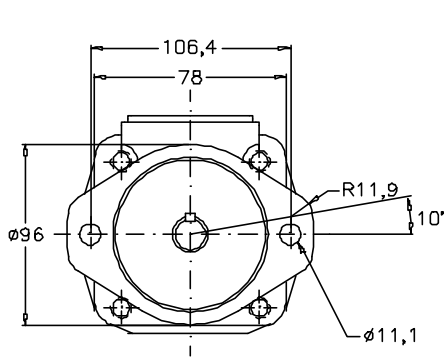
Gal./min.



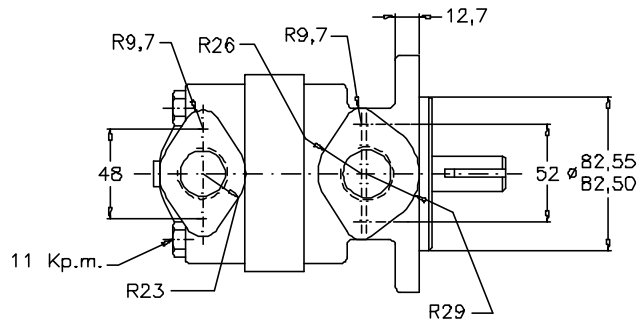
# SINGLE VANE PUMP VC20

FLOW			SPEED (rpm)		PRESSURE (Bar)		Nominal power (3)	CONNECTION		WEIGHT (Kgs.)
Lts. at 1000 rpm	US Gal. at 1200 rpm	Reduction (2)	Mín.	Máx.	Contin.	Intermit.		Inlet	Outlet	
19	6	2,8	600	3400	155	177	3,9	1 1/4" NPT	3/4" NPT	7,3
22	7	4,2		3000			4,4			
26	8	4,5		2800			5,1			
29	9	4,8		2800			5,6			
36	11	4,8		2500			6,5			
39	12	5,4		2400			7,5			
42	13	6,0		2400			8,1			

DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres

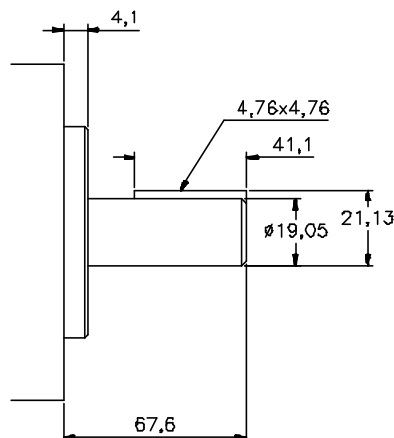


Galon	Dimension	
	A	B
6	125,2	102,1
7, 8, 9	131,6	108,4
11	136,7	113,5
12, 13	140,2	117,1

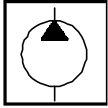


Num.	Inlet	Outlet
02	1" 1/4 BSP	3/4" BSP
04	1" 1/4 NPT	3/4" NPT

**Nº1 Shaft**



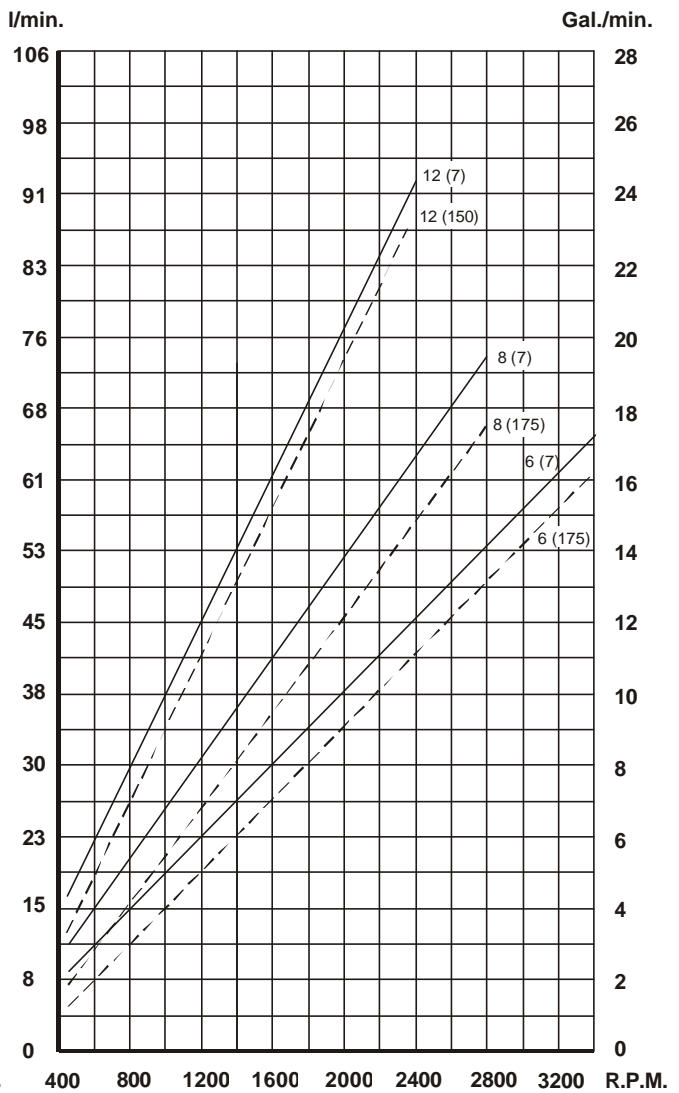
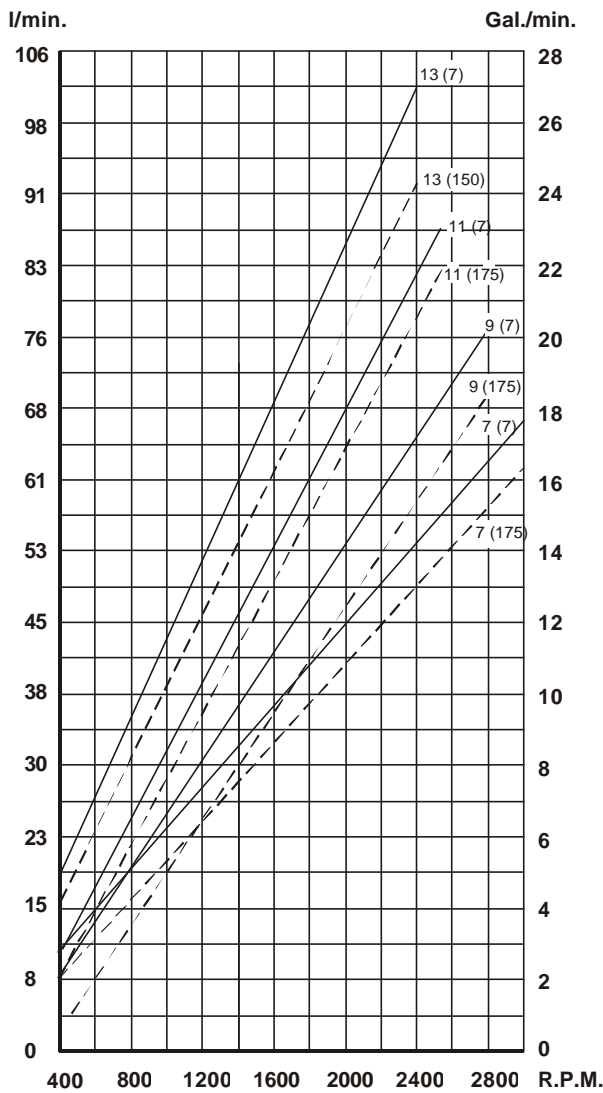
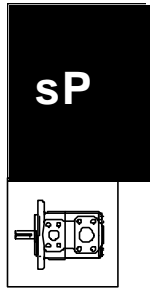
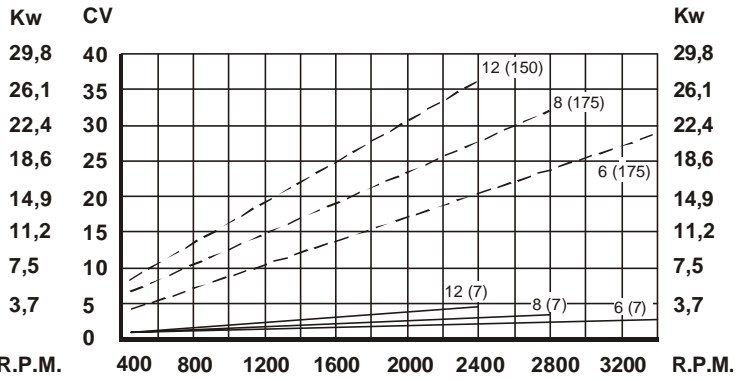
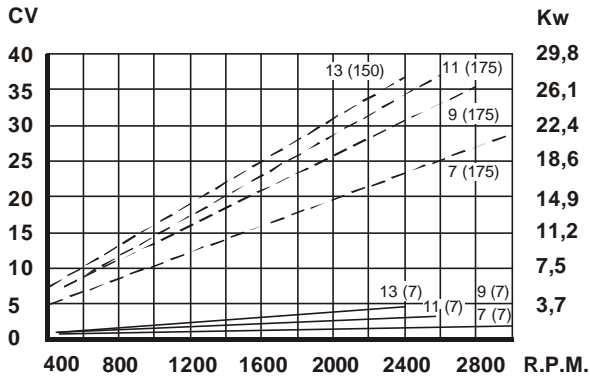
# SINGLE VANE PUMP VC20



## FLOW AND INPUT POWER DIAGRAMS

Max. pressure (bar)

Min. pressure (bar)

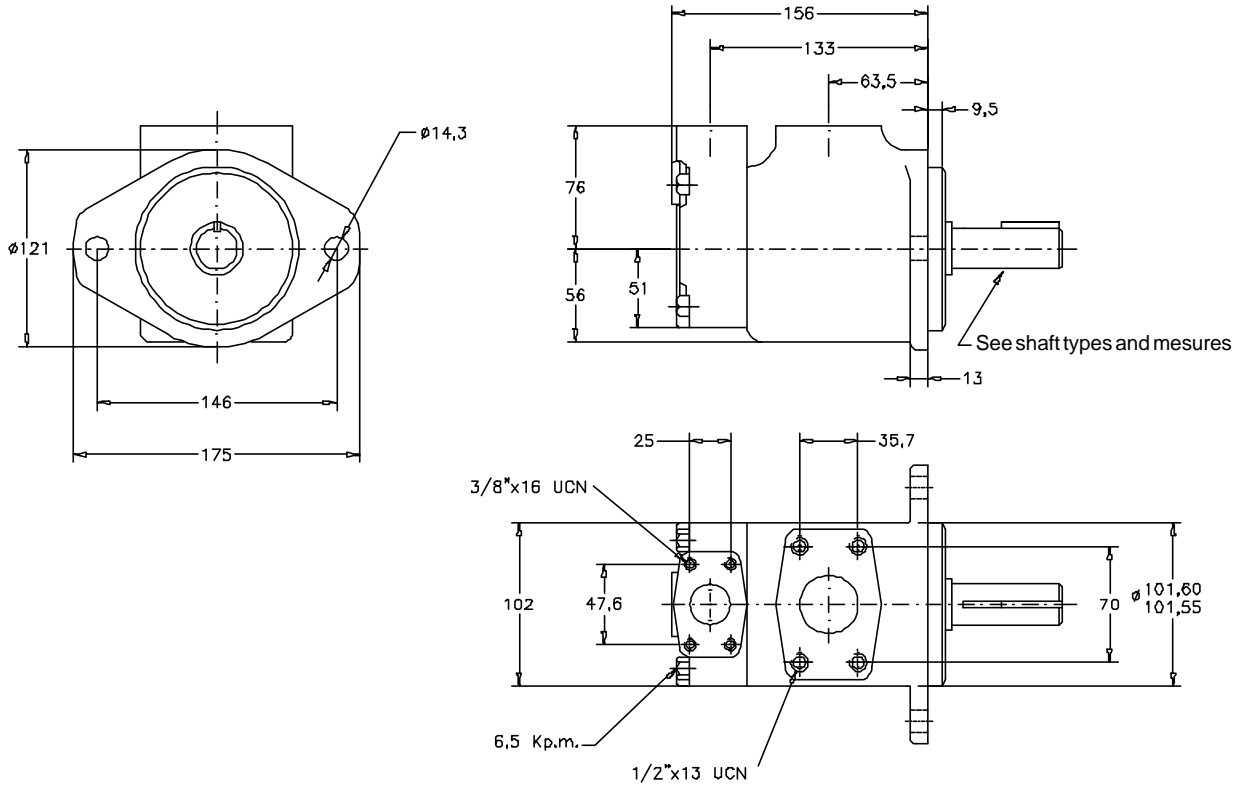


FLOW							SPEED (rpm)		PRES. (Bar)		CONNECTION		WEIGHT (Kgs.)	
Lts. a 1000 rpm	8	18	27	29	36	39	46	Mín.	Máx.	Contin.	Intermit.	Inlet		Outlet
Gal. a 1200 rpm	2	5	8	9	11	12	14	600	2500*	175	210	Ø 1 1/2"	Ø 3/4"	12

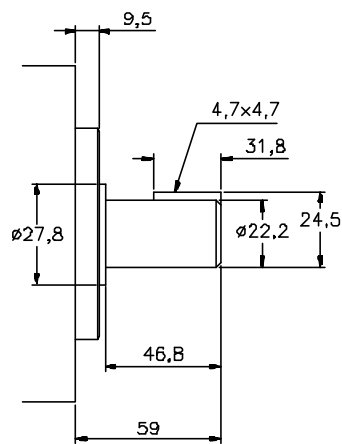
\* For further details see general chart

**DIMENSIONS IN MILLIMETRES**

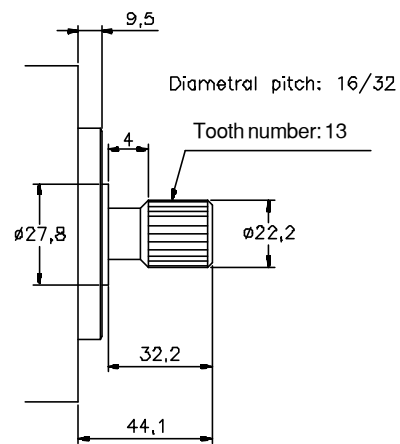
1" = 25.4 millimetres



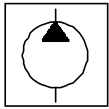
**Nº1 Shaft**



**Nº 151 Shaft**



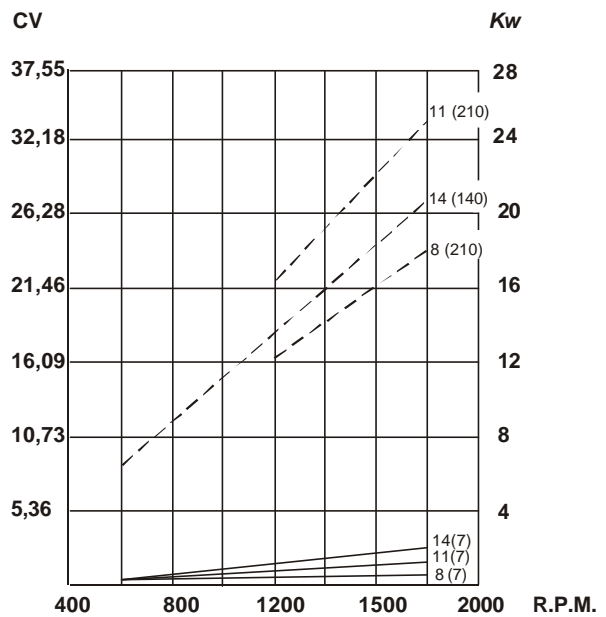
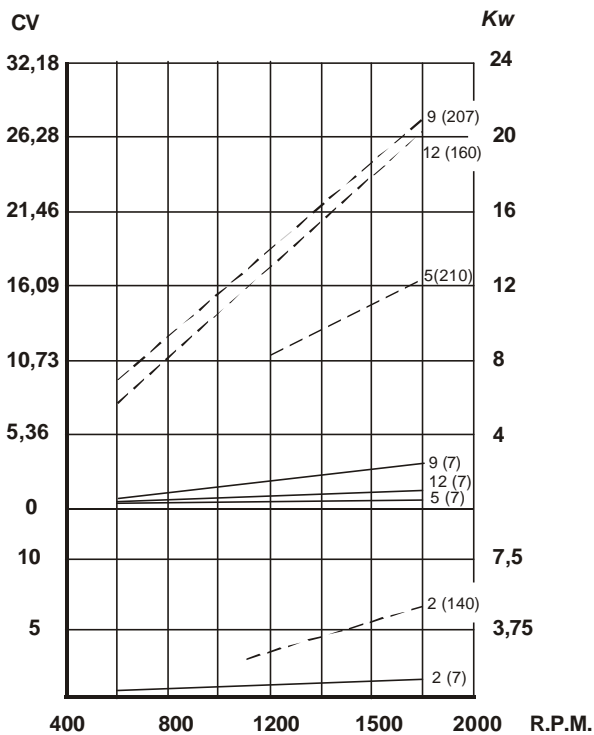
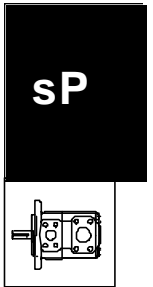
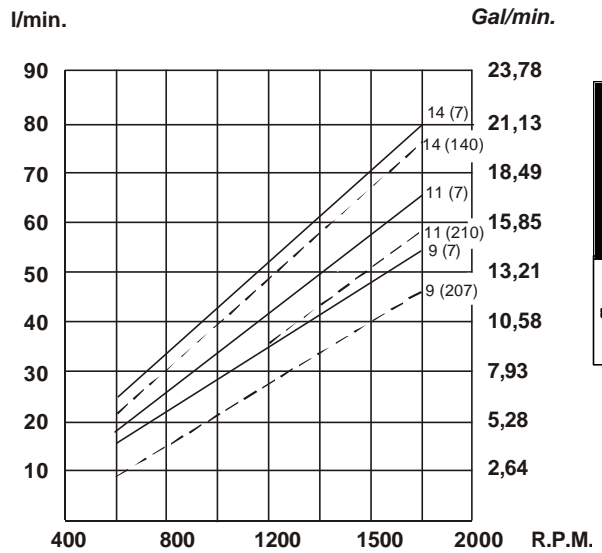
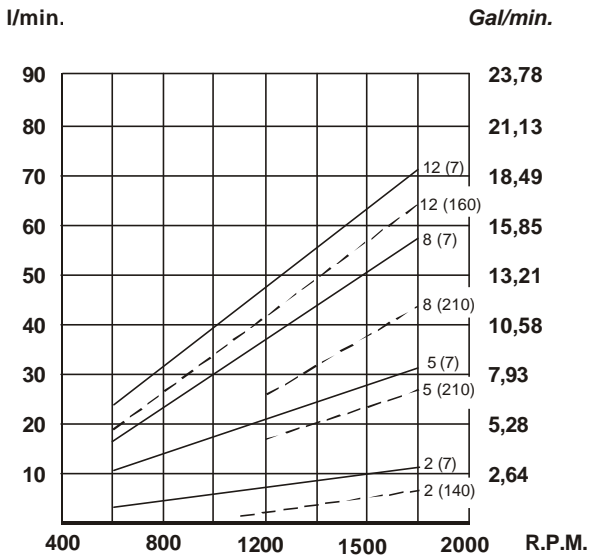
Enquire about other types of shafts



## FLOW AND INPUT POWER DIAGRAMS

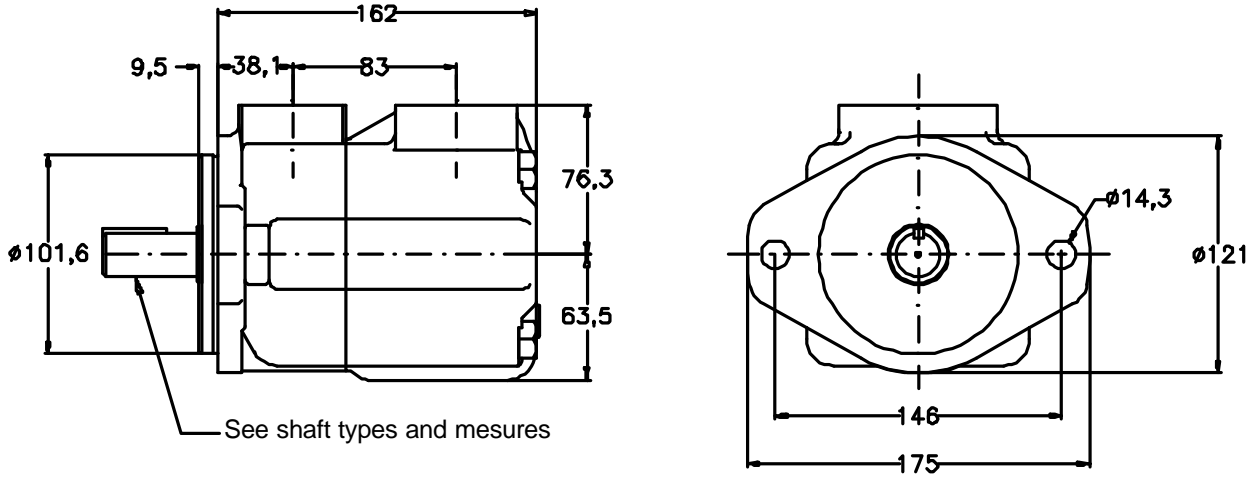
--- Max. pressure (bar)

— Min. pressure (bar)

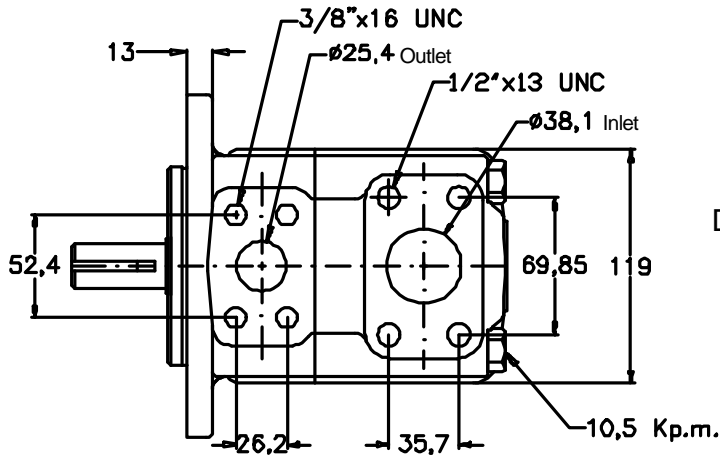


FLOW		SPEED (rpm)		PRES. (Bar)		CONNECTION		WEIGHT (Kgs.)
Lts.at 1000rpm	Gal. at 1200rpm	Min.	Máx.	Contin.	Intermit.	Inlet	Outlet	
26 40 45 55 60 67 80 88	8 12 14 17 19 21 24 27	600	2500	175	210	Ø1"1/2	Ø1"	15

27 gallons (88lts.) cartridge not monted in VQ25 vane pump model.

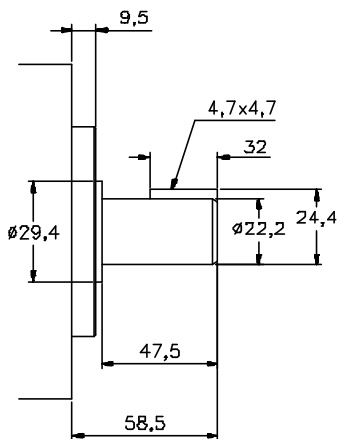


See shaft types and mesures

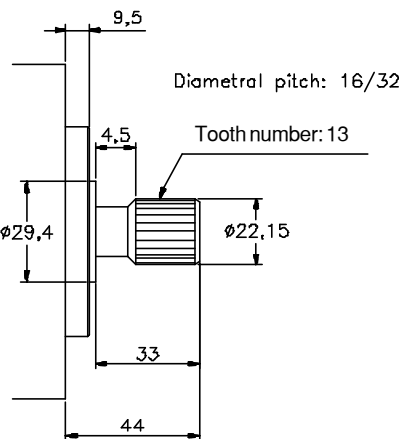


DIMENSIONS IN MILLIMETRES  
1" = 25.4 millimetres

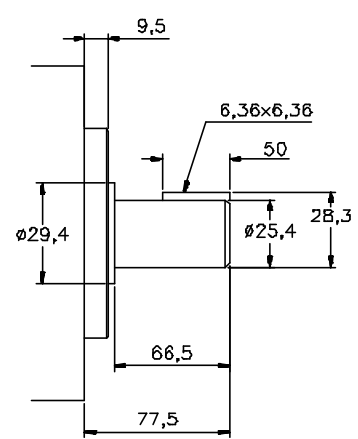
**Nº1 Shaft**



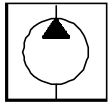
**Nº11 Shaft**



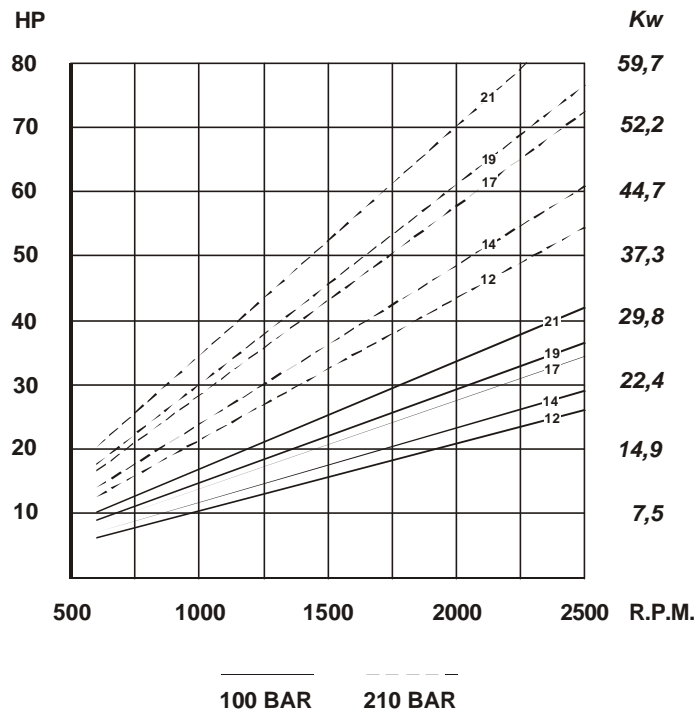
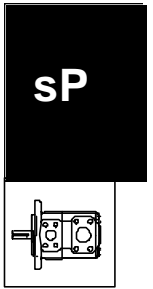
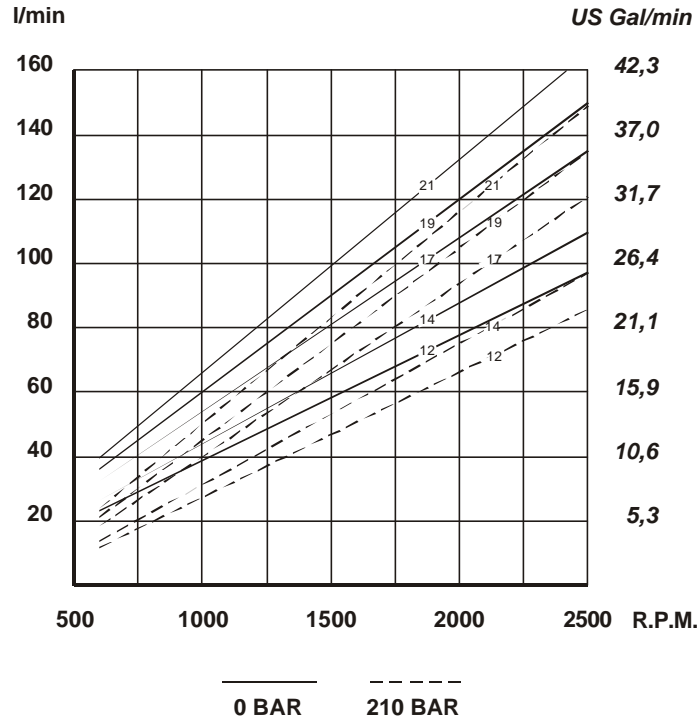
**Nº86 Shaft**



Enquire about other types of shafts

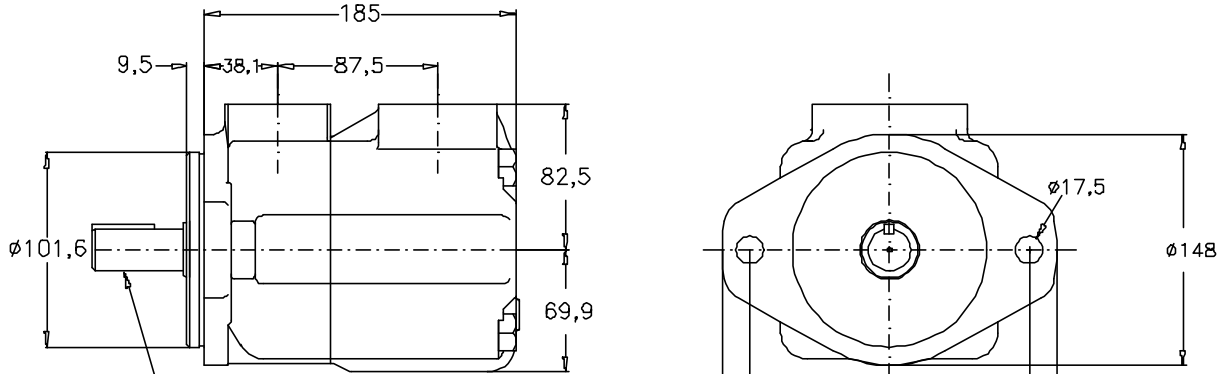


FLOW AND INPUT POWER DIAGRAMS

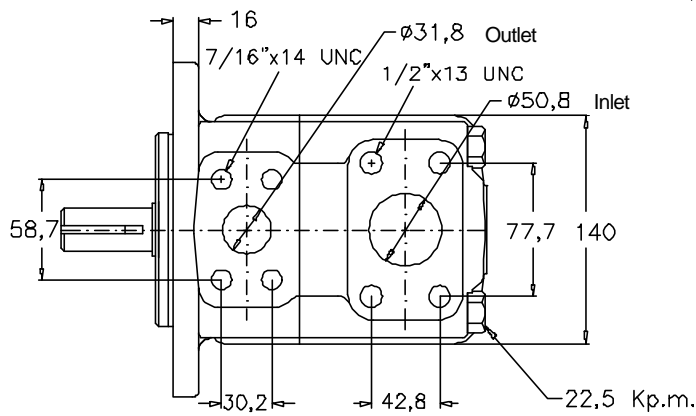


FLOW							SPEED (rpm)		PRES. (Bar)		CONNECTION		WEIGHT (Kgs.)
Lts.at 1000 rpm	66	81	97	112	121	142	Min.	Máx.	Contin.	Intermit.	Inlet	Outlet	23
Gal. at 1200 rpm	21	25	30	35	38	45	600	2400	175	210	Ø2"	Ø1"1/4	

DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres



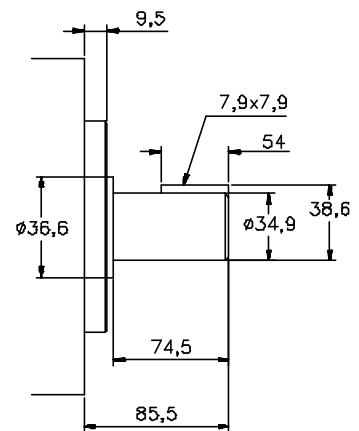
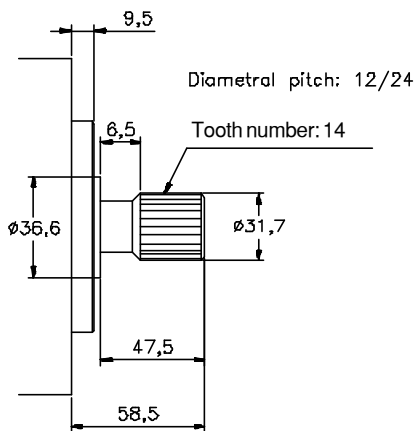
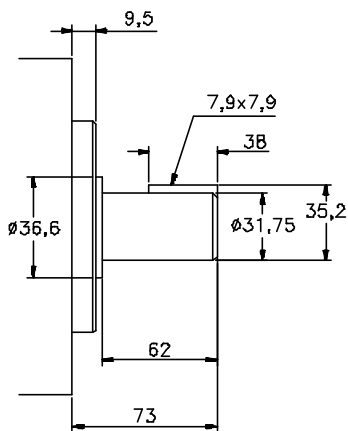
See shaft types and mesures



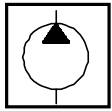
**Nº1 Shaft**

**Nº11 Shaft**

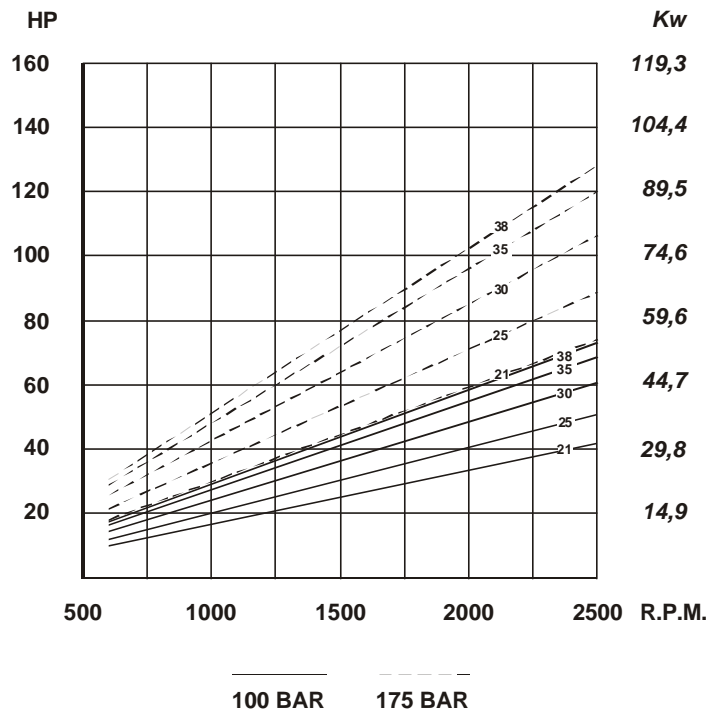
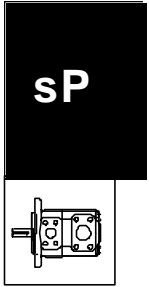
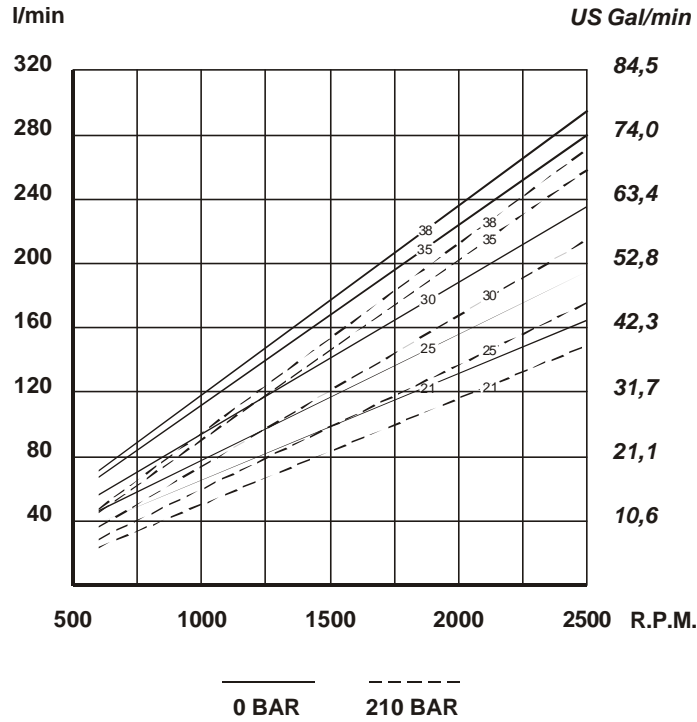
**Nº86 Shaft**



Enquire about other types of shafts



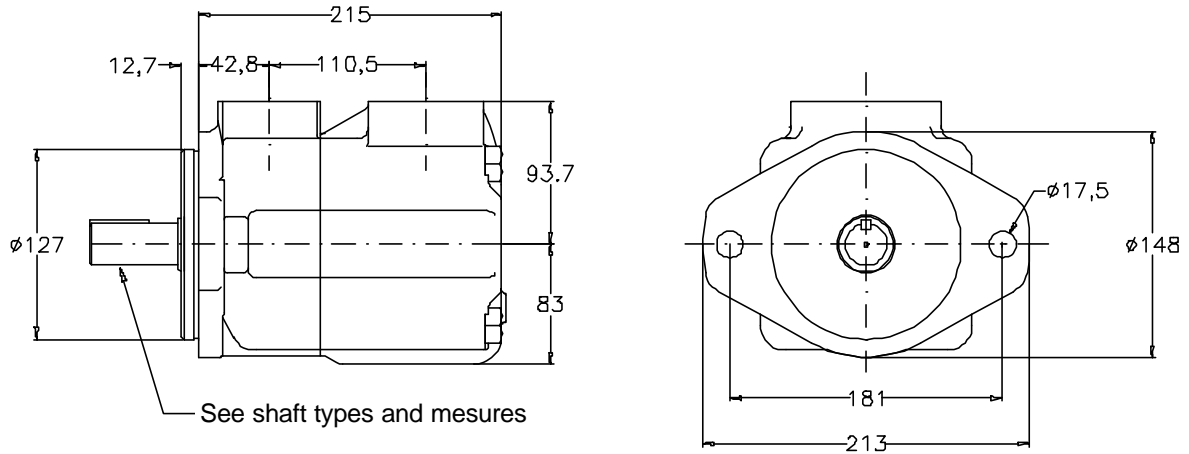
FLOW AND INPUT POWER DIAGRAMS



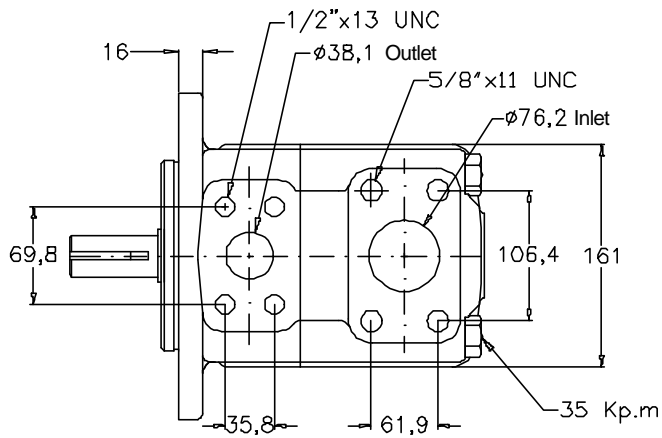
FLOW		SPEED (rpm)		PRES. (Bar)		CONNECTION		WEIGHT (Kgs.)
Lts.at 1000rpm	138 148 162 180 193 214 240	Mín.	Máx.	Contin.	Intermit.	Inlet	Outlet	35,5
Gal.at 1200rpm	42 47 50 57 60 67 75	600	2200*	155	175	Ø3"	Ø1 1/2"	

\* For further details see general chart

**DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres**



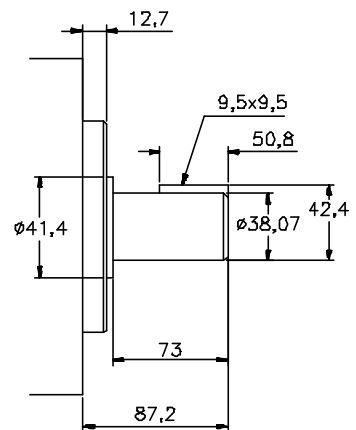
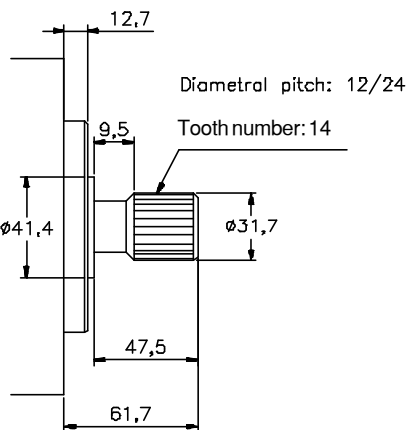
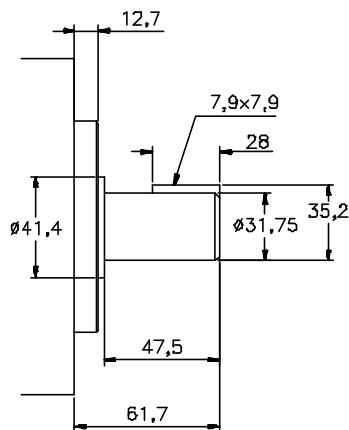
See shaft types and mesures



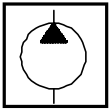
**Nº1 Shaft**

**Nº11 Shaft**

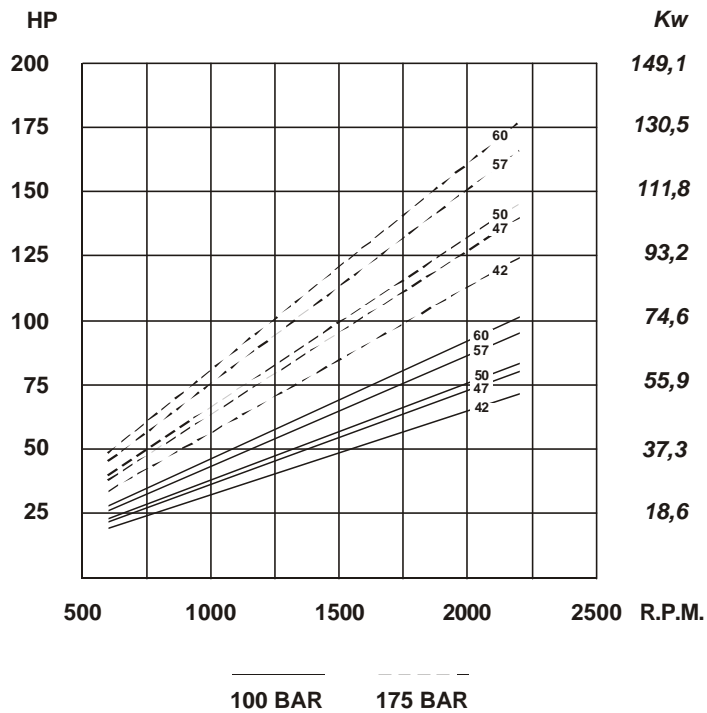
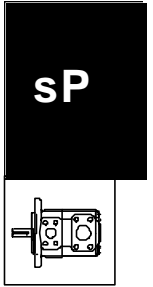
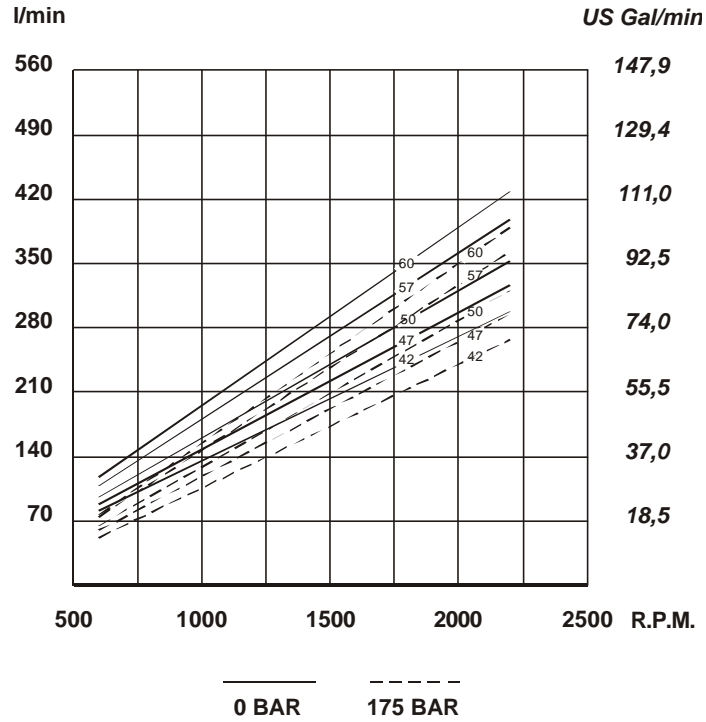
**Nº86 Shaft**



Enquire about other types of shafts



FLOW AND INPUT POWER DIAGRAMS



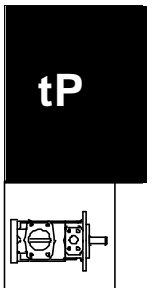


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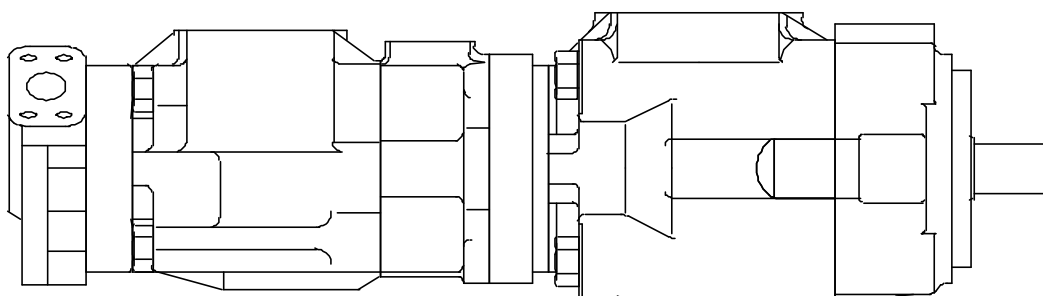
# *THRU DRIVE SINGLE VANE PUMPS*

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- V\*\*T thru drive single vane pumps



(See single pumps for displacement & power diagrams)



VK7TC thru drive pump with VK64 double pump

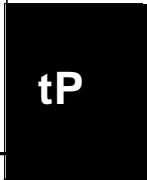
## THRU DRIVE SINGLE PUMPS CODE

**F3 VK 7T C 60 D 86 A A**  
 1 2 3 4 5 6 7 8 9

- 1 - "F3" means special seals for fire-resistant fluids. Omit if not required.
- 2 - **Pump Type:**  
 VK = 10 vanes pump, mobile and industrial use, UNC thread  
 VS = 12 vanes pump, industrial use (very quiet), UNC thread  
 VQ = 10 vanes and bronze plates pump, mobile use, UNC thread
- 3 - **Pumpmodel:** 4T, 6T and 7T.
- 4 - **Rear pump mounting:** With SAE mounting flange, 2-bolts.  
 A: SAE-A mounting flange  
 B: SAE-B mounting flange  
 C: SAE-C mounting flange
- 5 - **Flow:** In US Gallons per minute at 1200 rpm and 7 bar. and in litres per minute at 1000 rpm and 7 bar.
- 6 - **D = Right-hand** direction of rotation (Clockwise)  
**Y = Left-hand** direction of rotation.  
*(To check the direction of rotation view from the shaft end) .*
- 7 - **Shafttype:**  
 1: Parallel keyed  
 11: Splined  
 86: Heavy duty parallel keyed
- 8 - **Outlet position from the shaft:**  
 A: In line with inlet  
 B: 90° on the right from inlet (Clockwise from inlet)  
 C: 180° from inlet  
 D: 90° on the left from inlet (Counterclockwise from inlet)
- 9 - **Inlet outlet positions view from the flange:**  
 A: 45° on the right (Clockwise)  
 B: 45° on the left (Counterclockwise)  
 SAE-B and SAE-C flanges:  
 A: In line with in-front flange  
 B: 90° rotated

## THRU DRIVE SINGLE VANE PUMPS CHARACTERISTICS

TYPE	FLOW			SPEED (rpm)		PRESSURE (Bar)		Nominal Power (2)	CONNECTION		WEIGHT (Kgs.)
	Ltrs. at 1000 rpm	Gal. at 1200 rpm	Reduction (1)	Min.	Max.	Contin.	Intermit.		Inlet	Outlet	
VK4T VS4T VQ4T	26	8	4,5	600	2500 1800 (VS)	175	210	6,9 10,4 11,6 13,8 14,6 16,8 20,3 23,8	Ø64	Ø25,4	19,5
	40	12	5,7								
	45	14	5,7								
	55	17	5,8								
	60	19	5,8								
	67	21	6								
	80	24	6,2								
88*	27	6,5	1500	125	150						
VK6T VS6T VQ6T	66	21	8,6	600	2400 1800 (VS)	175	210	16,8 20,3 24,3 27,4 29,3 33,3	Ø76	Ø31,8	29,5
	81	25	9								
	97	30	10								
	112	35	11,4								
	121	38	11,4								
	142	45	13,1								
VK7T VS7T VQ7T	138	42	15	600	2200 1800 (VS)	155	175	32,3 36,3 37,9 43,2 46,1 51,2 57,4	Ø89	Ø38,1	38
	148	47	15,7								
	162	50	14,3								
	180	57	17,9								
	193	60	18,6								
	214	67	22								
	240	75	26								



\*27 gallons (88lts.) cartridge not monted in VQ4T thru drive single vane pump model.

- (1) **Delivery flow reduction** in Ltrs./min. at 100 Bar. 22 cST of oil viscosity at operating temperature. To calculate the approximate delivery flow at a given pressure and speed, use the following formula with flow reduction and theoretical flow values shown in the chart. Flow reduction values are independent of shaft speed.

$$\text{Approx. output flow (Ltrs./min.)} = \text{Theoretical flow} \times \frac{\text{R.P.M.}}{1000} \times \text{Reduction} \times \frac{\text{Pressure (Bar)}}{100}$$

- (2) **Nominal power** in H.P. at 100 Bar and 1000 RPM (to convert into Kw multiply by 0.735). To obtain the real input power at different pressure and revolutions, use the formula as follows:

$$\text{Real input power} = \text{Input power} \times \frac{\text{R.P.M.}}{1000} \times \frac{\text{Pressure (Bar)}}{100}$$

## REAR PUMP MOUNTING

The mounted pump to the V\*\*T\* shall the shaft showed bottom:

Model	Mounted pump shaft			
	DP splined	Teeth	Press angle	Flange
V**TA	16/32	9	30°	SAE-A
V**TB	16/32	13	30°	SAE-B
V**TC	12/24	14	30°	SAE-C

## TRANSMISSIBLE MAXIMUM TORQUE

The add of the torque of the V\*\*T plus the torque of the rear pump, in pressure, shall be equal to or less than the below torques:

V*4T		V*6T		V*7T	
Shaft	Max. torque Nm	Shaft	Max. torque Nm	Shaft	Max. torque Nm
1	313	1	392	1	588
11	313	11	568	11	803
86	392	86	588	86	803

## MAXIMUM TORQUE OF THE MOUNTED REAR PUMP

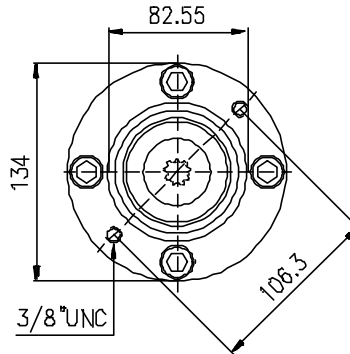
The torque of the mounted pump to the V\*\*T rear pump, in pressure, shall be equal to or less than the indicated torques on next page.

## REAR FLANGE MOUNTINGS OF THE V\*\*T\* THRU DRIVE PUMPS DIMENSIONS

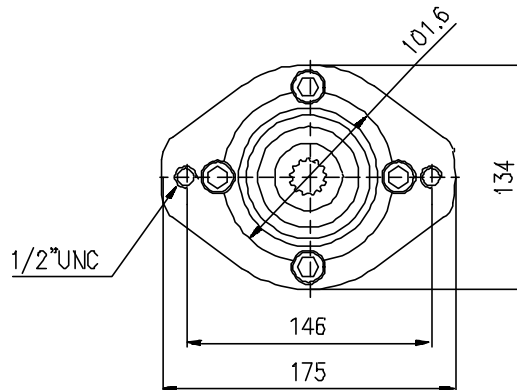
DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres

Rear flange (connection)	Max. torque Nm
A	130
B	315
C	440 (V*6TC) 700 (V*7TC)

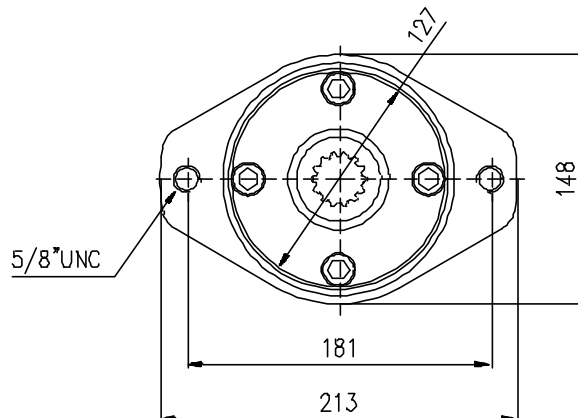
### V\*4TA, V\*6TA & V\*7TA TYPES Torque for screw 6,5Kp.m.



### V\*4TB, V\*6TB & V\*7TB TYPES

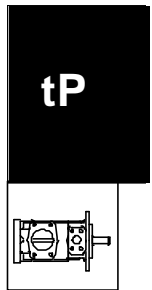
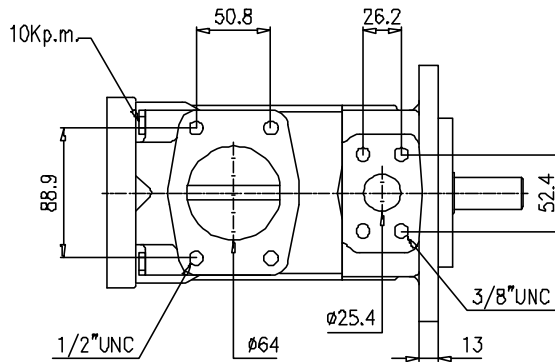
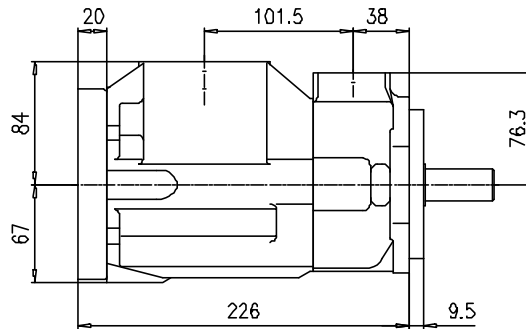
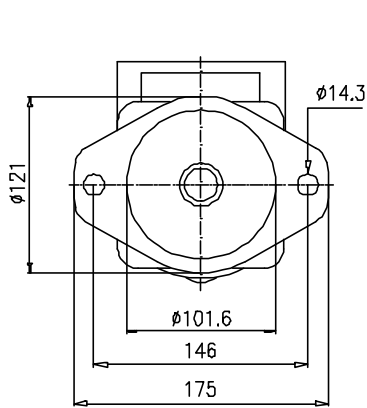
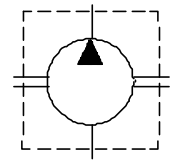


### V\*6TC & V\*7TC TYPES

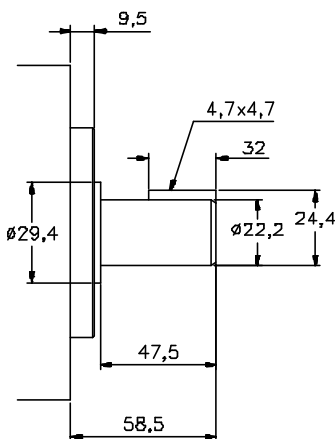


DIMENSIONS IN MILLIMETRES

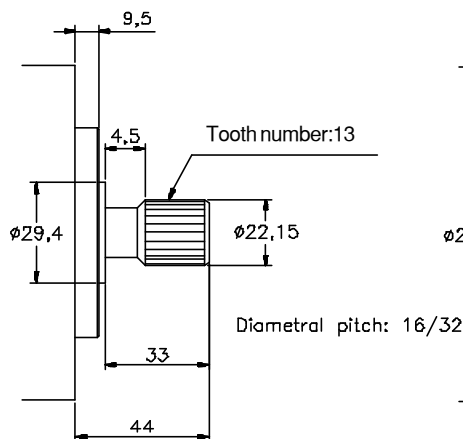
DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres



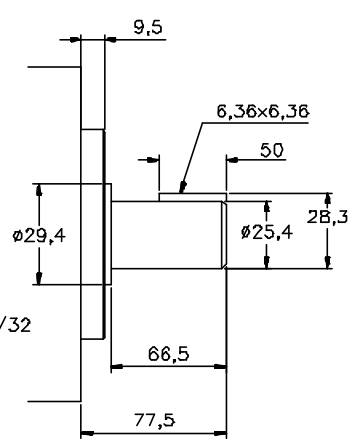
**N°1 Shaft**



**N°11 Shaft**

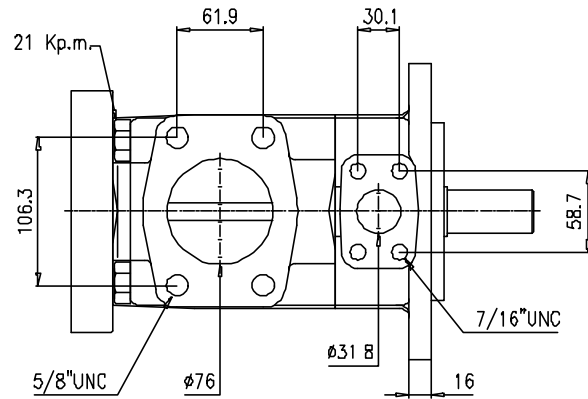
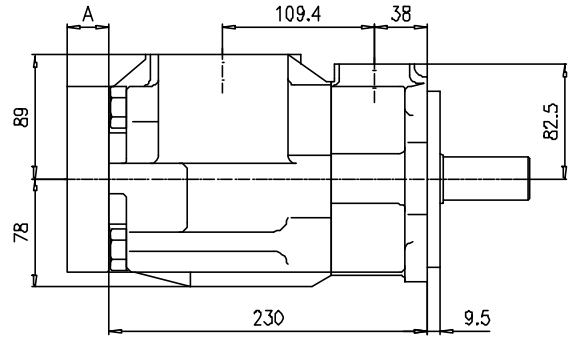
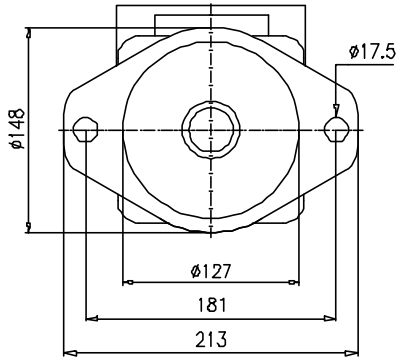
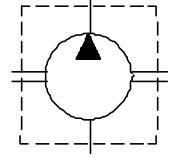


**N°86 Shaft**



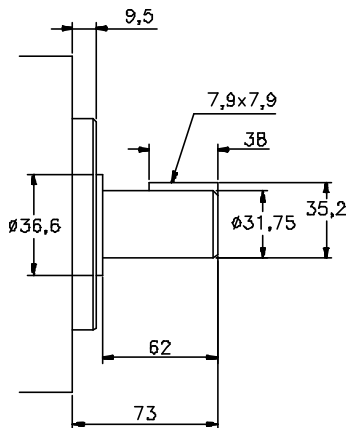
Enquire about other types of shaft

DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres

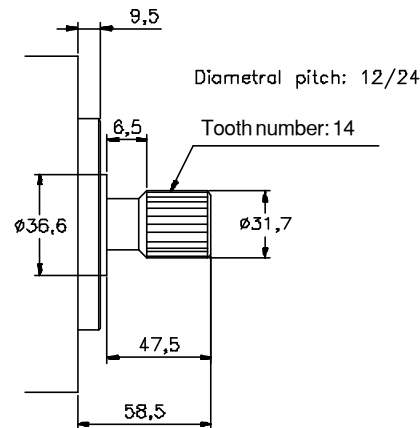


Model	A
V*6TA	20
V*6TB	30
V*6TC	38

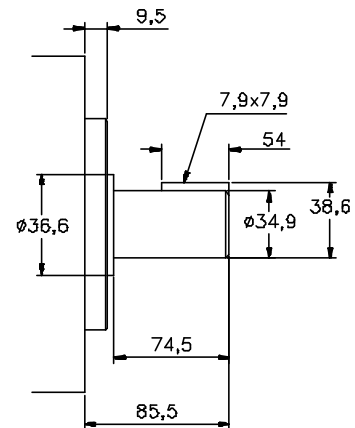
**N°1 Shaft**



**N°11 Shaft**

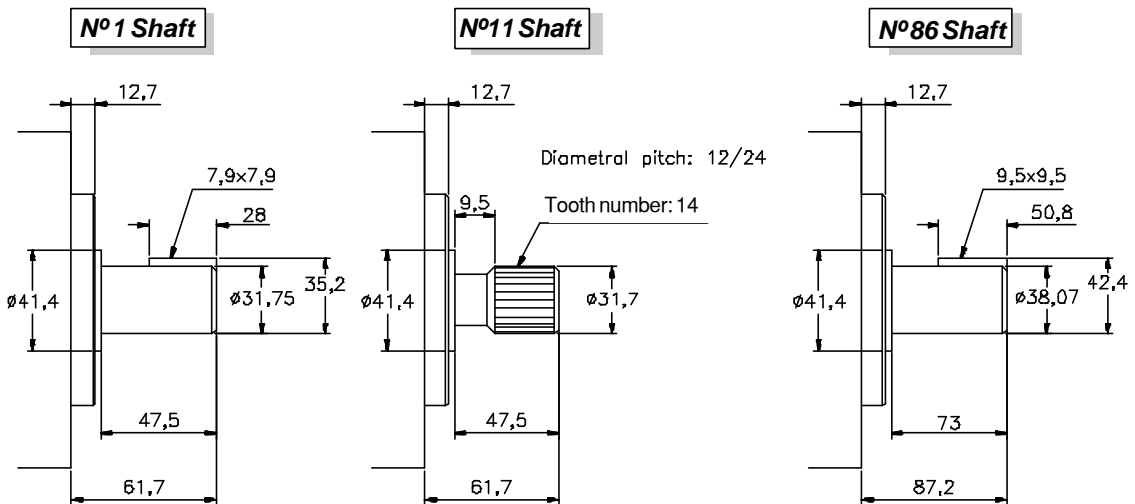
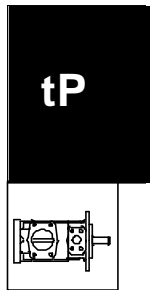
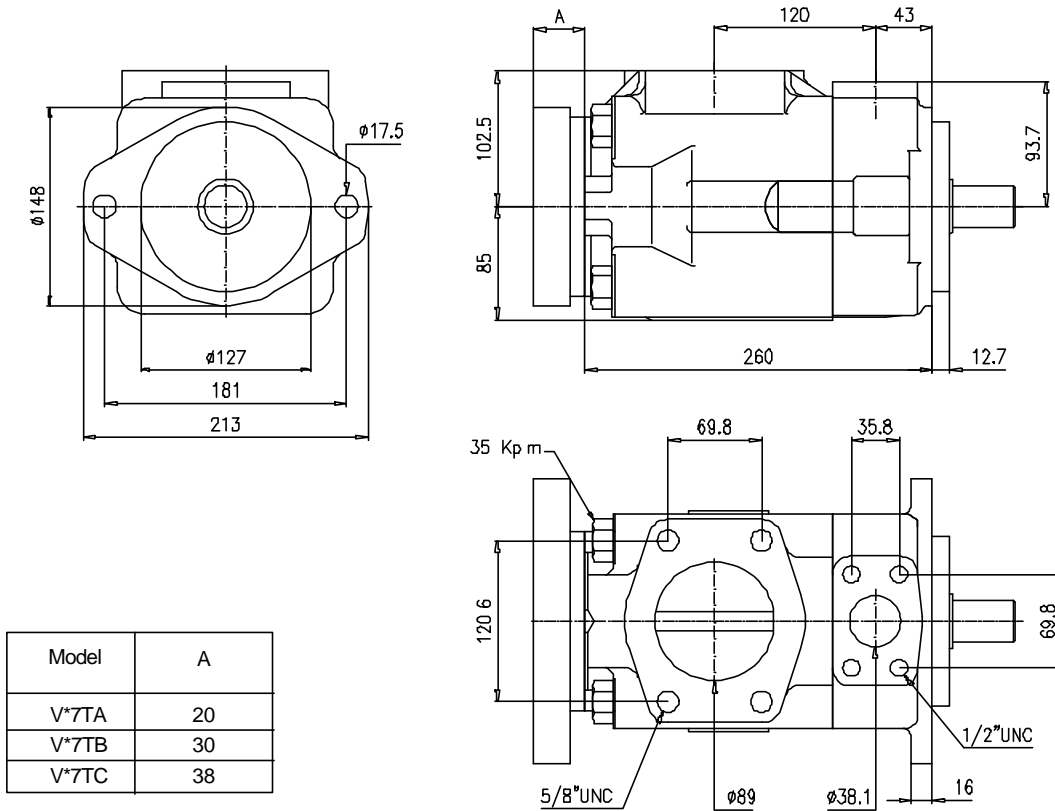
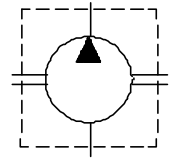


**N°86 Shaft**



Enquire about other types of shaft

DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres



Enquire about other types of shaft



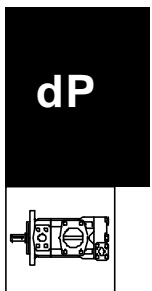
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## *DOUBLE VANE PUMPS*

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Industrial) - BHP, VK, VQ and VS Double vane pumps (Mobile and

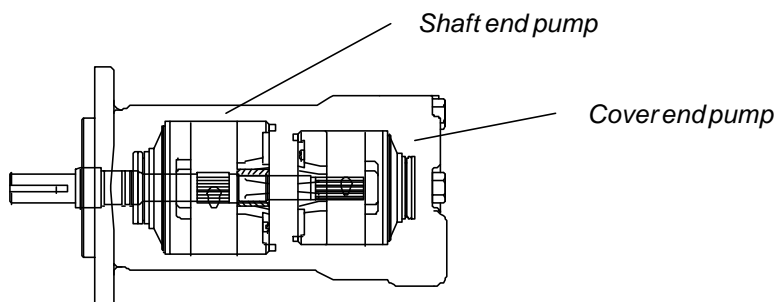
(See single pumps for displacement & power diagrams)



## DOUBLE VANE PUMP CODE

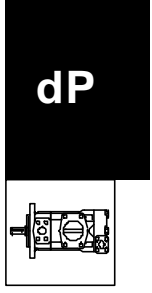
<b>F3</b>	<b>VK</b>	<b>43</b>	<b>21</b>	<b>8</b>	<b>D</b>	<b>1</b>	<b>A</b>	<b>A</b>
1	2	3	4	5	6	7	8	9

- 1 - "F3" means special seals for fire-resistant fluids. Omit if not required.
- 2 - **Type of pump:**  
**BHP** = 10 vane pump, **mobile and industrial uses**, metrics threads.  
**VK** = 10 vane pump, **mobile and industrial uses**, UNC threads.  
**VS** = 12 vane pump, (except the cover end cartridge of the VS\*3 pump), **industrial uses** (very quiet), UNC threads.  
**VQ** = 10 vane pump, **bronze plates, mobile uses**, UNC threads.
- 3 - **Model of pump:** 33,42,42V,43,63,64,73,74 y 76.  
 VK42 pump may include in the rear cartridge a cover with flow regulating and pressure limiter valves. If so, add one "V": VK42V.
- 4 - **Pump flow at shaft side:** BHP33 model in litres per minute at 1000 rpm and 7 Bar.  
 All the other models in US gallons per minute at 1200 rpm and 7 Bar.  
 (See flow chart).
- 5 - **Pump flow at cover side:** BHP33 and VK42-VS42-VQ42 models in litres per minute at 1000 rpm and 7 Bar. All the other models in gallons per minute at 1200 rpm and 7 Bar.  
 (See flow chart).
- 6 - **D** = **Right-hand** direction of rotation (clockwise).  
**Y** = **Left-hand** direction of rotation (Counterclockwise).  
 (To check the direction of rotation view from the shaft end).
- 7 - **Type of shaft:**
  - 1 = Parallel keyed
  - 2 = Splined
  - 11 = Splined
  - 86 = Heavy duty parallel keyed
- 8 - **Pump outlet position at shaft side:**  
 A: Outlet in line with inlet  
 B: 90° clockwise from inlet  
 C: 180° from inlet  
 D: 90° counterclockwise from inlet  
 (Viewed from shaft)
- 9 - **Pump outlet position at cover side:**  
 A: 45° clockwise from inlet  
 B: 135° clockwise from inlet  
 C: 135° counterclockwise from inlet  
 D: 45° counterclockwise from inlet  
 (Viewed from shaft)



## DOUBLE VANE PUMPS CHARACTERISTICS

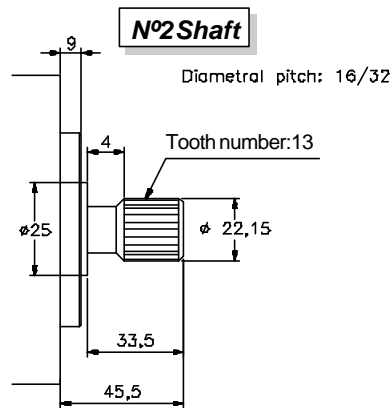
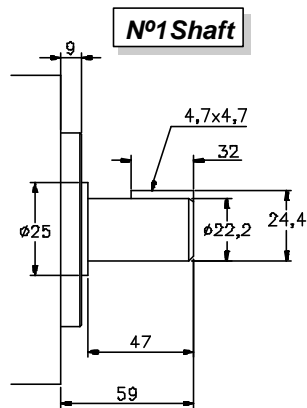
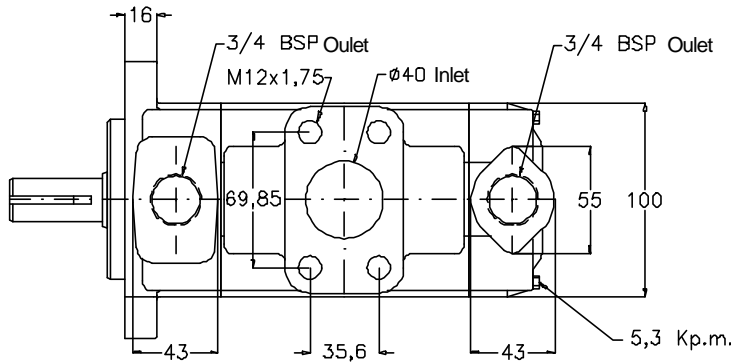
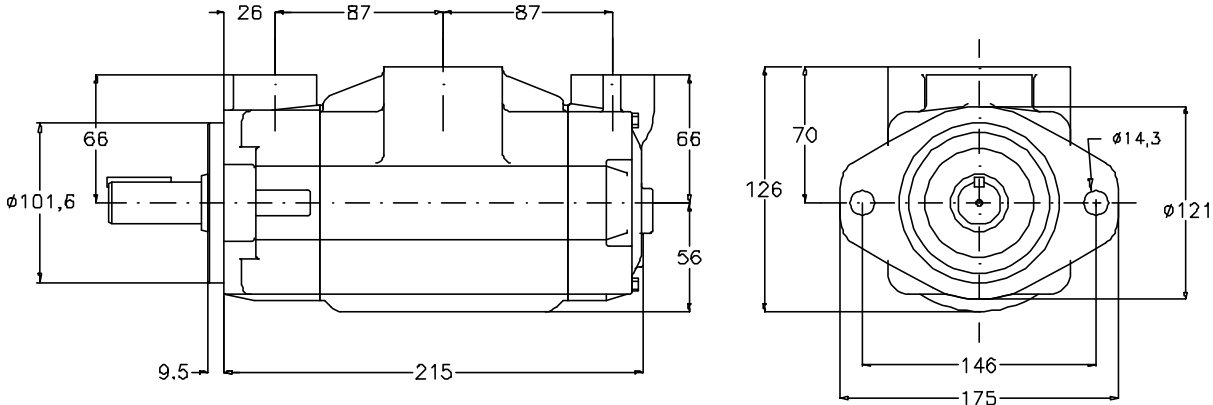
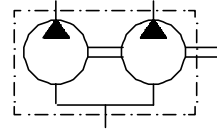
TIPO	SHAFTEND						COVER END						Weight (Kgs.)					
	FLOW			MAX. rpm	PRESURE (Bar)		Nomin. power (3)	FLOW			MAX. rpm	PRESURE (Bar)		Nomin. power (3)				
	Lts. at 1000 rpm	US Gal. at 1200 rpm	Reduc. (2)		Contín.	Intern.		Lts. at 1000 rpm	US Gal. at 1200 rpm	Reduc. (2)		Contín.			Intern.			
<b>BHP33</b>	6	2	0,9	2500	150	175	1,9	6	2	0,9	2500	150	175	1,9	15			
	16	5	1,7				4,3	16	5	1,7				4,3				
	18	6	2,8				5,3	18	6	2,8				5,3				
	25	8	4,5				6,9	25	8	4,5				6,9				
	27	9	4,8				7,6	27	9	4,8				7,6				
	35	11	4,8				8,8	35	11	4,8				8,8				
	38	12	5,4				10,2	38	12	5,4				10,2				
	44	14	6,6				11,9	44	14	6,6				11,9				
	50	16	7,8				13,6	50	16	7,8				13,6				
<b>VK42 VS42 VQ42 (1)</b>	26	8	4,5	2500 1800 (VS)	175	210	6,9	7	2,2	0,7	2500	150	175	1,8	16			
	40	12	5,7				10,4							8		2,5	1,1	2
	45	14	5,7				11,6							10		3,2	1,1	2,5
	55	17	5,8				13,8							12		3,8	1,1	3
	60	19	5,8				15,2							15		4,7	1,1	3,7
	67	21	6				16,8											
	80	24	6,2				20,3											
	88*	27	6,5				22,4											
	<b>VK43 VS43 VQ43</b>	26	8				4,5							2500 1800 (VS)		175	210	6,9
40		12	5,7	10,4	18	5	2,1	4										
45		14	5,7	11,6	27	8	2,8	6,6										
55		17	5,8	13,8	29	9	3,5	6,9										
60		19	5,8	15,2	36	11	4,3	7,3										
67		21	6	16,8	39	12	4,3	7,4										
80		24	6,2	20,3	46	14	4,3	7,6										
88*		27	6,5	22,4														
<b>VK63 VS63 VQ63</b>		66	21	8,6	2400 1800 (VS)	175	210	16,8	8	2	0,9	2500	175		210			1,9
	81	25	9	20,3				18						5		2,1	4	
	97	30	10	24,3				27						8		2,8	6,6	
	112	35	11,4	27,4				29						9		3,5	6,9	
	121	38	11,4	29,3				36						11		4,3	7,3	
	142	45	13,1	33,3				39						12		4,3	7,4	
								46						14		4,3	7,6	
<b>VK64 VS64 VQ64</b>	66	21	8,6	2400 1800 (VS)	175	210	16,8	26	8	4,5	2500 1800 (VS)	175	210	6,9	33			
	81	25	9				20,3							40		12	5,7	10,4
	97	30	10				24,3							45		14	5,7	11,6
	112	35	11,4				27,4							55		17	5,8	13,8
	121	38	11,4				29,3							60		19	5,8	15,2
	142	45	13,1				33,3							67		21	6	16,8
														80		24	6,2	20,3
														88*		27	6,5	22,4
<b>VK73 VS73 VQ73</b>	138	42	15	2200 1800 (VS)	155	175	32,3	8	2	0,9	2500 1800 (VS)	175	210	1,9	46			
	148	47	15,7				36,3							18		5	2,1	4
	162	50	14,3				37,9							27		8	2,8	6,6
	180	57	17,9				43,2							29		9	3,5	6,9
	193	60	18,6				46,1							36		11	4,3	7,3
	214	67	22				51,2							39		12	4,3	7,4
	240	75	26				57,4							46		14	4,3	7,6
<b>VK74 VS74 VQ74</b>	138	42	15	2200 1800 (VS)	155	175	32,3	26	8	4,5	2500 1800 (VS)	175	210	6,9	45			
	148	47	15,7				36,3							40		12	5,7	10,4
	162	50	14,3				37,9							45		14	5,7	11,6
	180	57	17,9				43,2							55		17	5,8	13,8
	193	60	18,6				46,1							60		19	5,8	15,2
	214	67	22				51,2							67		21	6	16,8
	240	75	26				57,4							80		24	6,2	20,3
														88*		27	6,5	22,4
<b>VK76 VS76 VQ76</b>	138	42	15	2200 1800 (VS)	155	175	32,3	66	21	8,6	2400 1800 (VS)	175	210	16,8	55			
	148	47	15,7				36,3							81		25	9	20,3
	162	50	14,3				37,9							97		30	10	24,3
	180	57	17,9				43,2							112		35	11,4	27,4
	193	60	18,6				46,1							121		38	11,4	29,3
	214	67	22				51,2							142		45	13,1	33,3
	240	75	26				57,4											



\* 27 gallons (88lbs.) cartridge not mounted in VQ42, VQ43, VQ64, VQ74 vane pump model.

See notes on next page

DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres



*Enquire about other types of shafts*

**(1) Delivery flow reduction** in Ltrs./min. at 100 Bar. 22 cST of oil viscosity at operating temperature. To calculate the approximate delivery flow at a given pressure and speed, use the following formula with flow reduction and theoretical flow values shown in the chart. Flow reduction values are independent of shaft speed.

$$\text{Approx. output flow (Ltrs./min.)} = \text{Theoretical flow} \times \frac{\text{R.P.M.}}{1000} \times \text{Reduction} \times \frac{\text{Pressure (Bar)}}{100}$$

**(2) Nominal power** in H.P. at 100 Bar and 1000 RPM (to convert into Kw multiply by 0.735).

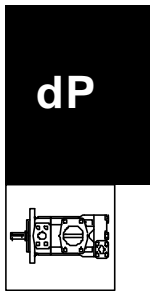
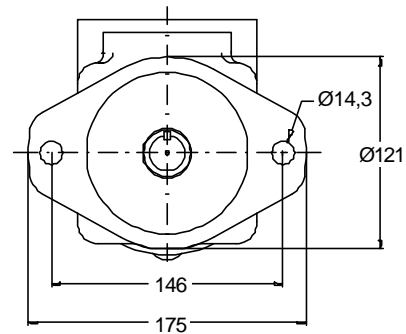
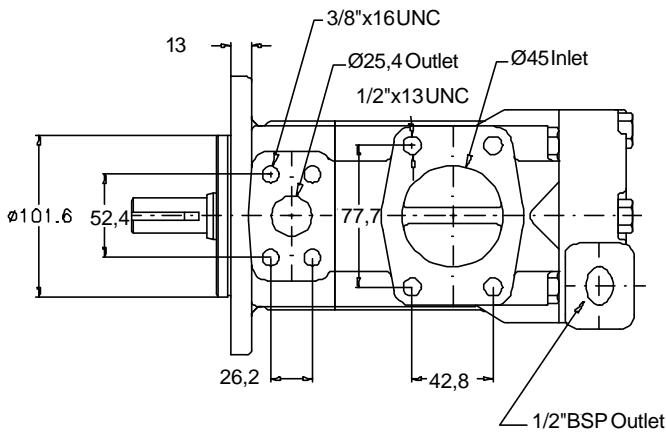
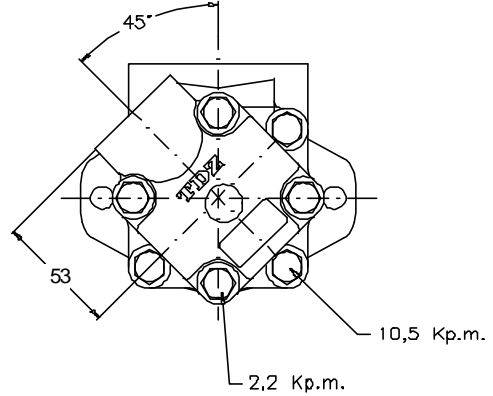
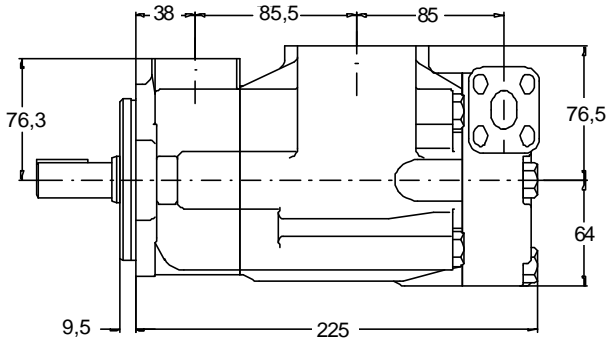
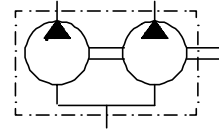
To get the real input power at different pressure and revolutions, use the formula as follows:

$$\text{Real input power} = \text{Input power} \times \frac{\text{R.P.M.}}{1000} \times \frac{\text{Pressure (Bar)}}{100}$$

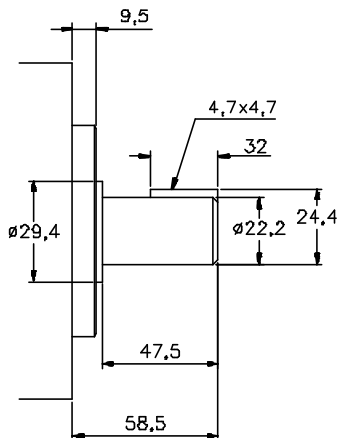
# DOUBLE VANE PUMPS VK-42, VS-42 & VQ-42



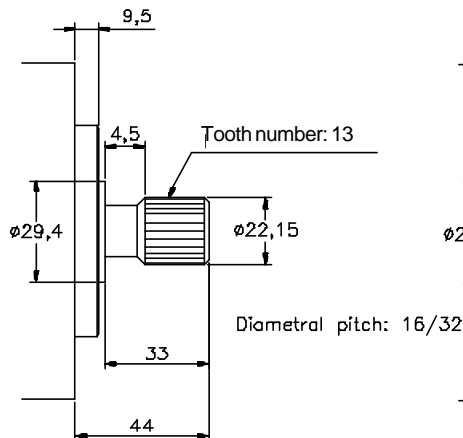
DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres



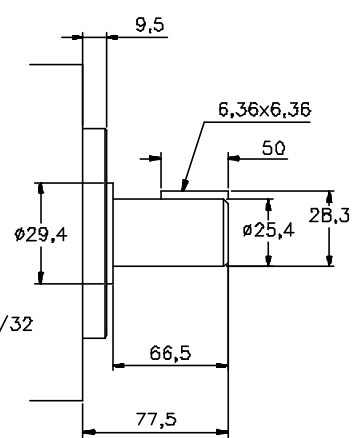
**N° 1 Shaft**



**N° 11 Shaft**



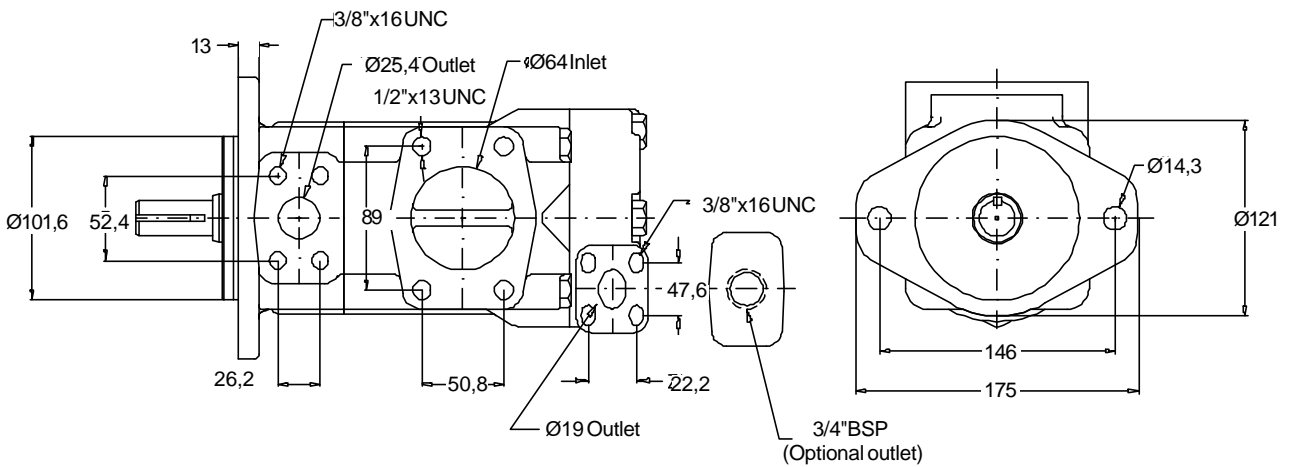
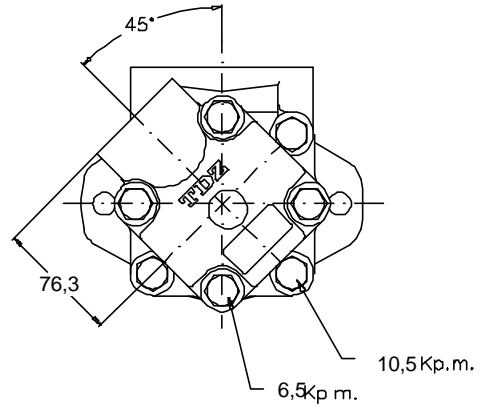
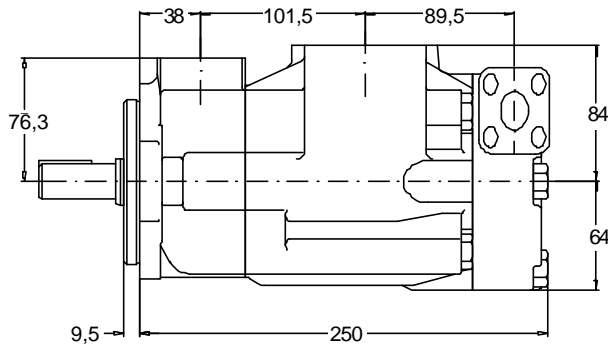
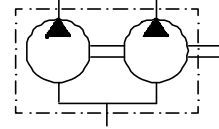
**N° 86 Shaft**



Enquire about other types of shafts

There is a version for the pump of the cover end with flow regulating and pressure limiter valves whose reference is **VK42V**.

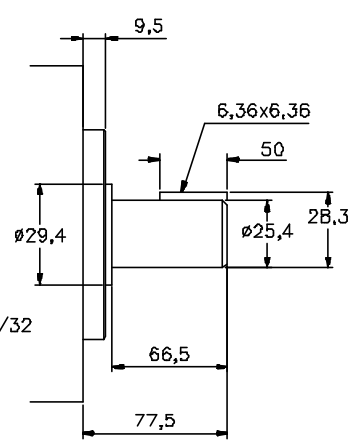
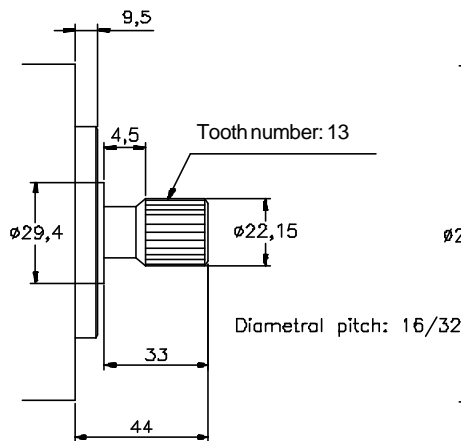
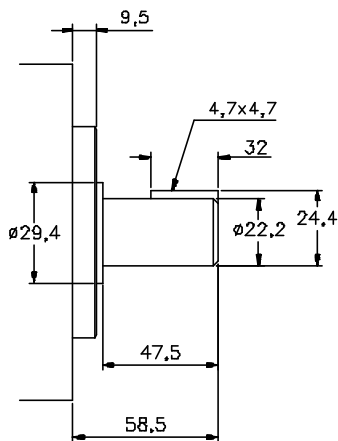
DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres



**Nº1 Shaft**

**Nº11 Shaft**

**Nº86 Shaft**

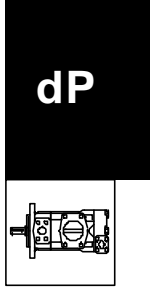
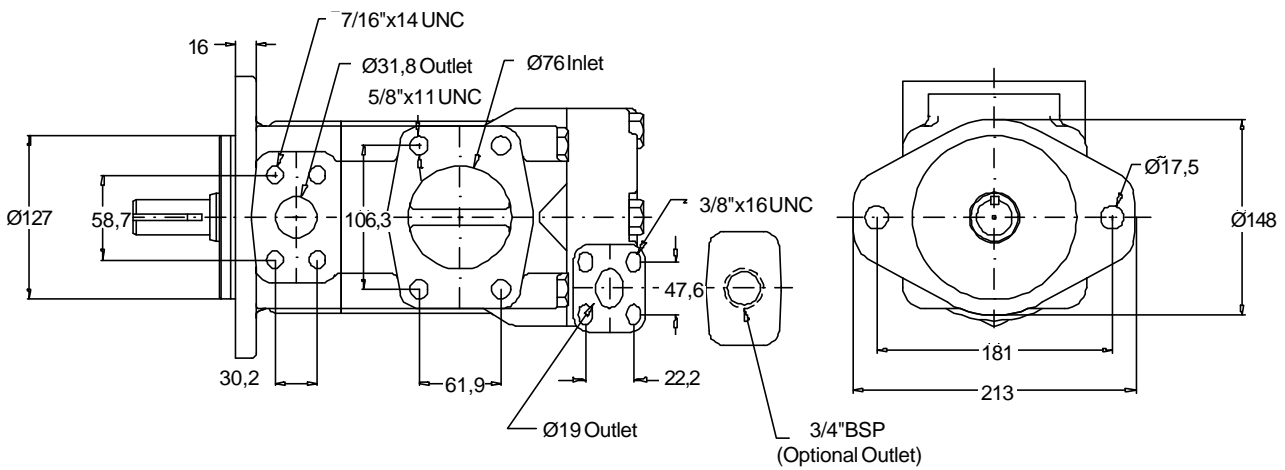
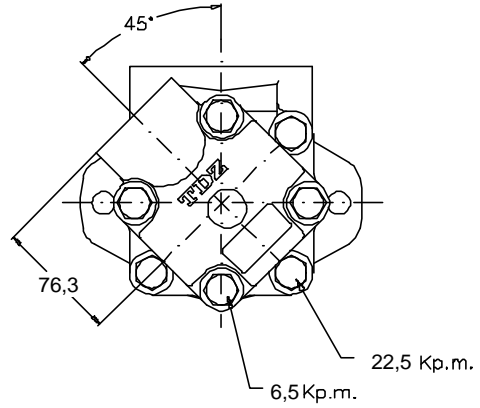
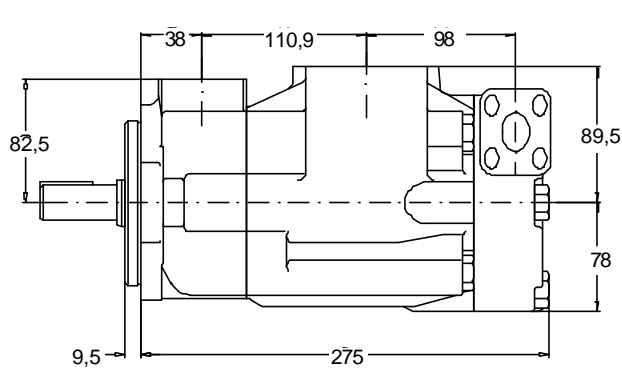
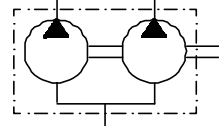


Enquire about other types of shafts

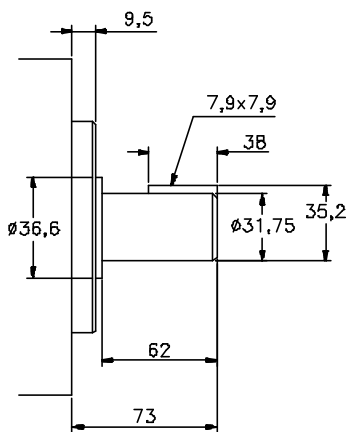
# DOUBLE VANE PUMPS VK-63, VS-63 & VQ-63



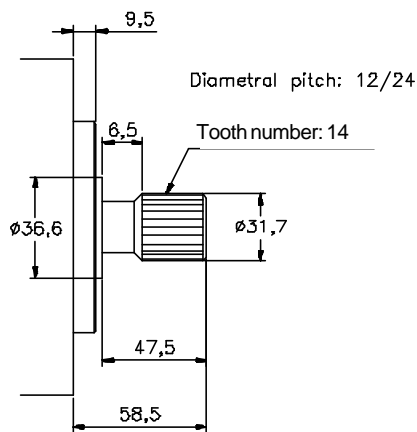
DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres



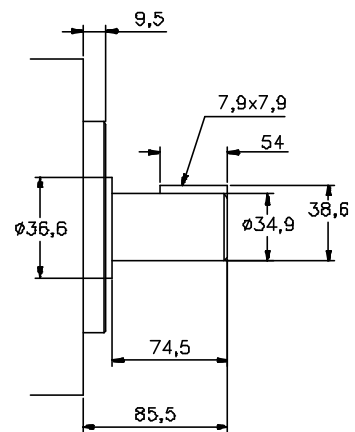
**N°1 Shaft**



**N°11 Shaft**

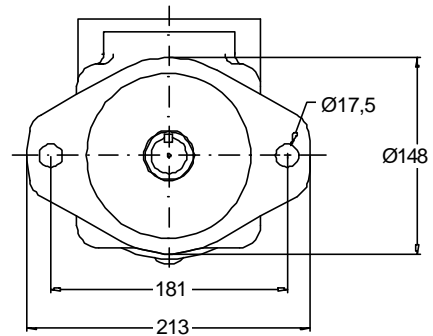
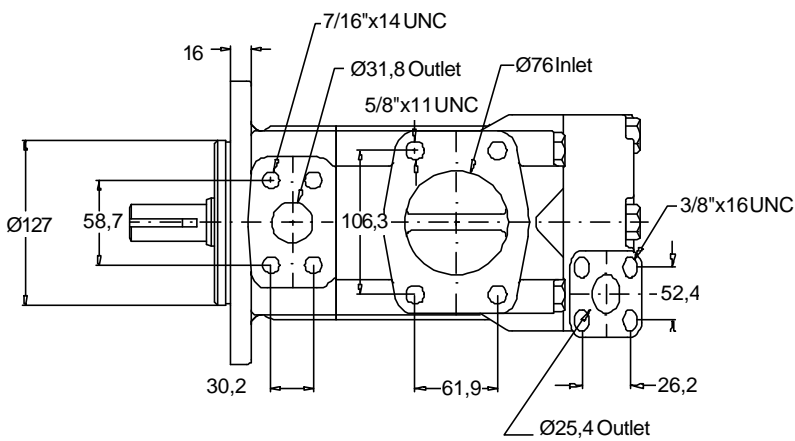
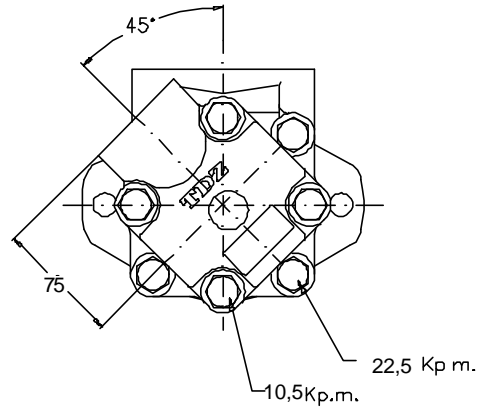
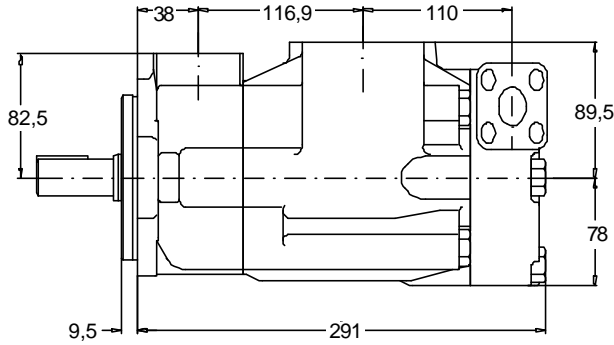
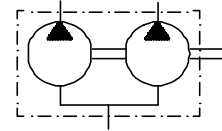


**N°86 Shaft**

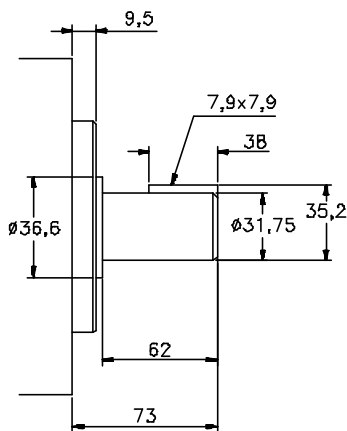


Enquire about other types of shafts

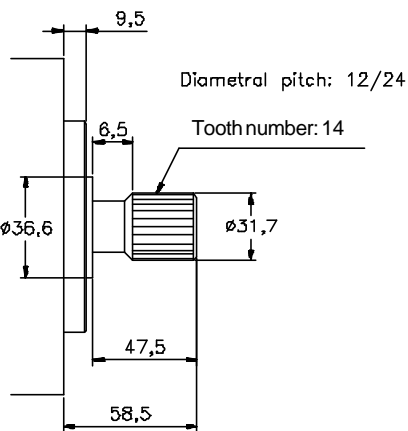
DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres



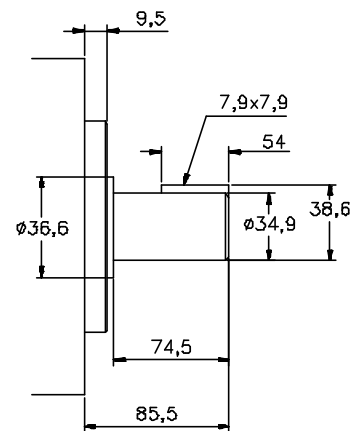
**N°1 Shaft**



**N°11 Shaft**



**N°86 Shaft**

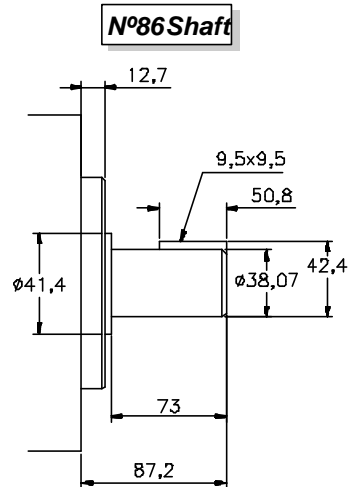
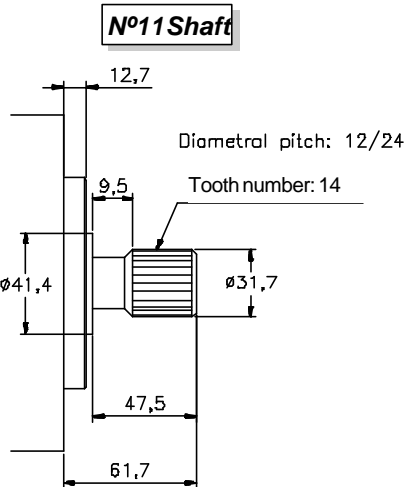
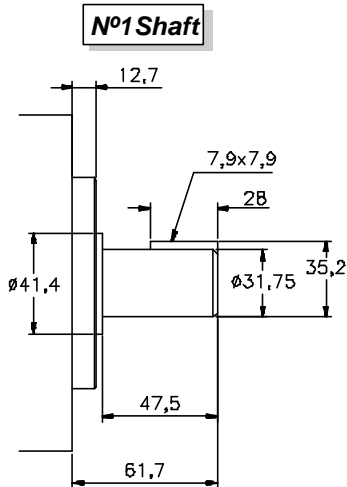
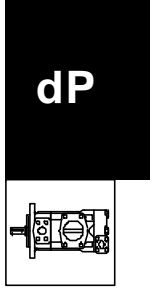
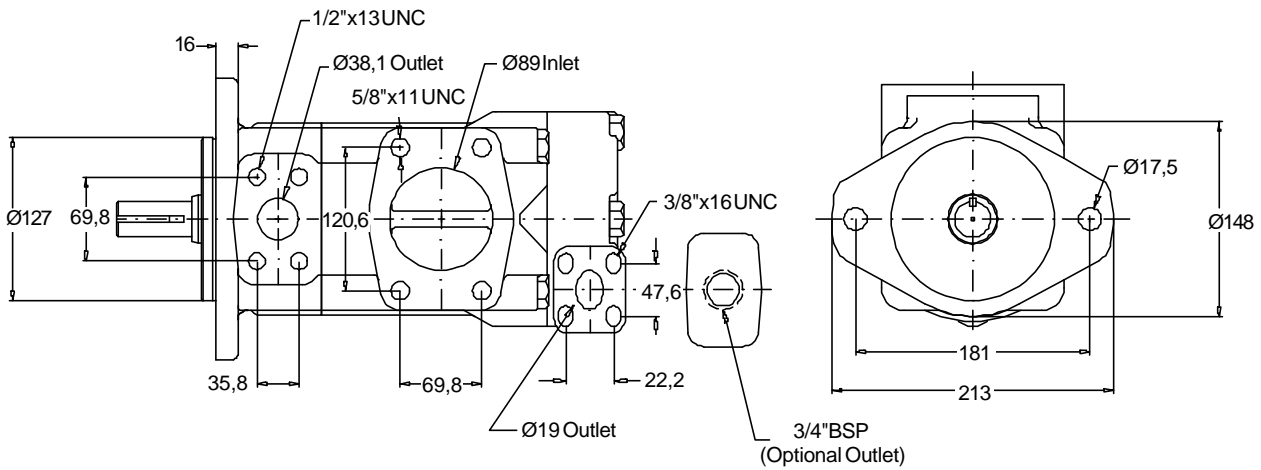
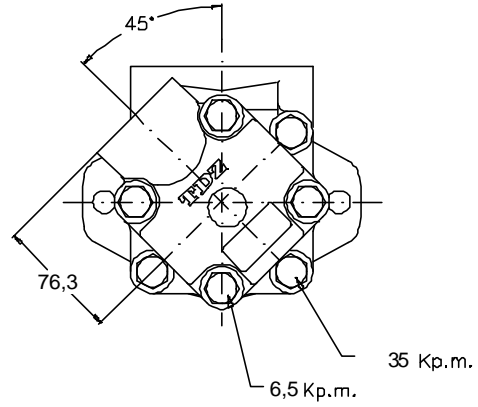
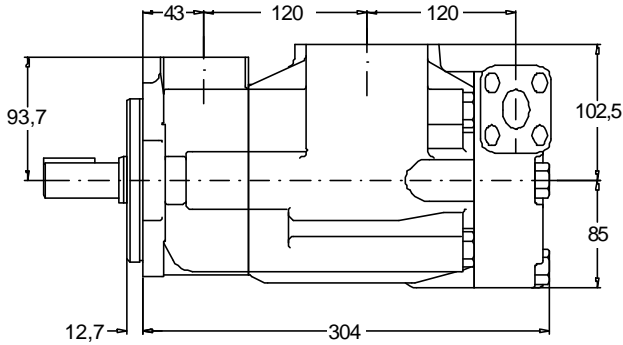
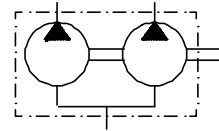


Enquire about other types of shafts

# DOUBLE VANE PUMPS VK-73, VS-73 & VQ-73

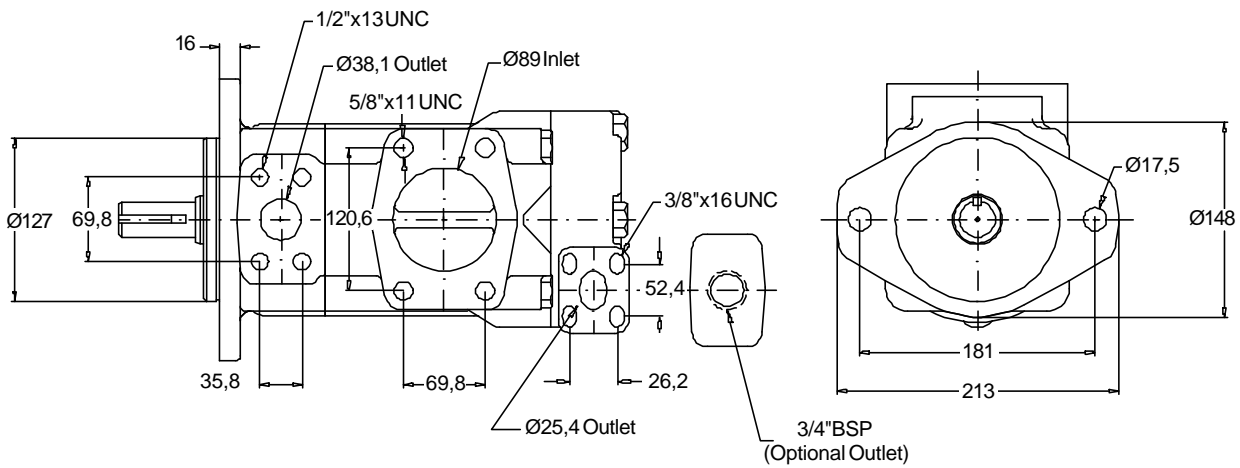
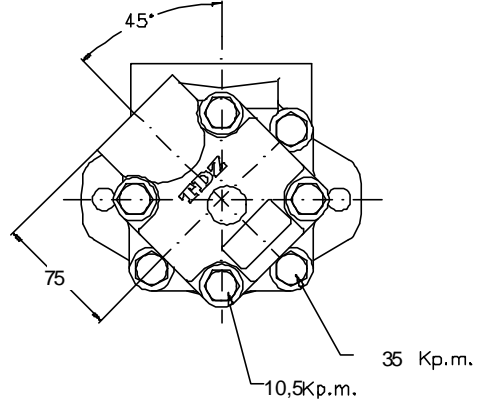
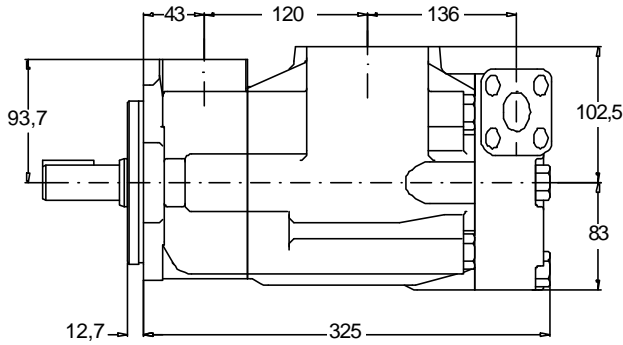
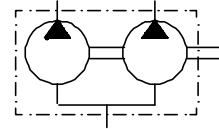


DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres

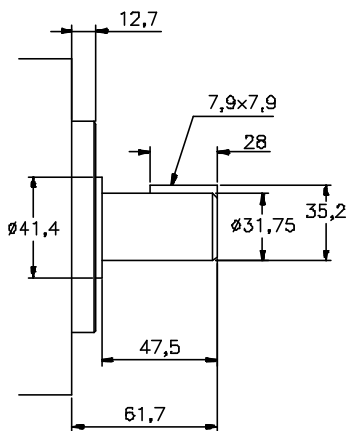


Enquire about other types of shafts

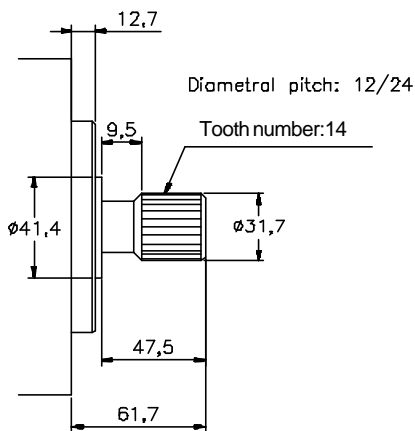
DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres



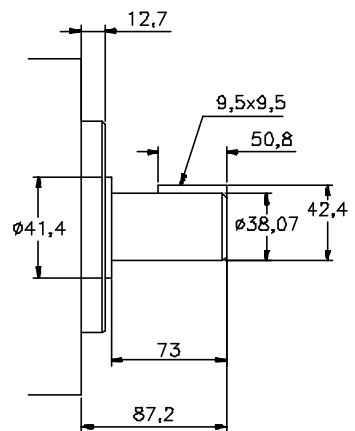
**N°1 Shaft**



**N°11 Shaft**



**N°86 Shaft**

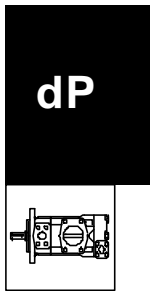
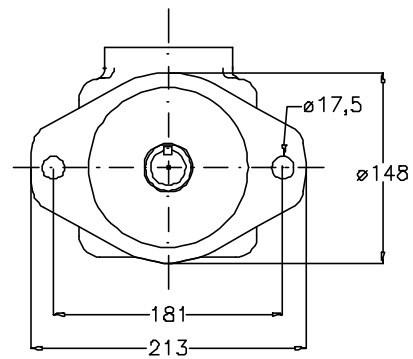
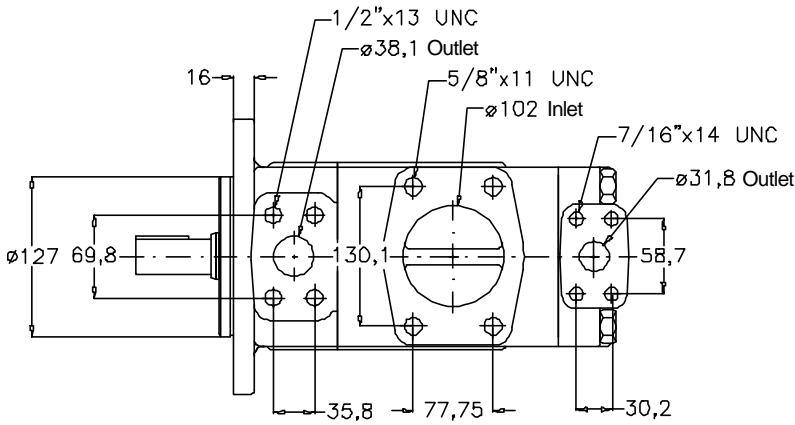
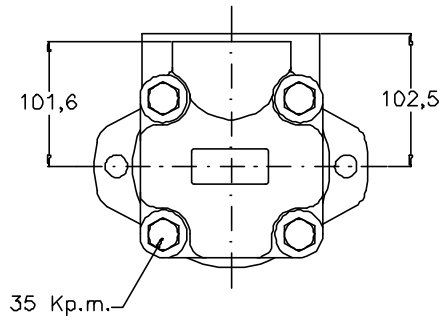
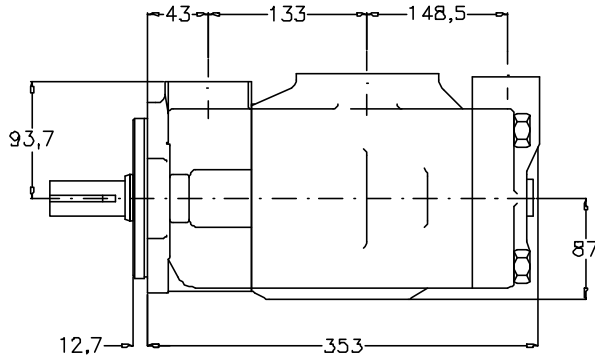
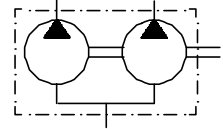


*Enquire about other types of shafts*

# DOUBLE VANE PUMPS VK-76, VS-76 & VQ-76



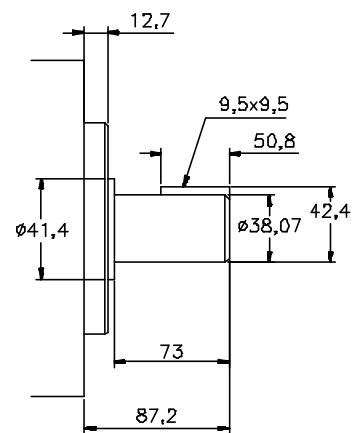
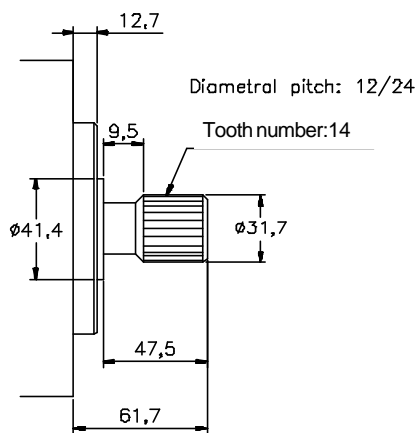
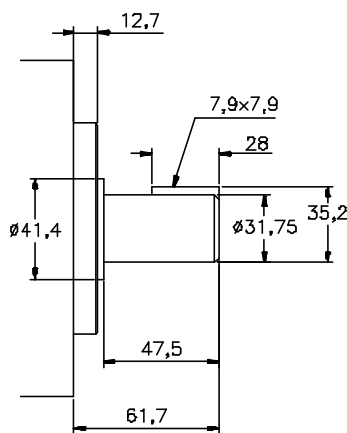
DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres



**N°1 Shaft**

**N°11 Shaft**

**N°86 Shaft**



Enquire about other types of shafts



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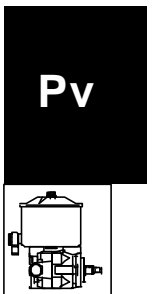
## *PUMPS WITH VALVES TANKS*

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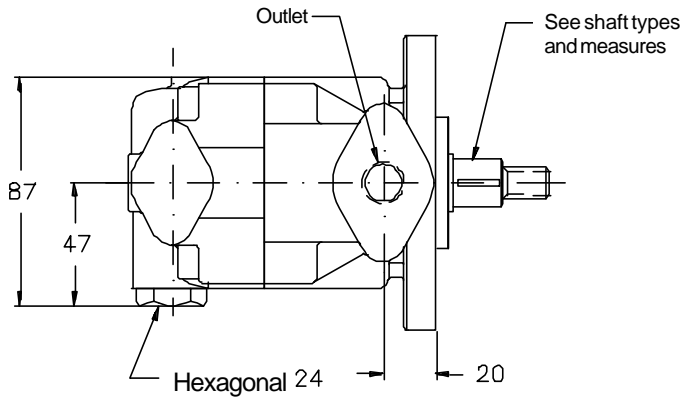
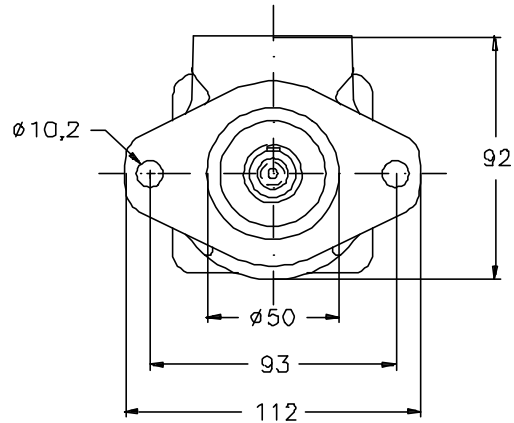
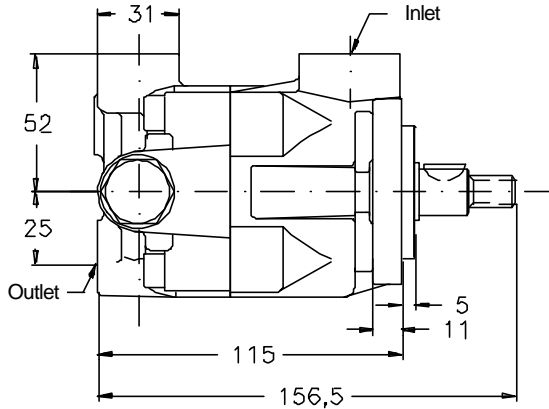
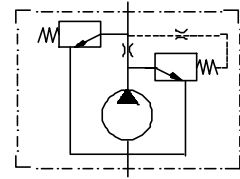
- Pumps with flow regulating and pressure limiting valves
- Pumps with valves and tank of 1,5 Ltrs. or 1 Lt. with built-in filter
- Pumps with valves and manual flow regulating key
- 1.5 litres and 1 litre oil tanks with built-in filter

These pumps include in a compact set, one BHP2 vane pump, one pressure limiter valve and one flow regulating pilot valve; being also possible to add an oil tank with paper filter cartridge. So, in a very small place and at an economical cost almost all necessary elements are available for many simple hydraulic circuits.

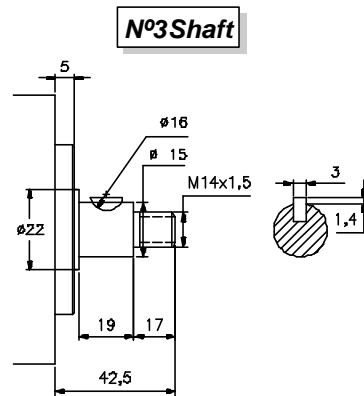
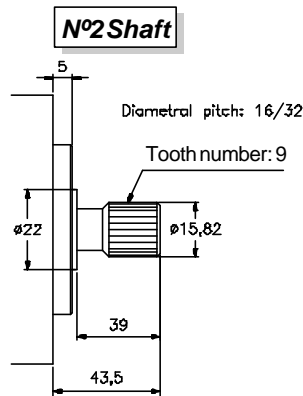
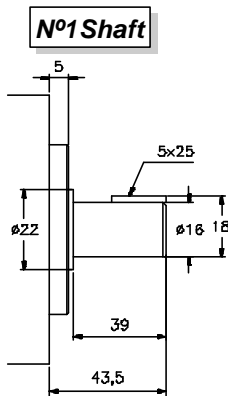
Flow regulating valve gives constant delivery flow, even with changes in pump rotation speed and load.



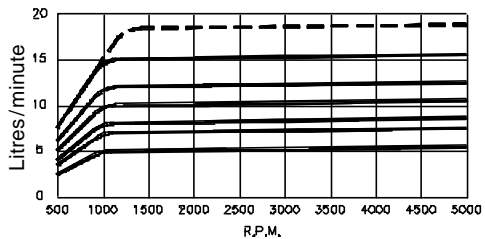
Valves can be adjustable, made to order, as follows:  
 - Flow: Up to the limit of the pump cartridge  
 - Pressure: 15 to 150 Kgs./cm<sup>2</sup>.



**DIMENSIONS IN MILLIMETRES**  
 1" = 25.4 millimetres



Continuous line shows those of pumps with outlet port sized to give as maximum the cartridge rated flow.  
 Broken line is, for instance, of one pump with hole sized to give as maximum flow 18 Ltrs. (In this case cartridge rated flow is 15 ltrs. at 1000 rpm.)



OUTLET	INLET	CARTRIDGES Ltrs./min at 1000 rpm
M12x1,5	M16x1,5	7
M14x1,5	M18x1,5	8
M16x1,5	3/4" BSP	10
3/8" BSP		12
		15

*Port sizes are optional. Any combination can be supplied.*

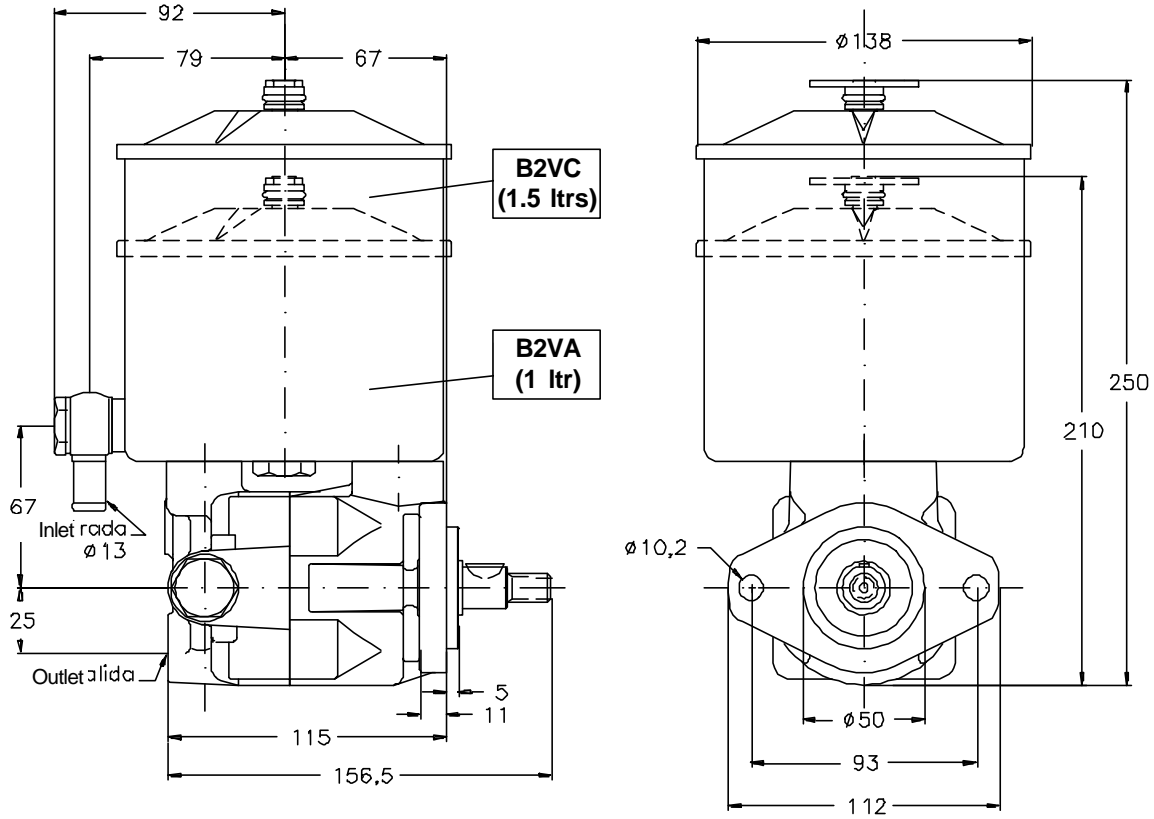
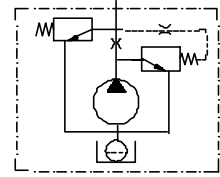
# B2VA & B2VC SINGLE VANE PUMP WITH VALVE, TANK AND FILTER



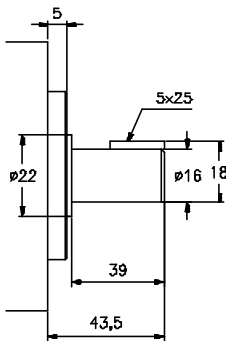
Valves can be adjustable, made to order, as follows:

- Flow: Up to the limit of the pump cartridge.
- Pressure: 15 to 150 Kgs./cm<sup>2</sup>.

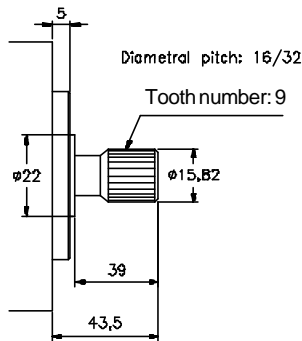
Tank includes inside one paper filter cartridge of 25µ



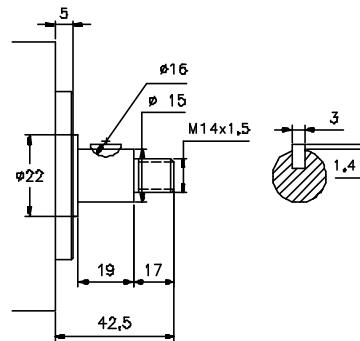
**Nº1 Shaft**



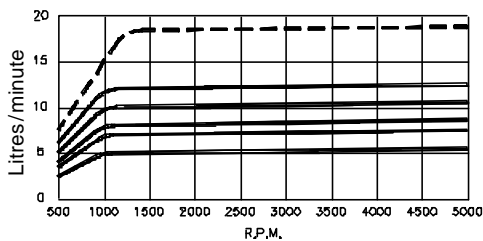
**Nº2 Shaft**



**Nº3 Shaft**

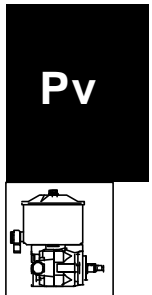


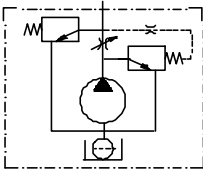
Continuous line shows those of pumps with outlet port sized to give as maximum the cartridge rated flow.  
Broken line is, for instance, of one pump with hole sized to give as maximum flow 18 Ltrs. (In this case cartridge rated flow is 12 ltrs. at 1000 rpm.)



OUTLET	INLET	CARTRIDGES Ltrs./min at 1000 rpm
M12x1,5	Ø 13	7
M14x1,5		8
M16x1,5		10
3/8" BSP		12
		15

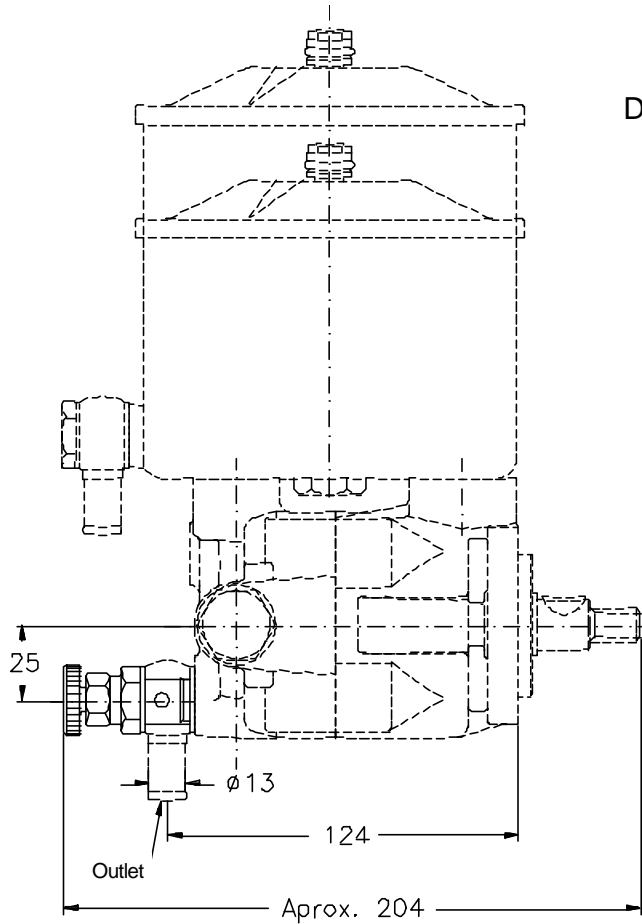
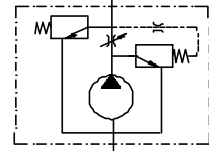
Port sizes are optional. Any combination can be supplied.



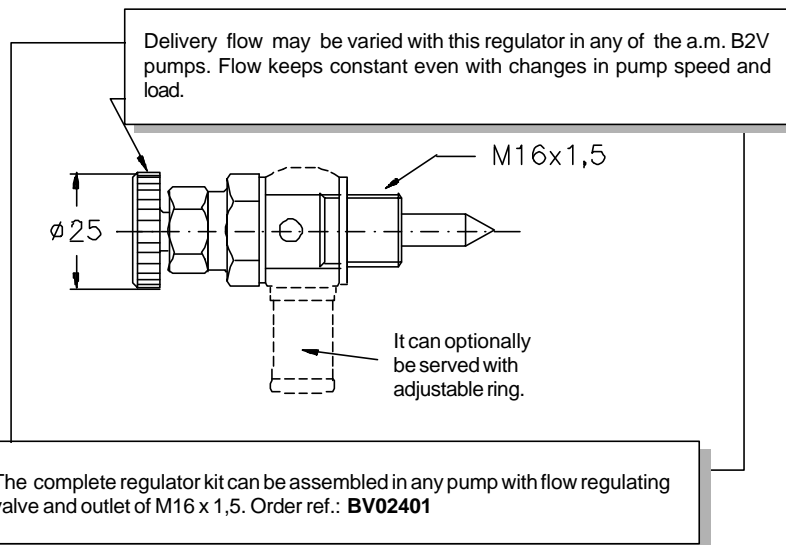


**TYPES**

- B2VRC:** Pump with manual flow & pressure regulating valves
- B2VARC:** Pump with f. & p. valves and 1 Ltr. tank
- B2VCRC:** Pump with f. & p. regulating valves and 1.5 Ltrs. tank



**DIMENSIONS IN MILLIMETRES**  
1" = 25.4 millimetres



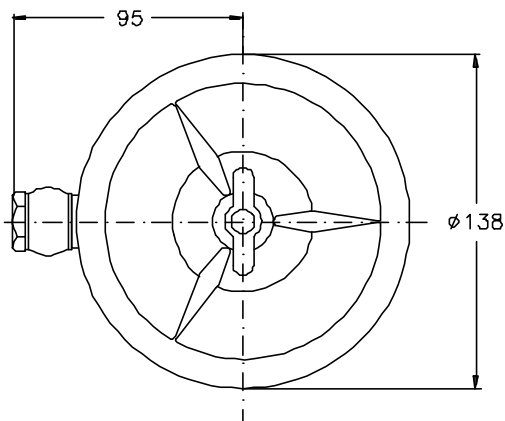
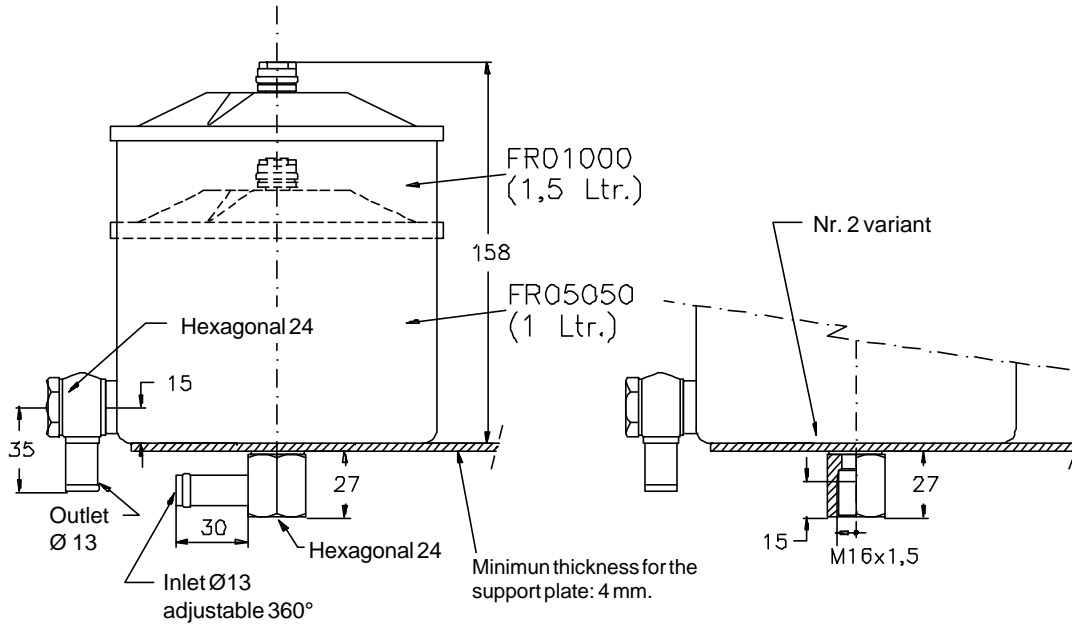
**FR01000 (1.5 LTrs.) AND FR05050 (1 Ltr.)**

**TANK TYPES WITH PAPER FILTER**

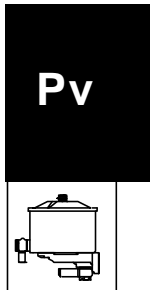
**- Without support -**



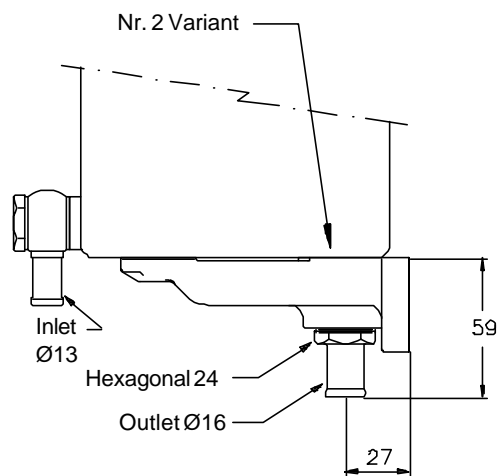
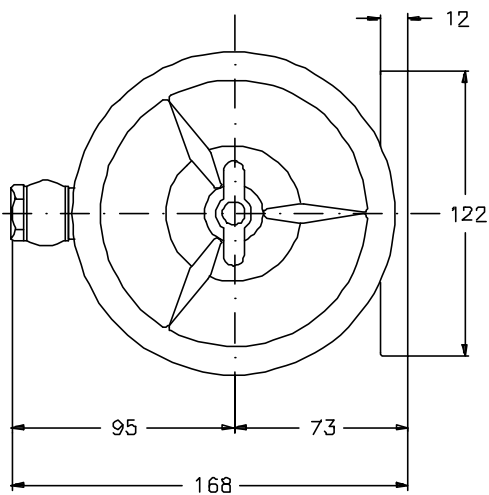
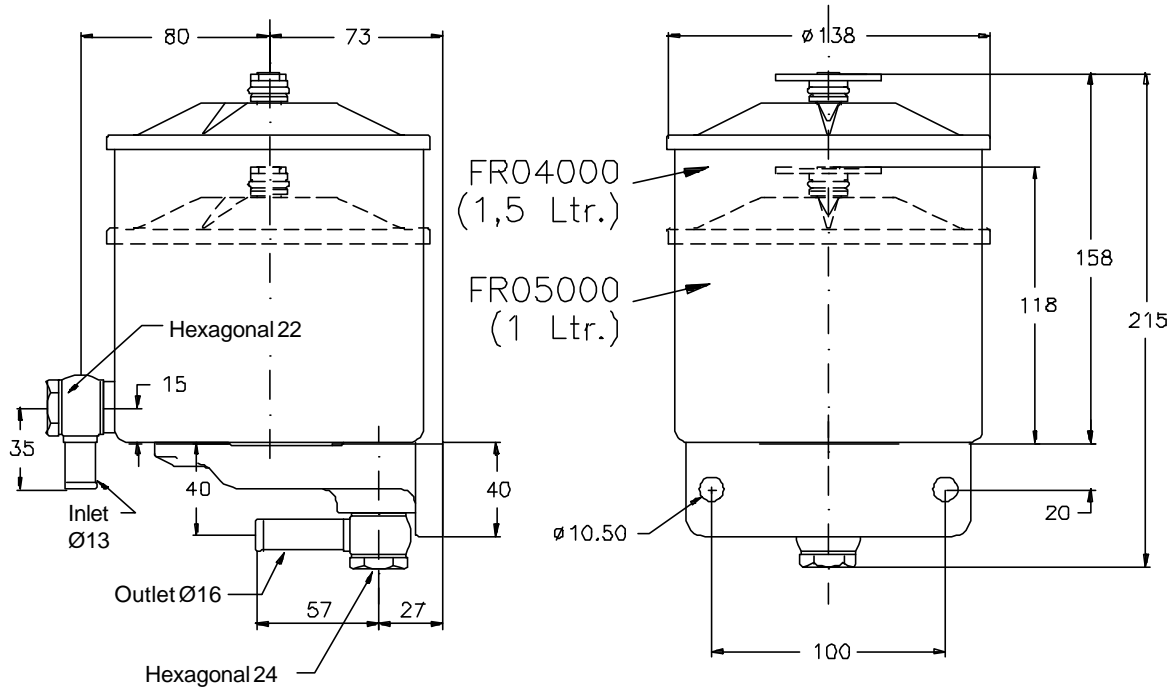
DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres



Tank includes one inlet paper filter cartridge of 25µ



DIMENSIONS IN MILLIMETRES 1" = 25.4 millimetres



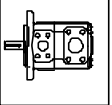
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# *MOTORS*

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- MHP motors

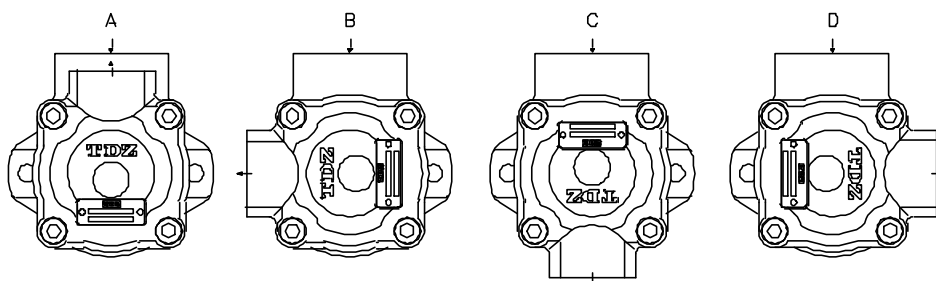
**Mt**



## VANE MOTORS CODE

<u>F3</u>	<u>MHP</u>	<u>2</u>	<u>10</u>	<u>D</u>	<u>1</u>	<u>A</u>
1	2	3	4	5	6	7

- 1 - "F3" means special seals for fire-resistant fluids. Omit if not required.
- 2 - **Motor type:**  
MHP = 10 vanes motor, mobile and industrial use, metric threads.
- 3 - **Motor model:**  
Models 2.
- 4 - **Flow:** In litres per minute at 1000 rpm and 7 bar.
- 5 - **D = Right-hand** direction of rotation (Clockwise).  
**Y = Left-hand** direction of rotation (Counterclockwise).  
(To check the direction of rotation view from the shaft end).
- 6 - **Shaft type:** See on each motor model information.
- 7 - **Outlet position from the shaft:**  
A: In line with inlet.  
B: 90° on the right from inlet (90° clockwise from inlet).  
C: 180° from inlet.  
D: 90° on the left from inlet (90° counterclockwise from inlet).

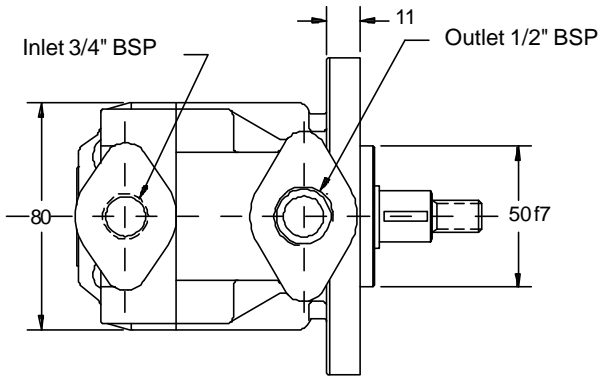
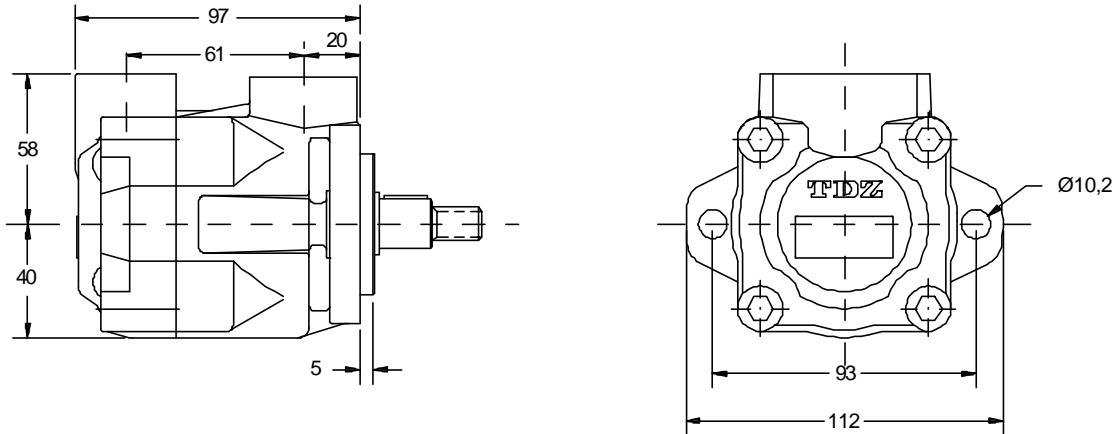


# VANE MOTOR TYPE MHP-2

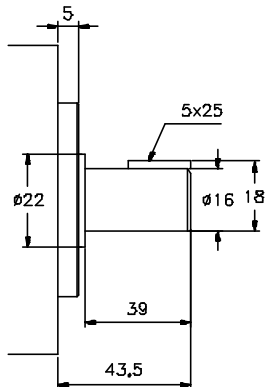


	FLOW					SPEED (rpm) (3)			PRES. (Bar)		CONNECTION		WEIGHT (Kgs.)
	7	8	10	12	15	Mín.	Máx. Contin.	Máx. Intermit.	Contin.	Intermit.	Inlet	Outlet	
Lts. a 1000 rpm	7	8	10	12	15								
Gal. a 1200 rpm	2,2	2,5	3,2	3,8	4,7								
Torque (N.m) <sup>(1)</sup>	11	13	16	19	24								
Nom. Power(CV) <sup>(2)</sup>	1,5	1,7	2,1	2,5	3,1	300	3000	3500	150	175	1/2" BSP	1/2" BSP	3,6

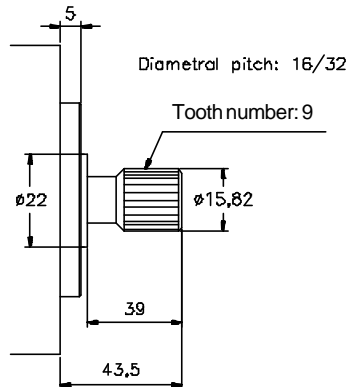
- (1) Theoretical Torque in N.m at 100 Bar.
  - (2) Nominal Power in H.P. at 100 Bar and 1000 r.p.m.
  - (3) For pressures lower of 100 bar, the maximum speed can increase until 20%
- Flow and power diagrams, see corresponding pump



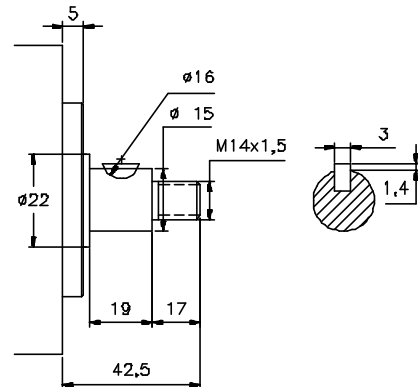
**Nº 1 shaft**



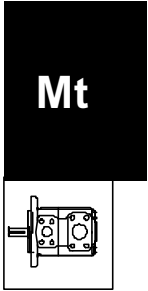
**Nº 2 shaft**



**Nº 3 shaft**



Enquire about other types of shafts



# ORDERING CODE

Model No. **MD4C - 075 - 1 - N - 00 - C 1 02 ..**

Series external drain

Nominal flow

- (torque) 0,39 Nm/bar
- 027 (0,45 Nm/bar)
- 031 (0,55 Nm/bar)
- 043 (0,74 Nm/bar)
- 055 (0,93 Nm/bar)
- 067 (1,13 Nm/bar)
- 075 (1,27 Nm/bar)
- 100 (1,56 Nm/bar)

Type of Shaft

- 1 = Keyed (SAE B)
- 2 = Keyed (non SAE)
- 3 = Splined (SAE B)
- 9 = Special (non SAE)

Rotation

N = Bi-directional

Modification

Port

- 01 = 1/2" NPT Port
- 02 = 1/2" UNF Port
- 03 = 1/2" UNF Drain
- 04 = 4 Bolt Flange
- 05 = 3/8"-16 UNC Threaded
- 06 = 9/16"-18 UNF Drain
- 07 = Threaded Port 3/4" BSP
- 08 = 3/8" BSP Drain
- 09 = 4 Bolt Flange
- 10 = 3/8"-16 UNC Threaded
- 11 = 3/8" BSP Drain
- M4 = 4 Bolt Flange
- Metric Threaded M10x20
- 3/8" BSP Drain

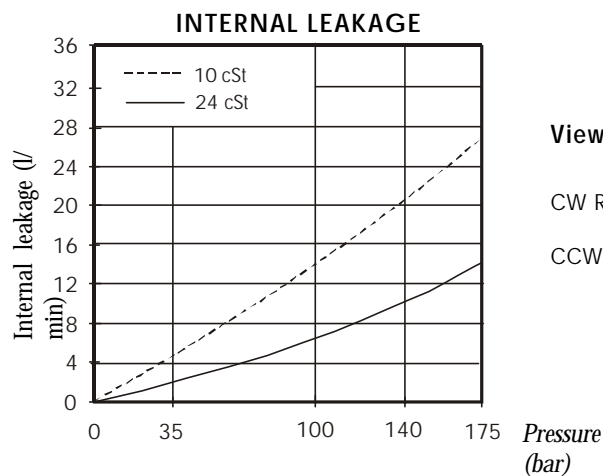
Seal Class

1 = 1

Desing letter

Porting combination

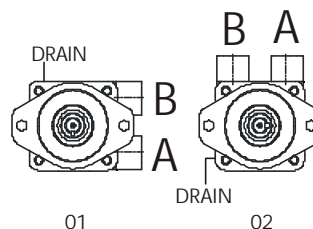
- 01 = Side ports (right/left)
- 02 = Side ports (up/down)



View from shaft end:

- CW Rotation A = inlet, B = outlet
- CCW Rotation A = outlet, B = inlet

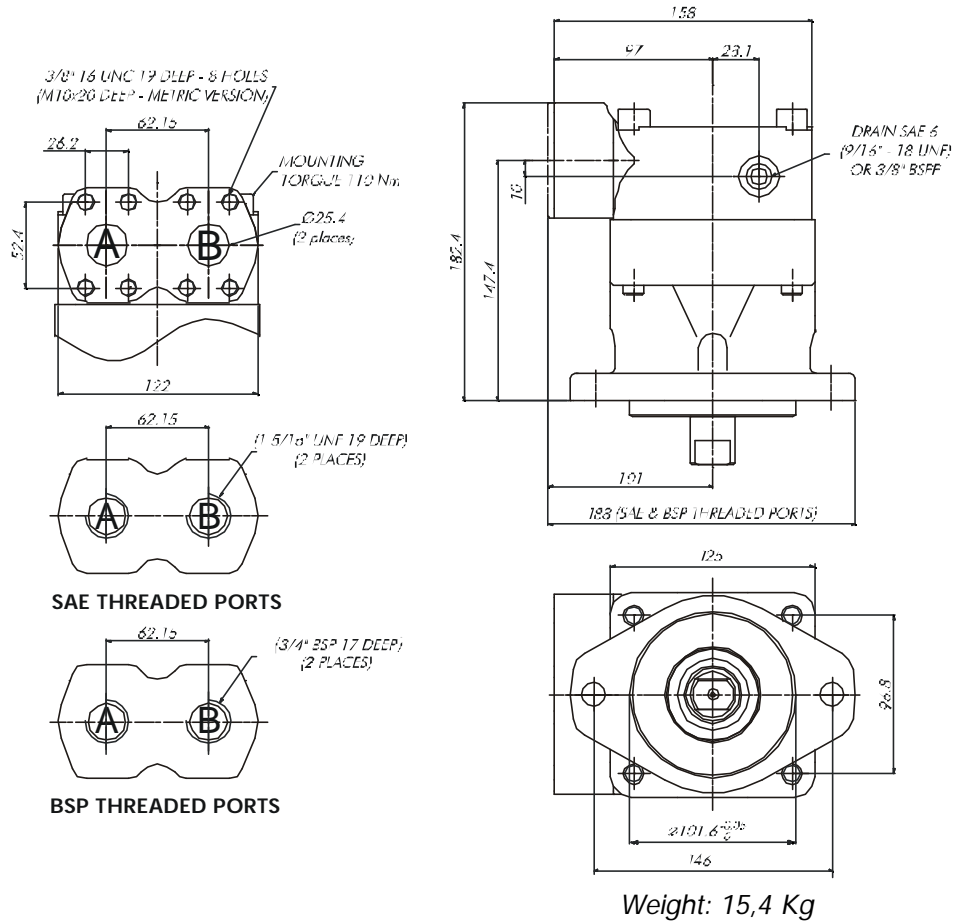
Porting combination



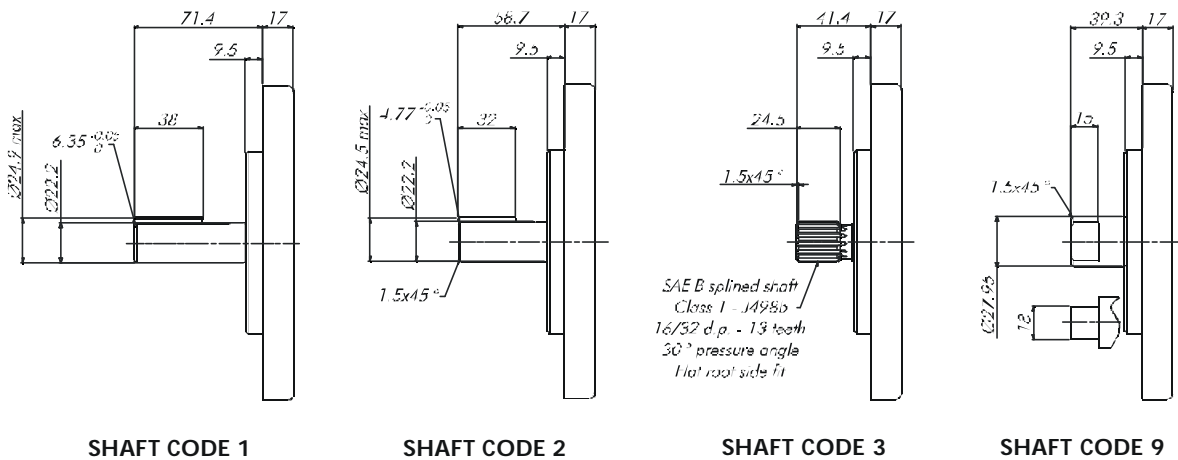
# OPERATING CHARACTERISTICS (24 cSt)

Model	Volumetric displacement (Vi) cc/rev	Input flow at n = 2000 RPM		Torque T at n = 2000 RPM	Power output at n = 2000 RPM
		Theoretical l/min	at 175 bar ? p l/min	at 175 bar ? p Nm	at 175 bar ? p kW
MD4C - 024	24.4	49.0	63.0	60.5	12.7
MD4C - 027	28.2	56.0	70.0	70.0	14.7
MD4C - 031	34.5	69.0	83.0	86.8	18.0
MD4C - 043	45.5	93.0	107.0	120.0	25.1
MD4C - 055	58.8	118.0	132.0	149.0	31.2
MD4C - 067	71.1	142.0	156.0	170.0	35.6
MD4C - 075	80.1	160.0	174.0	198.0	41.5

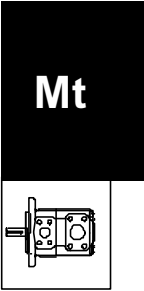
# PORT CONNECTIONS



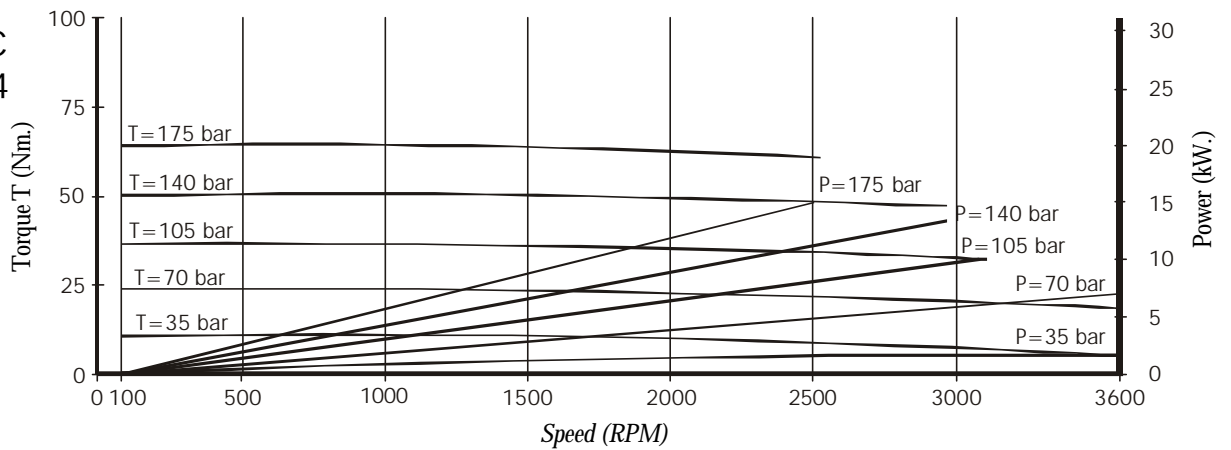
# SHAFT TYPE



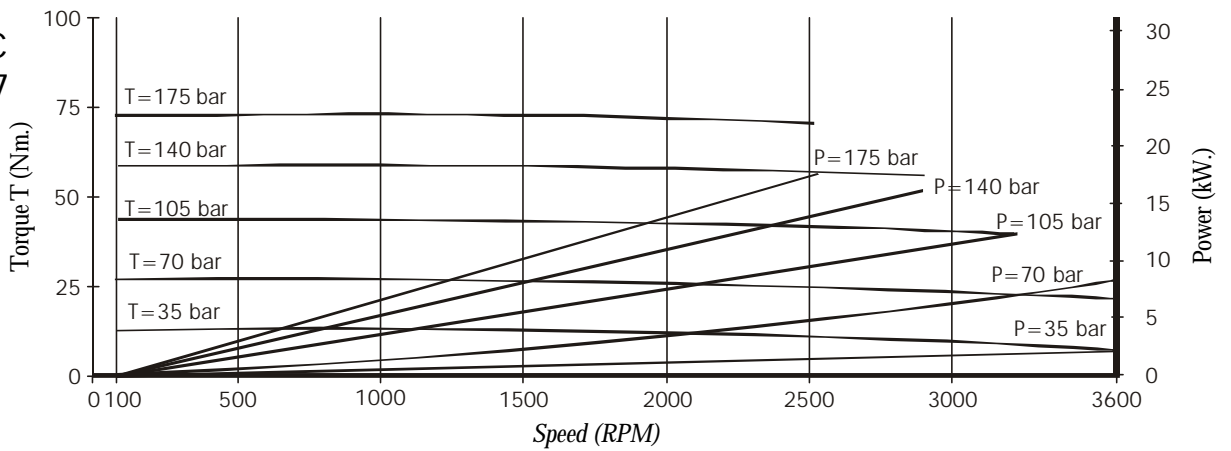
Enquire about other shaft type



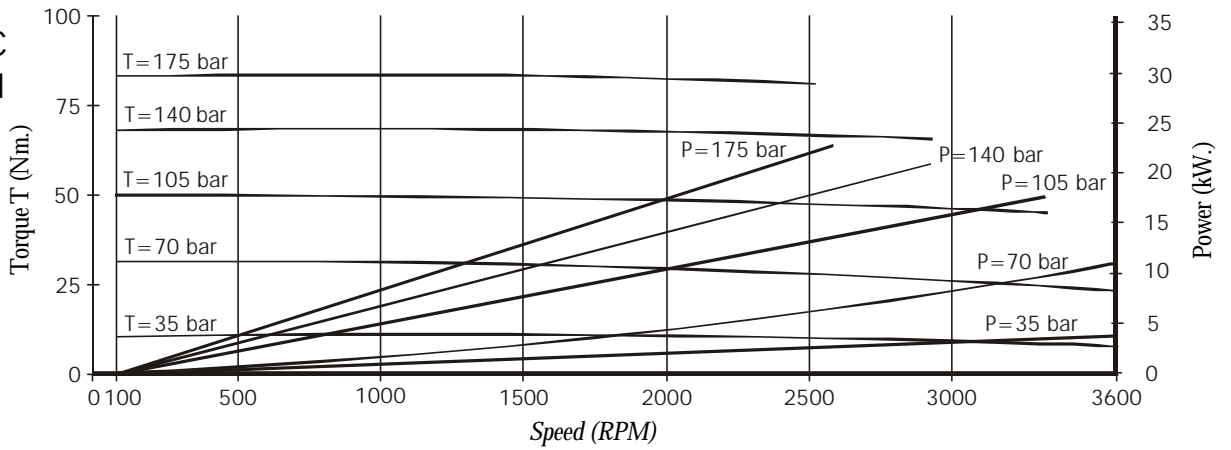
MD4C  
024



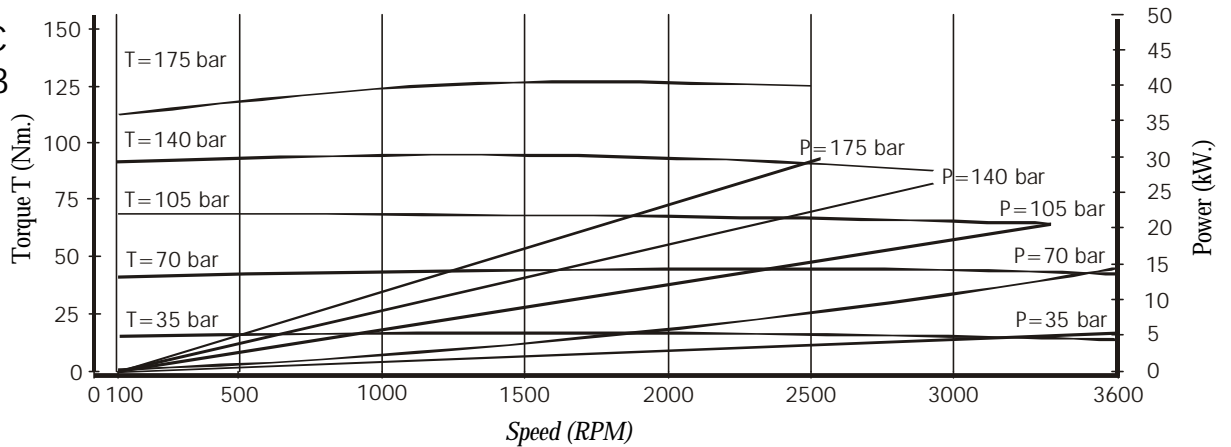
MD4C  
027

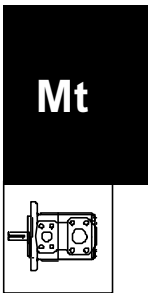
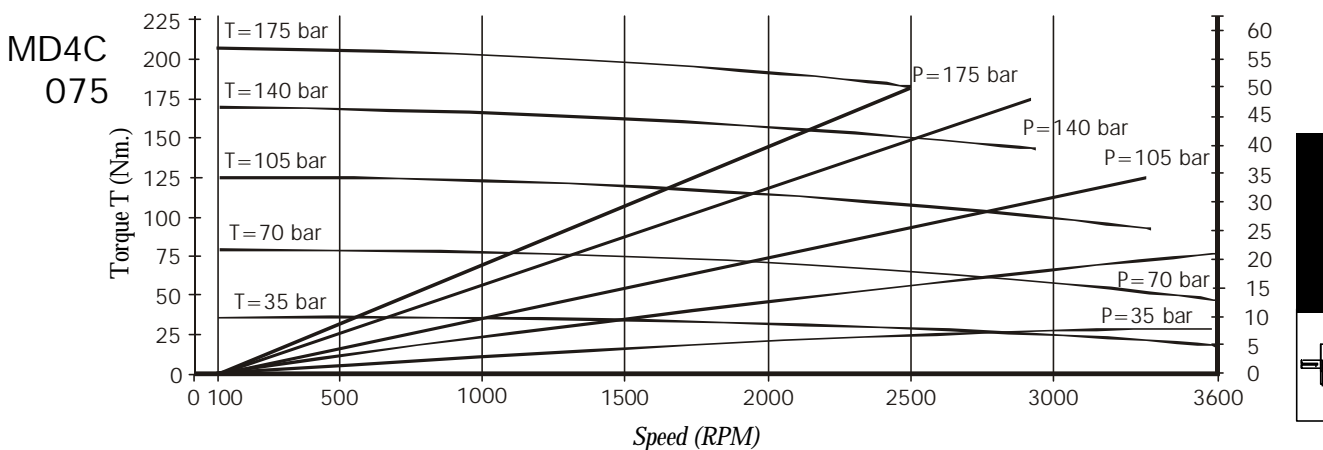
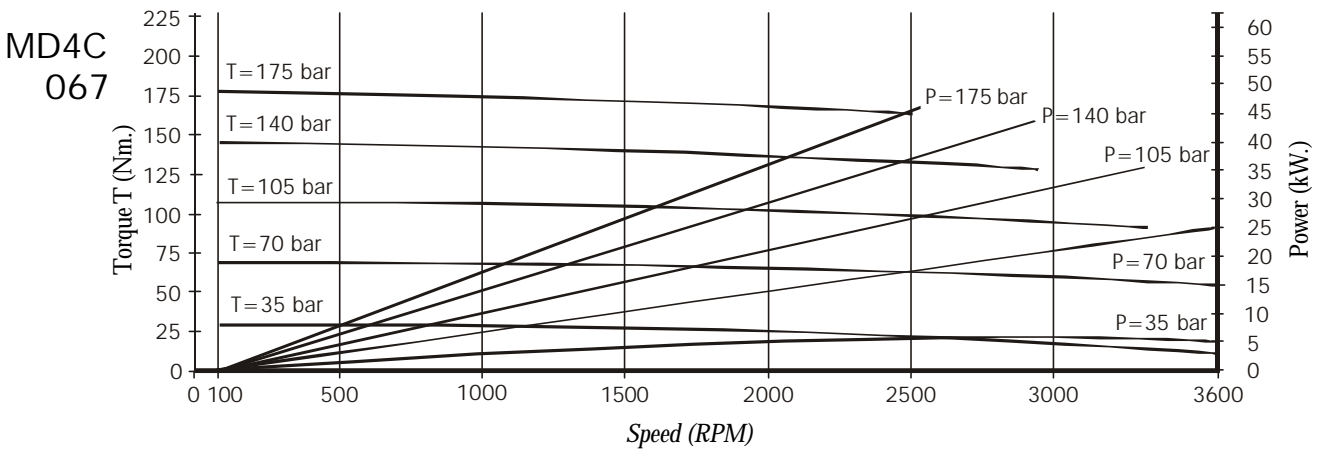
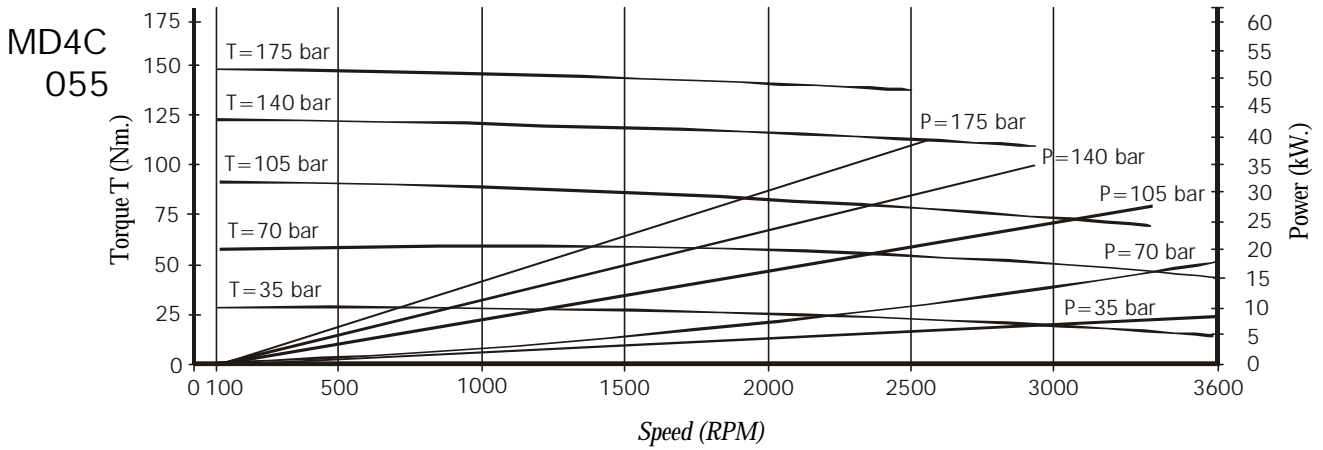


MD4C  
031



MD4C  
043







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# *FLANGES*

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- SAE 4-bolt flanges for pipes and pumps connection

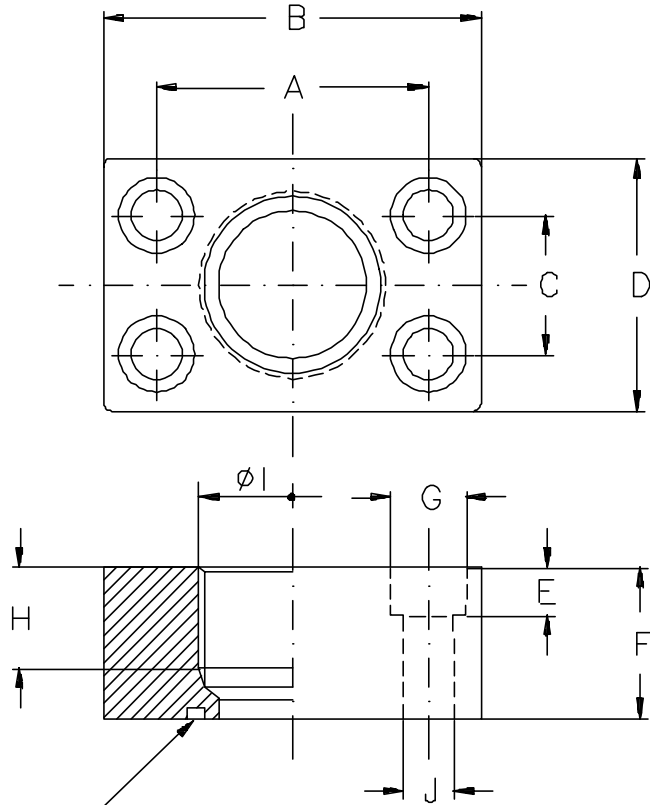
**FI**



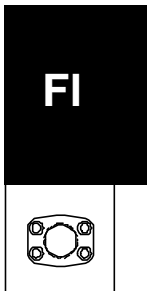
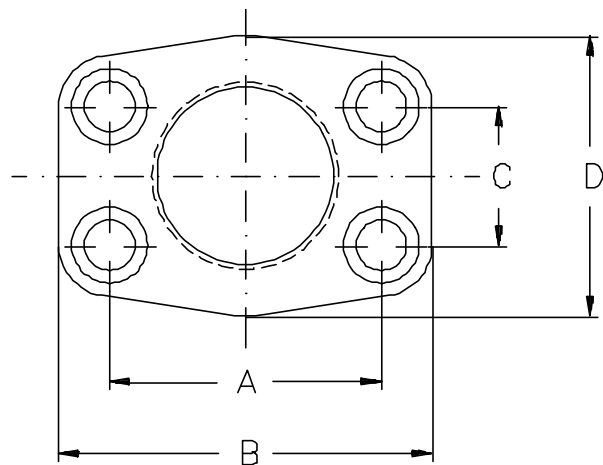
PUMP TYPE		A	B	C	D	E	F	G	H	I	J	References	
												Flange (1)	Group (2)
BH*4	O	52,4	70	26,2	47	8	20	16,5	20	¾"x14BSP	10,5	BH04030	BH04041
	I	69,85	97	35,7	65	12,5	39	19,5	26	1½"x11BSP	13	BH04028	
BH*6	O	58,7	87	30,14	58	11	30	19	30	1¼"x11BSP	12,5	BH06033	BH06041
	I	88,9	115	50,8	86,5	13	30	23	30	2½"x11BSP	14,5	BH06030	
BH*7	O	See BH*4 inlet flange										BH04028	BH07041
	I	106,3	138,3	61,9	107	13	35	23	35	3"x11BSP	14,5	BH07027	
V*25	O	See BH*4 outlet flange										BH04030	VK25070
	I	See BH*4 inlet flange										BH04028	
V*35	O	See BH*6 outlet flange										BH06033	VK35070
	I	77,7	105	42,85	80	13	40	20	26	2½"x11BSP	13	VK35073	
V*45	O	See BH*4 inlet flange										BH04028	VK45070
	I	See BH*7 inlet flange										BH07027	
V*42	Os	See BH*4 outlet flange										BH04030	VK42070
	I	See V*35 inlet flange										VK35073	
	Oc	No outlet flange assembled (See BHP2 pump cover)										-	
V*43	Os	See BH*4 outlet flange										BH04030	VK43070
	I	See BH*6 inlet flange										BH06030	
V*4T	Oc	47,6	65	22,2	45	-	29	-	19	¾"x14BSP	10,5	VK50006	
V*63	Os	See BH*6 outlet flange										BH06033	VK63070
	I	See BH*7 inlet flange										BH07027	
V*6T	Oc	See V*43 cover end side outlet flange										VK50006	
V*64	Os	See BH*6 outlet flange										BH06033	VK64070
	I	See BH*7 inlet flange										BH07027	
	Oc	See BH*4 outlet flange										BH04030	
V*73	Os	See BH*4 inlet flange										BH04028	VK73070
	I	120,6	153	69,85	135	-	39	-	30	Ø102,3	16,5	VK73073	
V*7T	Oc	See V*43 cover end side outlet flange										VK50006	
V*74	Os	See BH*4 inlet flange										BH04028	VK74070
	I	See V*73 inlet flange										VK73073	
	Oc	See BH*4 outlet flange										BH04030	
V*76	Os	See BH*4 inlet flange										BH04028	VK76070
	I	130,1	162	77,75	152	-	39	-	28	Ø114,3	16,5	VK76073	
	Oc	See BH*6 outlet flange										BH06033	

- (I) Inlet flange (single and double pumps).  
(O) Outlet flange (single pumps).  
(Os) Shaft end side outlet flange (double pumps).  
(Oc) Cover end side outlet flange (double pumps).  
(1) Flanges sold singly or separately include "O" ring but not screws or bolts.  
(2) 1 set of flanges include inlet and outlet flanges, "O" rings and the specific bolts for each pump.

*Works with fire resistant fluids should be indicated in the orders, as "O" rings are special.*



Every flange includes appropriate "O" ring.





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## *REPLACEMENT CARTRIDGE KITS*

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- TDZ replacement cartridge kits for single, double, triple Vickers and Caterpillar vane pumps.

**Ct**



## MOBILE APPLICATIONS

**CR:** NBR seal, 10 vanes

**CT:** VITON seal, 10 vanes

**CQ:** NBR seal, 10 vanes, with bimetallic plates

**CF:** VITON seal, 10 vanes, with plates

SINGLE PUMPS TRHU DRIVE SINGLE PUMPS DOUBLE PUMPS (FIRST CARTRIDGE)						
PUMP TYPE	FLOW		CAST IRON PLATES (VK) ROTATION		BIMETALIC PLATES (VQ) ROTATION	
	gal/min. (1200 rpm)	l/min. (1000 rpm)	RIGHT	LEFT	RIGHT	LEFT
20V V*20	2	8	CR10102	CR11102	CQ10102	CQ11102
	5	18	CR10105	CR11105	CQ10105	CQ11105
	8	27	CR10108	CR11108	CQ10108	CQ11108
	9	29	CR10109	CR11109	CQ10109	CQ11109
	11	36	CR10111	CR11111	CQ10111	CQ11111
	12	39	CR10112	CR11112	CQ10112	CQ11112
	14	46	CR10114	CR11114	CQ10114	CQ11114
25V V*25 V*4T 2520V* V*43	8	26	CR10005	CR11009	CQ10005	CQ11009
	12	40	CR10000	CR11004	CQ10000	CQ11004
	14	45	CR10001	CR11005	CQ10001	CQ11005
	17	55	CR10002	CR11006	CQ10002	CQ11006
	19	60	CR10004	CR11008	CQ10004	CQ11008
	21	67	CR10003	CR11007	CQ10003	CQ11007
	24	80	CR10007	CR11011	CQ10007	CQ11011
27	88	CR10006	CR11010	Not mounted in VQ model		
30V	24	76	CR10010	CR11012	CQ10010	CQ11012
	28	88	CR10011	CR11013	CQ10011	CQ11013
35V V*35 V*6T 35**V V*6*	21	66	CR10024	CR11028	CQ10024	CQ11028
	25	81	CR10020	CR11024	CQ10020	CQ11024
	30	97	CR10021	CR11025	CQ10021	CQ11025
	35	112	CR10022	CR11026	CQ10022	CQ11026
	38	121	CR10023	CR11027	CQ10023	CQ11027
	45	142	CR10025	CR11029	CQ10025	CQ11029
45V V*45 V*7T 45**V V*7*	42	138	CR10030	CR11034	CQ10030	CQ11034
	47	148	CR10031	CR11035	CQ10031	CQ11035
	50	162	CR10032	CR11036	CQ10032	CQ11036
	57	180	CR10034	CR11038	CQ10034	CQ11038
	60	193	CR10033	CR11037	CQ10033	CQ11037
	67	214	CR10035	CR11039	CQ10035	CQ11039
	75	240	CR10036	CR11040	CQ10036	CQ11040
DOUBLE PUMPS (SECOND CARTIDGE)						
2520V 3520V 4520V V*43 V*63 V*73	2	8	CR20020	CR21026	CQ20020	CQ21026
	5	18	CR20021	CR21027	CQ20021	CQ21027
	8	27	CR20022	CR21028	CQ20022	CQ21028
	9	29	CR20026	CR21032	CQ20026	CQ21032
	11	36	CR20023	CR21029	CQ20023	CQ21029
	12	39	CR20024	CR21030	CQ20024	CQ21030
	14	46	CR20025	CR21031	CQ20025	CQ21031
3525V 4525V V*64 V*74	8	26	CR20015	CR21019	CQ20015	CQ21019
	12	40	CR20010	CR21014	CQ20010	CQ21014
	14	45	CR20011	CR21015	CQ20011	CQ21015
	17	55	CR20012	CR21016	CQ20012	CQ21016
	19	60	CR20014	CR21018	CQ20014	CQ21018
	21	67	CR20013	CR21017	CQ20013	CQ21017
	24	80	CR20017	CR21021	CQ20017	CQ21021
27	88	CR20016	CR21020	Not mounted in VQ model		
4535V V*76	21	66	CR20004	CR21008	CQ20004	CQ21008
	25	81	CR20000	CR21004	CQ20000	CQ21004
	30	97	CR20001	CR21005	CQ20001	CQ21005
	35	112	CR20002	CR21006	CQ20002	CQ21006
	38	121	CR20003	CR21007	CQ20003	CQ21007
45	142	CR20005	CR21009	CQ20005	CQ21009	

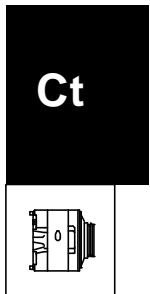
INDUSTRIALAPPLICATIONS

CR: NBR seal, 10 vanes

CS: NBR seal, 12 vanes

CV: VITON seal, 12 vanes

SINGLE PUMPS TRHU DRIVE SINGLE PUMPS DOUBLE PUMPS (FIRST CARTRIDGE)				
PUMPTYPE	FLOW		ROTATION	
	gal/min. (1200 rpm)	l/min. (1000 rpm)	RIGHT	LEFT
25V VS4T 2520VS VS43	8	26	CS10008	CS11008
	12	40	CS10012	CS11012
	14	45	CS10014	CS11014
	17	55	CS10017	CS11017
	19	60	CS10019	CS11019
	21	67	CS10021	CS11021
	24	80	CS10024	CS11024
	27	88	CS10027	CS11027
35V VS35 VS6T 35**VS VS6*	21	66	CS30021	CS31021
	25	81	CS10025	CS11025
	30	97	CS10030	CS11030
	35	112	CS10035	CS11035
	38	121	CS10038	CS11038
	45	142	CS10045	CS11045
45V VS45 VS7T 45**VS VS7*	42	138	CS10042	CS11042
	47	148	CS10047	CS11047
	50	162	CS10050	CS11050
	57	180	CS10057	CS11057
	60	193	CS10060	CS11060
	67	214	CS10067	CS11067
	75	240	CS10075	CS11075
DOUBLE PUMPS (SECOND CARTIDGE)				
**20VS VS*3	2	8	CR20020	CR21026
	5	18	CR20021	CR21027
	8	27	CR20022	CR21028
	9	29	CR20026	CR21032
	11	36	CR20023	CR21029
	12	39	CR20024	CR21030
	14	46	CR20025	CR21031
3525VS 4525VS VS64 VS74	8	26	CS40008	CS41008
	12	40	CS40012	CS41012
	14	45	CS40014	CS41014
	17	55	CS20017	CS21017
	19	60	CS20019	CS21019
	21	67	CS20021	CS21021
	24	80	CS20024	CS21024
27	88	CS20027	CS21027	
4535VS VS76	21	66	CS40021	CS41021
	25	81	CS20025	CS21025
	30	97	CS20030	CS21030
	35	112	CS20035	CS21035
	38	121	CS20038	CS21038
	45	142	CS20045	CS21045





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*INSTRUCTIONS FOR USE AND REPAIRS*

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- Cartridge identification, change of rotation, standards for repairs.

Due to the difficulty in finding out spare cartridge references, either for the loss of the pump feature plate, or for the lack of the machine spare part catalogue, it is most convenient to include some sheets to identify the sample accurately and to give some advice for a correct assembly.

To identify properly cartridge and pump, use the 3 following pages as follows:

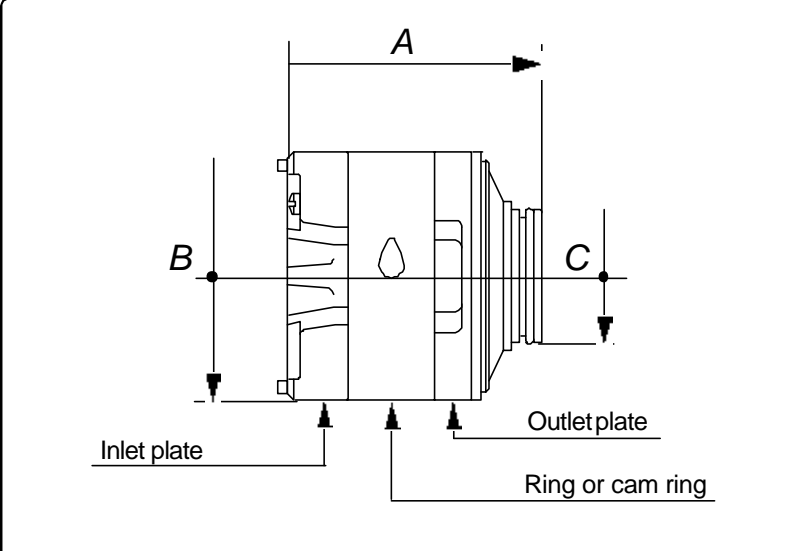
**- DIMENSIONS AND FLOW**

Find out pump type and flow in the dimensions chart, look at the figure engraved on the ring as shown (gallons/min. at 1200 rpm).

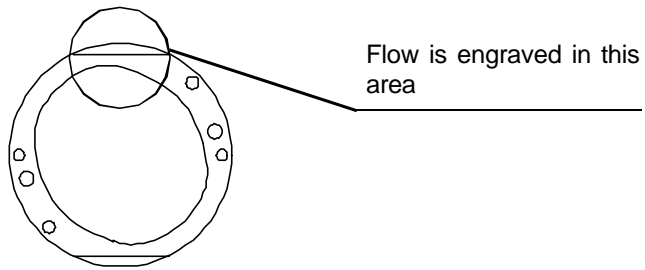
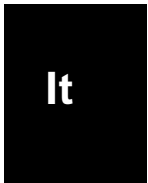
**- SUPPORT BUSHING AND SHAFT ROTATION**

Locate support bushing to know whether the cartridge belongs to a single or double pump. On this page there are also some clues to identify shaft rotation.

**DIMENSIONS AND FLOW**



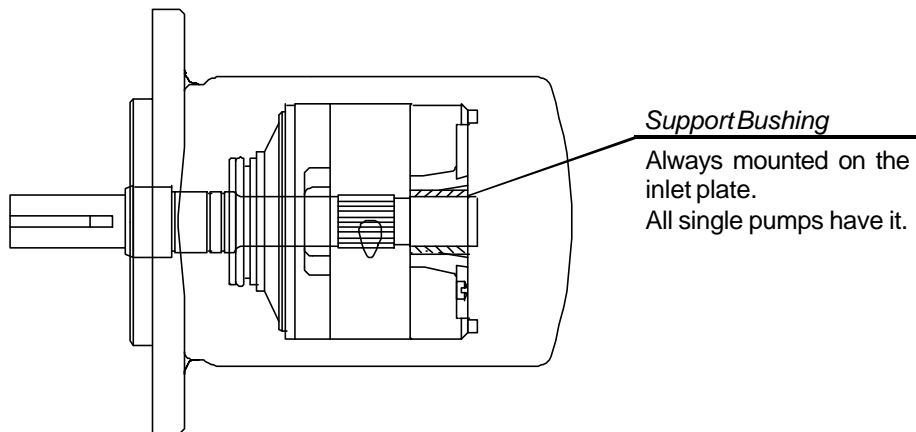
DIMENSIONS in mm.	PUMP TYPE				
	20V	25V	30V	35V	45V
<b>A</b>	81,8	99,5	110,5	118,4	140,5
<b>B</b>	82,6	96,8	96,8	114,25	133,3
<b>C</b>	47,15	52,15	52,15	72,15	80,15
<b>WEIGHT</b> aprox. in Kg.	2,300	3,800	4,100	6,400	10,200
<b>FLOW</b> in Gal. at 1.200 rpm	2	8	24	21	42
	5	12	28	25	47
	8	14		30	50
	9	17		35	57
	11	19		38	60
	12	21		45	67
	14	24			75
	14	27			

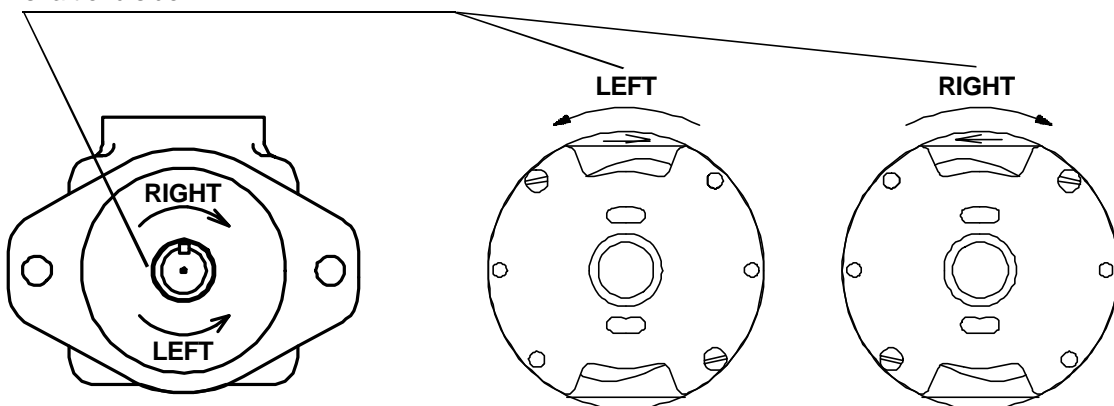
## PUMP ROTATION

To determine pump rotation look at it from the shaft end side. If clockwise it is right hand rotation, on the contrary, it is left hand rotation.

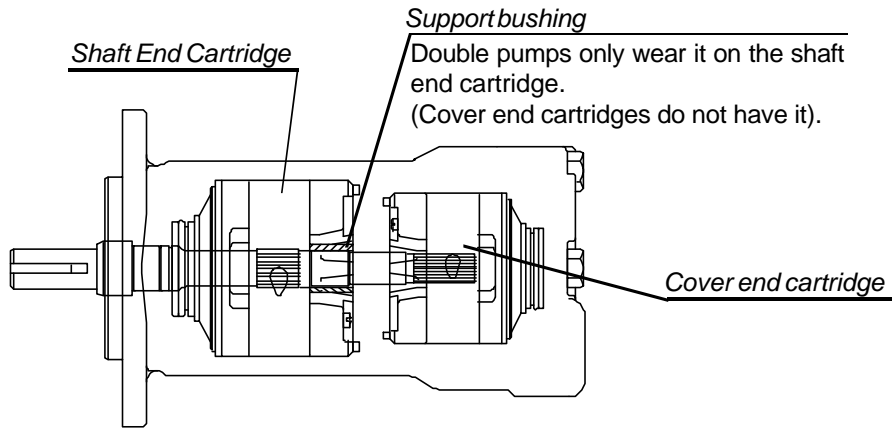
When taking out cartridge and putting it on to the outlet plate take into account that rotation is seen the other way round; anyway, an arrow engraved in the ring or cam ring shows the real turning sense. (See pictures.)



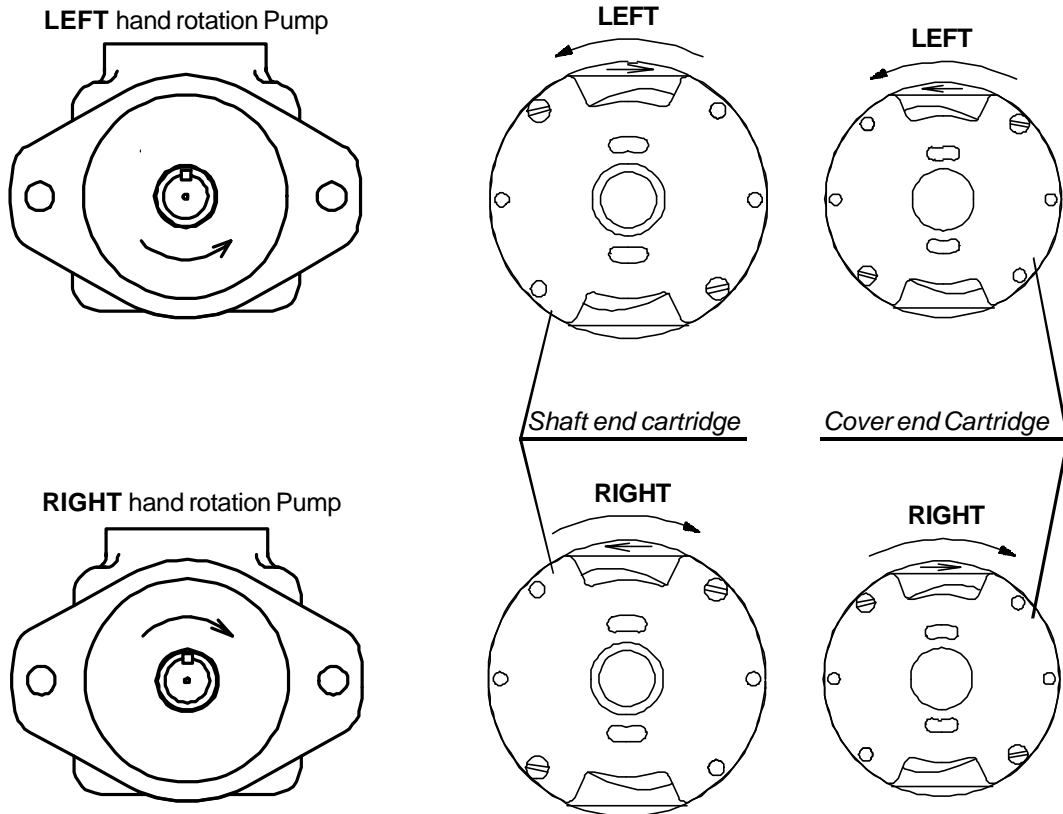
Pump rotation is viewed from the shaft end side.



**PUMP ROTATION**



Double pump special feature is that their 2 cartridges are opposite each other, therefore when putting them on the outlet plate, they will apparently have opposite turning sense. Anyway, the arrow in the ring shows the correct rotation. (Pump and cover end cartridge rotation always coincide.)



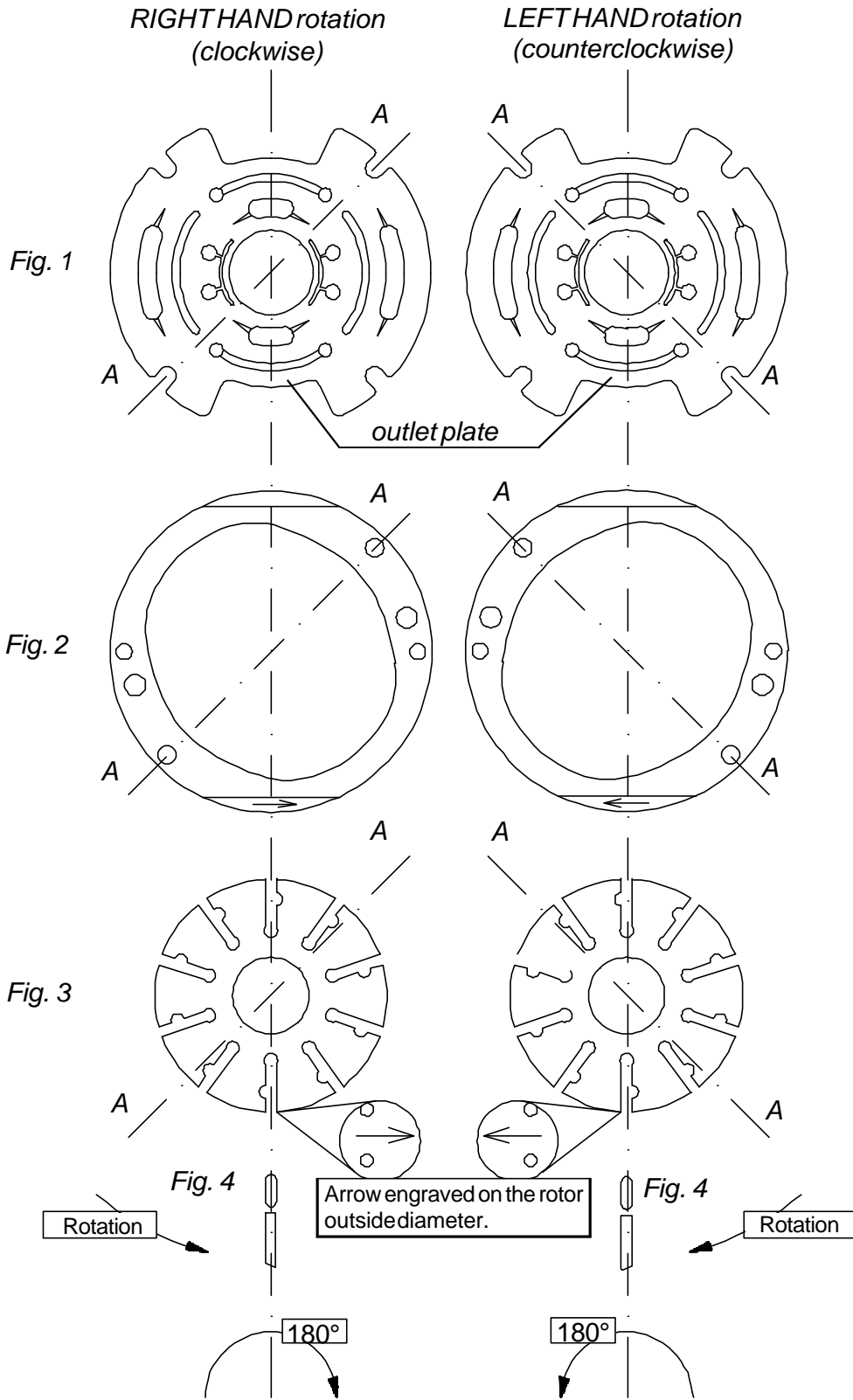
Since this is a high precision kit (mechanized in tolerances within thousandth of millimeter), any abrasive impurity can damage it in a few minutes or damage it to shorten its performance, before disassembling it is necessary that working place, tools and worker hands are completely clean and neat.

Please avoid any blow, however insignificant, taking special care with all edge sides, ring seat points and inlet and outlet plates.

All these preventive measures taken, proceed as follows:

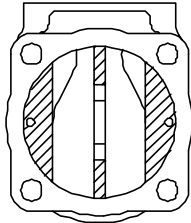
- 1° Lean the cartridge, holding it tightly, at the work bench on the outlet plate. Loosen the 2 screws which fix the kit, take them out as well as the pins (if there are any). Take out inlet plate shifting it laterally, as due to the protective oil it may be gummed up. Place it at the bench on a clean paper, white preferably.
- 2° Do the same with vanes, rotor and ring.  
Place the rotor, once disassembled, onto the outlet plate with arrow showing the required turning sense (see detail in the circle, fig. 3), afterwards, put inserts into vanes (fig. 4), and finally, introduce them in the slots, well at the bottom, with vane closing edge in forward rotation, as arrow shows in the corresponding picture.
- 3° Be sure there is no small dirty particles on the leaning surface, put ring on to the outlet plate, placing it in the required turning sense. Make chamfer edges coincide, in which flow and arrow are engraved, with inlet or admission port.
- 4° Set inlet plate, pins and the 2 screws as shown in the pictures, taking into account that the lattes must be in opposite position to the ones they had before disassembling. (To do so, just turn ring, rotor and vanes 180°). Fasten the screws moderately and dip the whole cartridge kit into clean hydraulic oil for a while. After these steps it is ready to be assembled.

Please pay good attention to the cartridge and pump rotation, as they do not always coincide. Be very careful to identify them properly. (See previous pages.)



## CARTRIDGE REPLACEMENT

To successfully replace cartridge, be sure to follow these warnings:



1° - Check if due to use there is tread on the cartridge seat zone (dark area in the picture).

If so, deepness must not be higher than 0,01 mm. (This could be observed even with a fingernail), being most convenient in such cases grinding or changing the pump body with this fault, as otherwise noise and performance values will not be the right ones. (In case you can not grind the seat, TDZ has -available for sale- a simple machine specially designed for this purpose).

2° - Look at the cartridge to be replaced, if wear is normal just change oil in tank circuit and change or clean filters.

3° - Should the used cartridge shows seizure in rotor, outlet & inlet plates, disassemble the pump completely. Check that the key is in good condition (it could be cut out). Then, put the shaft between points to make sure it is not twisted or crooked. Change it in case of any fault.

Take all the oil out of the circuit and other parts. Clean the tank carefully. If there is available any used cartridge mount it and start the machine for at least 15 minutes, driving all controls. To do so, spend the least possible amount of oil, since it will have to be replaced after this operation, although it could be reused again, after being filtrated in a filter no bigger than 5 microns, as it still keeps additives).

Replace or clean all filters, mount the new cartridge and fill the tank to the level with new oil.

## CARTRIDGE REPAIRS MINIMAL CLEARANCE BETWEEN CAM RING AND ROTOR

MODEL	Inches	Millimetres
20V	0.0007	0,018
25V	0.0012	0,030
30V	0.0014	0,035
35V	0.0015	0,038
45V	0.0016	0,040

\* Vane length must be from 0,005 to 0,010 mm. (0,0002 to 0,0004 inches) less than rotor thickness.

**To rebuild cartridges it is necessary to use grinding & lapping machines, as well as measurement tools able to work in microns.**

**TIGHTEN TORQUE FOR PUMP SCREWS**

	Reference	Tighten torque in Kp.m.	
	<b>SINGLE PUMPS</b>	20V	6,5
25V		10,5	
35V		22,5	
45V		35	
<b>DOUBLE PUMPS</b>		Inletbody	Cover
	25-20V	10,5	6,5
	35-20V	22,5	6,5
	35-25V	22,5	10,5
	45-20V	35	6,5
	45-25V	35	10,5
	45-35V	35	
<p>Rear flange mountings of the V**T* thru drive pumps.</p> <p>Tighten torque for pump screws: 6,5 Kp.m.</p>			
<p><i>Tighten the screws, with a torque no bigger than 0,5 to 1 Kp.m before beginning the last or final tighten.</i></p> <p><i>Follow the order shown in the picture.</i></p>		