



# PISTON PUMP

## TPV Series 1 & Series 2

### Variable Displacement Pump



#### Open Circuit

Size 18...140

**Series 1**  
Nominal Pressure 280 BAR  
Peak pressure 350 BAR

**Series 2**  
Nominal pressure 250 bar  
Peak pressure 315 bar

#### Features

- Variable displacement axial piston pump of swashplate design
- Flow is proportional to drive speed and displacement.
- SAE mounting flange & shaft
- Flange connections to SAE
- 2 case drain ports
- Good suction characteristics
- Permissible continuous pressure 280 BAR
- Low noise level
- Long service life
- Axial and radial loading of drive shaft possible
- High power-weight ratio
- Wide range of controls
- Short response times
- Through drive option for { | } & { | }

Phone: 07 3889 4591  
Fax: 07 3889 5921  
[www.tidalfuidpower.com.au](http://www.tidalfuidpower.com.au)  
[sales@tidalfuidpower.com.au](mailto:sales@tidalfuidpower.com.au)



# Model Code

# SAE mounting flange

TPV - 1 - 071 - PF1 - S 14 - R - TD - B - 62 - 13										
Description	Series	Displacement in cc/rev	Control Device	Shaft Type	No of Spline Teeth	Shaft Rotation	End Cover	Mounting Flange	Service Line Connection	Through Drive spline coupling No of teeth
<b>T</b> (Tidal)	<b>1</b> 280 Bar Continious. 350 Bar peak	<b>018</b> (SAE A 2 Bolt Mount)	<b>P</b> Pressure Control	<b>S</b> Spline	<b>9</b> (5/8" Dia) <b>11</b> (3/4" Dia)	<b>Viewed</b> From Shaft End	<b>N</b> No Through Drive	<b>61</b> End Ports Flanged	<b>62</b> Side Ports Flanged	<b>N/A</b>
		<b>028</b> (SAE B 2 Bolt Mount)	<b>PRG</b> Remote Pressure Control	<b>U</b> Spline	<b>13</b> (7/8" Dia)					
		<b>045</b> (SAE B 2 Bolt Mount)	<b>PF</b> Pressure & Flow Control	<b>R</b> Spline	<b>13</b> (7/8" Dia) <b>15</b> (1" Dia)					
		<b>063</b> (SAE B 2 Bolt Mount)	<b>PF1</b> Pressure & Flow Control (Orifice Plugged)	<b>K</b> Key	<b>15</b> (1" Dia)					
		<b>071</b> (SAE C 2 Bolt Mount)	<b>PFLR</b> Pressure, Flow & Torque Control (HP Control)		<b>14</b> (1 1/4" Dia)		<b>TD</b> Through Drive	<b>A</b> (3 1/4")	<b>9</b> (5/8" Dia) <b>11</b> (3/4" Dia) <b>13</b> (7/8" Dia) <b>15</b> (1" Dia) <b>14</b> (1 1/4" Dia) <b>17</b> (1 1/2" Dia) <b>13</b> (1 3/4" Dia)	<b>N/A</b>
		<b>100</b> (SAE C 2 Bolt Mount)			<b>14</b> (1 1/4" Dia) <b>17</b> (1 1/2" Dia)			<b>B</b> (4")		
		<b>140</b> (SAE D 4 Bolt Mount)	<b>FD</b> Fixed Displacement (No Control)		<b>13</b> (1 3/4" Dia)			<b>C</b> (5")		
								<b>D</b> (6")		

Size	18	28	45	63	71	100	140
Parrallel with keys	K	3/4"	7/8"	1"	1"	1 1/4"	1 1/2"
Spline shaft SAE (non through drive)	U	9T (5/8")		13T (7/8")			14T (1 1/4")
Spline shaft SAE (non through drive)	S	11T (3/4")	13T (7/8")	15T (1")	14T (1 1/4")	14T (1 1/4")	17T (1 1/2")
Spline shaft SAE (through drive)	S		13T (7/8")	15T (1")	14T (1 1/4")	14T (1 1/4")	17T (1 1/2")
Spline shaft SAE (through drive)(High Torque)	R*		13T (7/8")	15T (1")		14T (1 1/4")	17T (1 1/2")

R\* Non Standard

## End Cover (Series 1 unless noted)

Size	18	28	45	63	71	100	140
Without through drive	N61				*		*
	N62	*	*	* Series 1	* Series 2	*	*
	N64			* Series 2			
With through drive mounting							
SAE A Spline shaft 5/8" (15.875)	TD-A	-	9	9	-	9	9
SAE A-B Spline shaft 3/4" (19.05)	TD-A	-	11	11	-	11	11
SAE B Spline shaft 7/8" (22.22)	TD-B	-		13	-	13	13
SAE B-B Spline shaft 1" (25.4)	TD-B	-		15	-	15	15
SAE C Spline shaft 1 1/4" (31.8)	TD-C	-			-	14	14
SAE C-C Spline shaft 1 1/2" (38.1)	TD-C	-			-		17
SAE D Spline shaft 1 3/4" (44.4)	TD-D	-			-		13

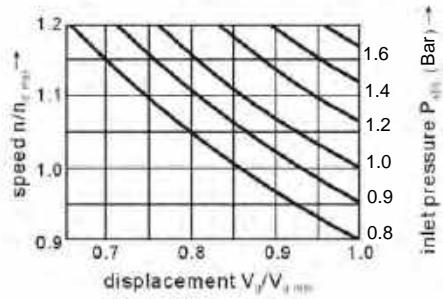
## Technical Data

### Operating pressure range-inlet

Absolute pressure at port S

$P_{S\text{ min}}$  \_\_\_\_\_ 0.8 Bar  
 $P_{S\text{ max}}$  \_\_\_\_\_ 30 Bar

Determination of inlet pressure  $P_{\text{abs}}$  at suction port S or reduction of displacement for increasing speed.



### Operating pressure range-outlet

Pressure at port B  
Nominal pressure  $P_N$  \_\_\_\_\_ 280 Bar  
Peak pressure  $P_{\text{max}}$  \_\_\_\_\_ 350 bar

(Pressure data to DIN 24312)

Applications with intermittent operating pressures up to 315 Bar at 10% duty are permissible.  
Limitation of pump output pressure spikes is possible with relief valve blocks mounted directly on flange connection.

### Case drain pressure

Maximum permissible pressure of leakage fluid (at port L,L<sub>1</sub>):  
Maximum 0.5 Bar higher than the inlet pressure at port S,  
but no higher than 2 Bar absolute.

### Direction of through flow

S to P

### Table of values (theoretical values without taking into account $\eta_{\text{me}}$ and $\eta_{\text{hy}}$ ; values rounded off)

Size		18	28	45	63	71	100	140
Displacement	( $V_g$ max) cc/rev	18	28	45	63	71	100	140
Max. speed <sup>1)</sup>	at $V_{g\text{ max}}$ (No max) rpm	3000	3000	2600	2600	2200	2000	1800
Max. permitted speed (limit speed)	(No max) with increased input pressure $P_{\text{in}}$ bzw. $V_g < V_{g\text{ max}}$ rpm	3600	3600	3100	3140	2600	2400	2100
Max. flow	at $n_{\text{max}}$ (Q vo max) L/min	54	84	117	163	156	200	252
	at $n_e = 1500$ min <sup>-1</sup> L/min	27	42	68	95	107	150	210
Max. power	at $n_{\text{max}}$ ( $P_0$ max) kW	25	39	55	##	73	93	118
( $\Delta P = 280$ Bar)	at $n_e = 1500$ min <sup>-1</sup> kW	13	20	32	##	50	70	98
Max. torque ( $\Delta P = 280$ Bar)	at $V_{g\text{ max}}$ (T max) Nm	80	125	200	##	316	445	623
Torque ( $\Delta P = 100$ Bar)	at $V_{g\text{ max}}$ (T) Nm	29	45	72	100	113	159	223
Moment of inertia about drive axis (J)	Kgm <sup>2</sup>	0.0011	0.0017	0.0033	0.0056	0.0083	0.0167	0.0242
Case volume	L	0.7	0.7	1.0	0.8	1.6	2.2	3.0
Weight (without fluid)	Kg	15	15	12	22	33	45	60
Maximum axial force of drive shaft $F_{af\text{ max}}$	N	1000	1000	1500	1760	2400	4000	4800
Max. permissible radial force <sup>2)</sup> $F_{g\text{ max}}$	N	770	1200	1500	2000	1900	2300	2800

1) These values are valid for an absolute pressure of 1 Bar at the suction port S. By reducing the displacement or increasing the input pressure the speed can be increased as shown in the diagram.

2) Please consult us for higher radial forces.

### Determination of displacement

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

$$\text{Torque } T = \frac{1.59 \cdot V_g \cdot \Delta P}{100 \cdot \eta_{\text{me}}} = \frac{V_g \cdot \Delta P}{20 \cdot \pi \cdot \eta_{\text{me}}} \quad [\text{Nm}]$$

$$\text{Power } P = \frac{T \cdot n}{9549} = \frac{2\pi \cdot T \cdot n}{60000} = \frac{q_v \cdot \Delta P}{600 \cdot \eta_i} \quad [\text{kW}]$$

$V_g$  = displacement (cc) per revolution

$\Delta P$  = pressure differential (Bar)

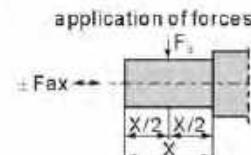
$n$  = speed (rpm)

$\eta_v$  = volumetric efficiency

$\eta_{\text{me}}$  = mechanical-hydraulic efficiency

$\eta_i$  = overall efficiency ( $\eta_i = \eta_v \cdot \eta_{\text{me}}$ )

$q_v$  = L/min



## Fluid, Mechanical Displacement Limiter

### • Hydraulic fluid

The TPV variable displacement pump is suitable for use with mineral oil.

### • Operating viscosity range

In order to obtain optimum efficiency and service life we recommend that the operating viscosity (at operating temperature) be selected from within the range

$$v_{opt} = \text{operating viscosity } 16 \dots 36 \text{ mm}^2/\text{s}$$

Referred to the reservoir temperature (open circuit).

### • Viscosity limits

The limiting values for viscosity are as follows:

$$v_{min} = 10 \text{ mm}^2/\text{s}$$

short term at a max. permissible case temp. of 90°C.

$$v_{max} = 1000 \text{ mm}^2/\text{s}$$

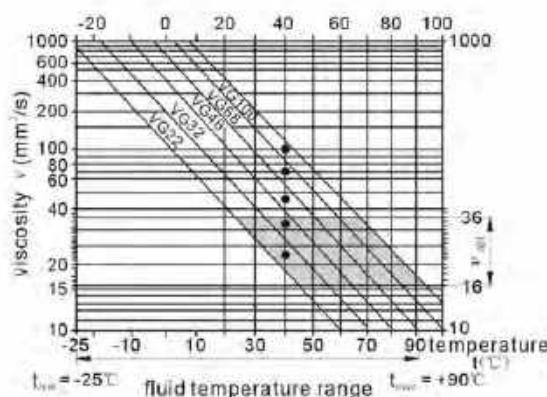
short term on cold start

### • Temperature range (see selection diagram)

$$t_{min} = -25^\circ\text{C}$$

$$t_{max} = +90^\circ\text{C}$$

### • Selection diagram



### • Notes on the selection of the hydraulic fluid

In order to select the correct fluid, it is necessary to know the operating temperature in the tank (open loop) in relation to the ambient temperature.

The hydraulic fluid should be selected so that within the operating temperature range, the operating viscosity lies within the optimum range ( $v_{opt}$ ) (see shaded section of the selection diagram). We recommend that the higher viscosity range should be chosen in each case.

Example: At an ambient temperature of  $x^\circ\text{C}$  the operating temperature is  $60^\circ\text{C}$ . Within the operating viscosity range ( $v_{opt}$ ; shaded area), this corresponds to viscosity ranges VG46 or VG68; VG68 should be selected.

Important: The leakage oil (case drain oil) temperature is influenced by pressure and pump speed and is always higher than the tank temperature. However, at one point in the circuit may the temperature exceed 90°C.

If it is not possible to comply with the above conditions because of extreme operating parameters or high ambient temperatures please consult us.

### • Filtration

The finer the filtration the better the cleanliness of the pressure fluid and the longer the life of the axial piston unit. To ensure the functioning of the axial piston unit a minimum cleanliness level of:

9 to NAS 1638

18/15 to ISO/DIS 4406 is necessary

If above mentioned grades cannot be maintained please consult supplier.

### • Mechanical displacement limiter

Mechanical displacement limiter is possible on the non-rough-drive model, N62 but not for other codes

N61 and N64

$V_{gmax}$ : for sizes 18 to 140  
setting range  $V_{gmax}$  to 50%  $V_{gmax}$  stepless

$V_{gmin}$ : for sizes 100 and 140  
setting range  $V_{gmin}$  to 50%  $V_{gmin}$  stepless

## Installation Notes

Optional installation position. The pump housing must be filled with fluid during commissioning and remain full when operating. In order to attain the lowest noise level, all connections (suction, pressure, case drain ports) must be linked by flexible couplings to tank.

Avoid placing a check valve in the case drain line. This may, however, be permissible in individual cases, after consultation with us.

### 1. Vertical installation (shaft end upwards)

The following installation conditions must be taken into account:

#### 1.1. Arrangement in the reservoir

Before installation fill pump housing, keeping it in a horizontal position.

- a) If the minimum fluid level is equal to or above the pump mounting face close port "L<sub>1</sub>" plugged, leave ports "L" and "S" open; L piped and recommendation S piped (see Fig. 1).
- b) If the minimum fluid level is below the pump mounting face pipe port "L<sub>1</sub>" and "S" according to Fig. 2. Close port "L<sub>1</sub>" with respect taking into consideration conditions in 1.2.1.

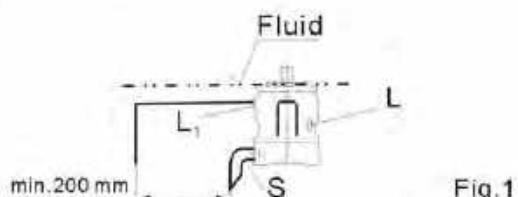


Fig. 1

#### 1.2. Arrangement outside the reservoir

Before installation fill the pump housing, keeping it in a horizontal position. For mounting above reservoir see Fig. 2.

##### Limiting condition:

- 1.2.1. Minimum pump inlet pressure  $P_{\text{abs min}} = 0.8 \text{ Bar}$   
Under both static and dynamic conditions.

Note: Avoid mounting above reservoir wherever possible in order to achieve a low noise level.

The permissible suction height  $h$  comes from the overall pressure loss, but may not be bigger than  $h_{\text{max}} = 800 \text{ mm}$  (immersion depth  $h_{\text{min}} = 200 \text{ mm}$ ).

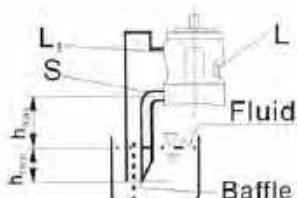


Fig. 2

$$\text{Overall pressure loss } \Delta P_{\text{tot}} = \Delta P_1 + \Delta P_2 + \Delta P_3 \leq (1 - P_{\text{abs min}}) = 0.2 \text{ Bar}$$

$\Delta P_1$ : Pressure loss in pipe due to accelerating column of fluid

$$\Delta P_1 = \frac{\rho \cdot l \cdot dv}{dt} = 10.5 \text{ (Bar)}$$

$$\rho = \text{density}(\text{kg/m}^3)$$

$$l = \text{pipe length (m)}$$

$$dv/dt = \text{rate of change in fluid velocity}(\text{m/s})$$

$\Delta P_2$ : Pressure loss due to static head

$$\Delta P_2 = h \cdot \rho \cdot g = 10.5 \text{ (Bar)}$$

$\Delta P_3$ : Line losses (elbows etc.)

$$\rho = \text{density}(\text{kg/m}^3)$$

$$g = \text{gravity} = 9.81 \text{ m/s}^2$$

## 2. Horizontal installation

The pump must be installed so that "L" or "L<sub>1</sub>" is at the top.

### 2.1. Arrangement in the reservoir

a) If the minimum fluid level is above the top of the pump, port "L<sub>1</sub>" closed; "L" and "S" should remain open, L piped and recommendation S piped (see Fig. 3)

b) If the minimum fluid level is equal to or below the top of the pump, pipe ports "L" and possibly "S" as Fig. 4; close port "L<sub>1</sub>".

The conditions according to item 1.2.1.

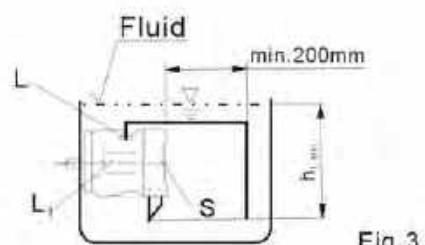


Fig. 3

### 2.2. Installation outside the reservoir

Fill the pump housing before commissioning. Pipe ports "S" and the higher port "L" or "L<sub>1</sub>".

- a) When mounting above the reservoir, see fig. 4. Conditions according to 1.2.1.

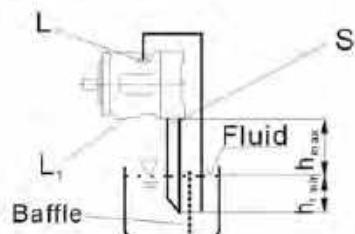


Fig. 4

- b) Mounting below the reservoir

Pipe ports "L<sub>1</sub>" and "S" according to Fig. 5, close port "L".

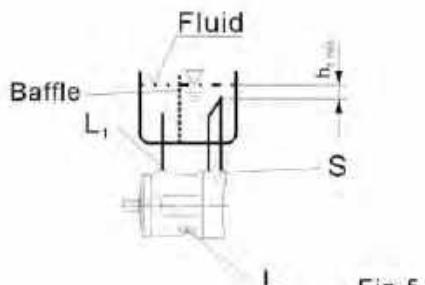
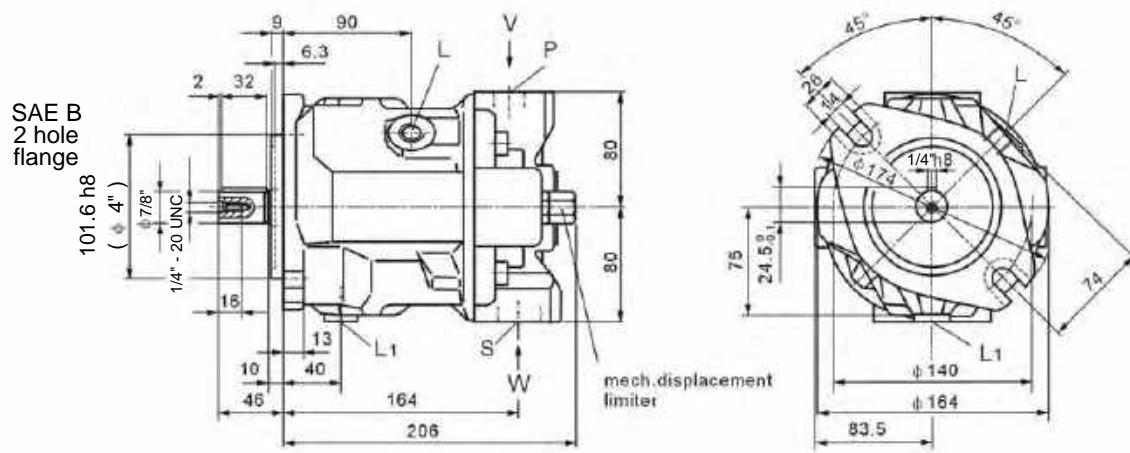


Fig. 5

## Installation Dimensions

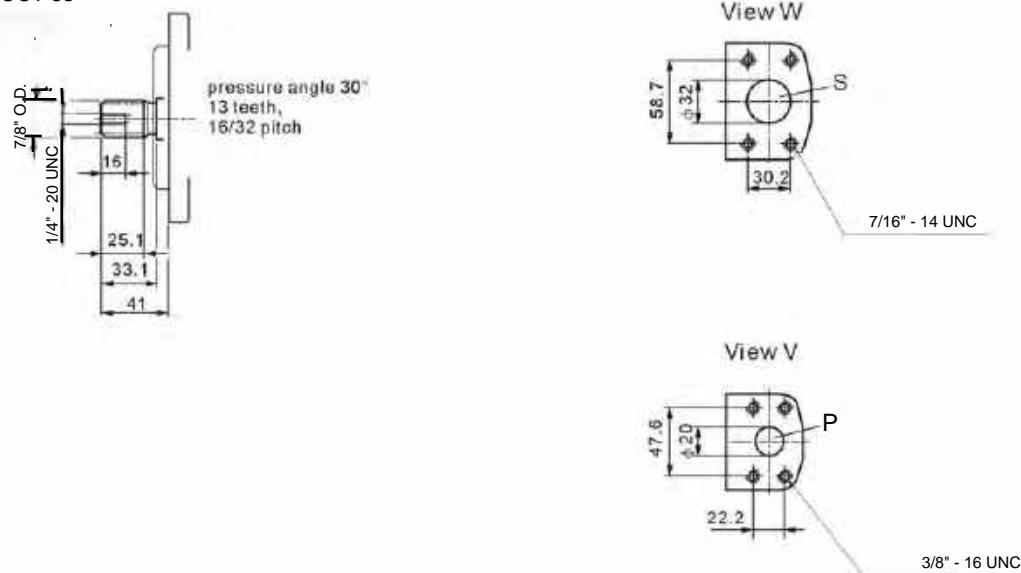
TPV-1-028-x x x - x x x - x - N62 ( without control valves )

Shaft K  
SAE B



Shaft S13

Shaft 22.4 ; (SAE B)  
SAE J744 OCT 83

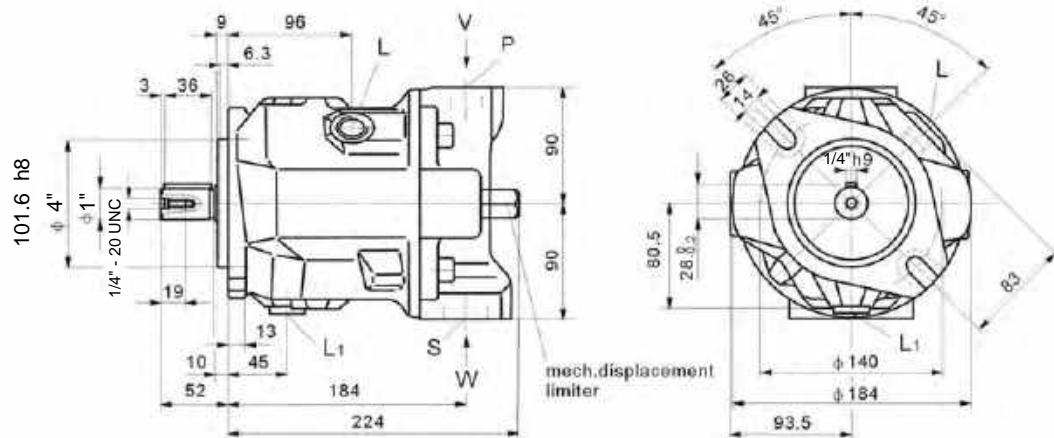


P	Pressure port	SAE 3/4" (Standard pressure range)
S	Suction port	SAE 11/4" (Standard pressure range)
L/L <sub>1</sub>	Case drain ports	3/4" - 16 UNO (L <sub>1</sub> plugged at factory)

## Installation Dimensions

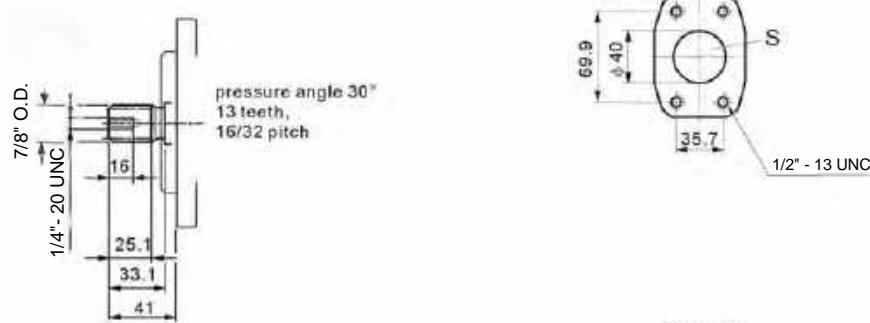
TPV-1-045-xxx - xxx - x - N62 ( without control valves )

Shaft K  
SAE B-B



Shaft S13

Shaft 22.4; SAE B  
SAE J744 OCT83



Shaft S15

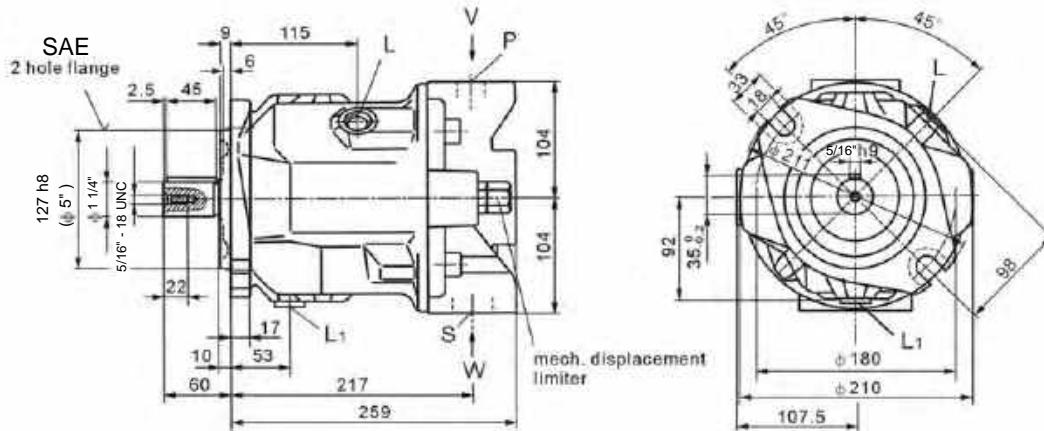
Shaft 25-4; (SAE B-B)  
SAE J744 OCT 83



## Installation Dimensions

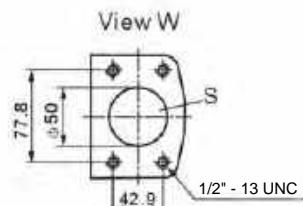
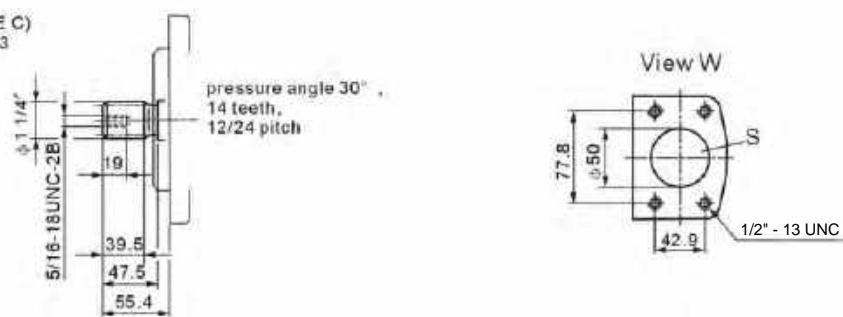
TPV-1-071-xxx - xxx - x - N62

SHAFT K  
SAE C

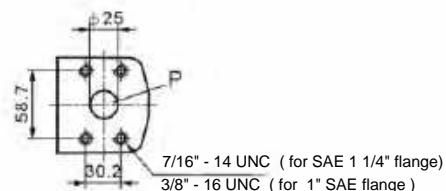


### Shaft S 14

Shaft 32-4; (SAE C)  
SAE J744 OCT 83



View V

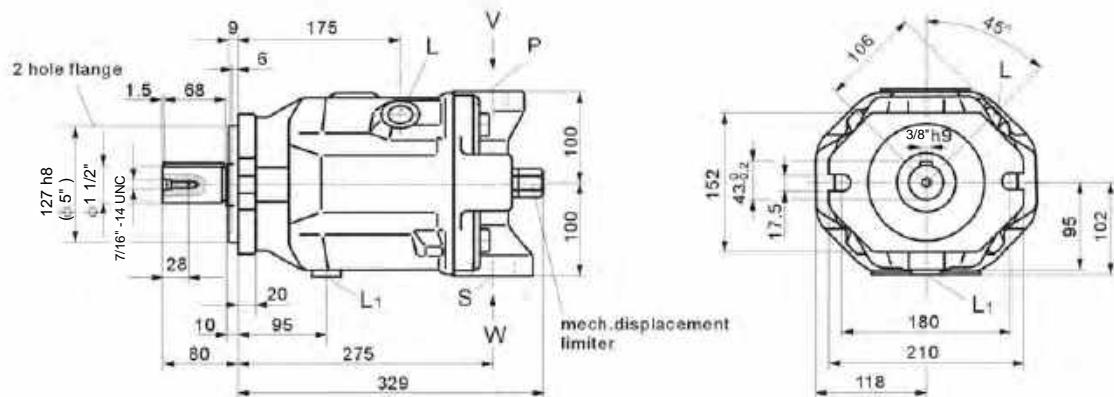


P	Pressure port	SAE 1"	(Standard pressure range)
S	Suction port	SAE 2"	(Standard pressure range)
L/L <sub>1</sub>	Case drain ports	7/8 - 14 UNO	(L <sub>1</sub> plugged at factory)

## Installation Dimensions

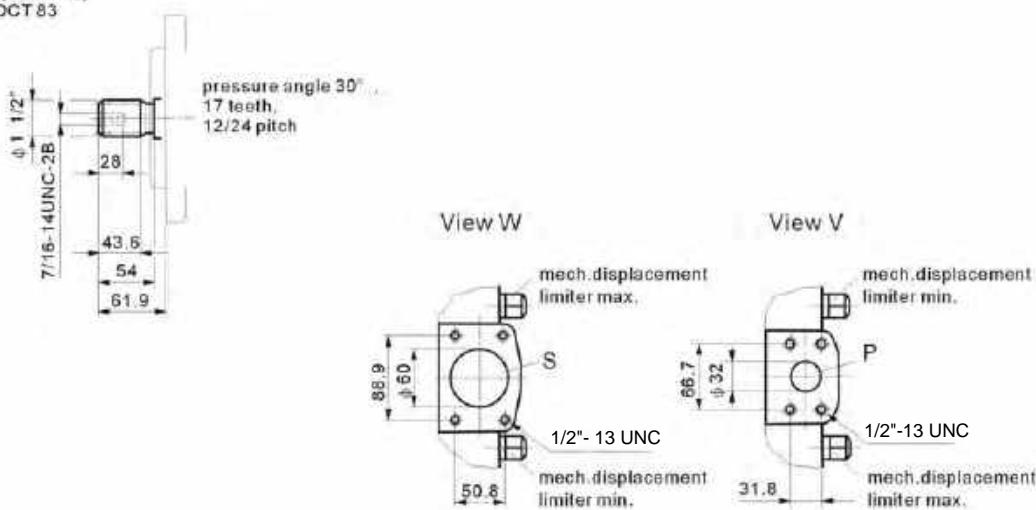
TPV-1-100-xxx - xxx - x - N62

### Shaft K SAE C-C



### Shaft S17

Shaft 38-4 (SAE C-C)  
SAE J744 OCT 83

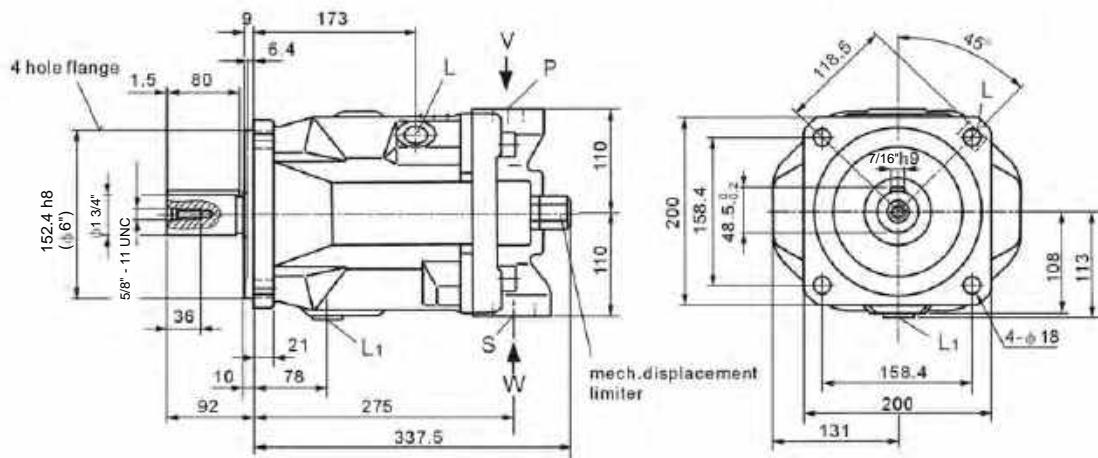


P	Pressure port	SAE 1 1/4"	(High pressure range)
S	Suction port	SAE 2 1/2"	(Standard pressure range)
L/L	Case drain ports	1 1/16" - 12 UNO	(L, plugged at factory)

## Installation Dimensions

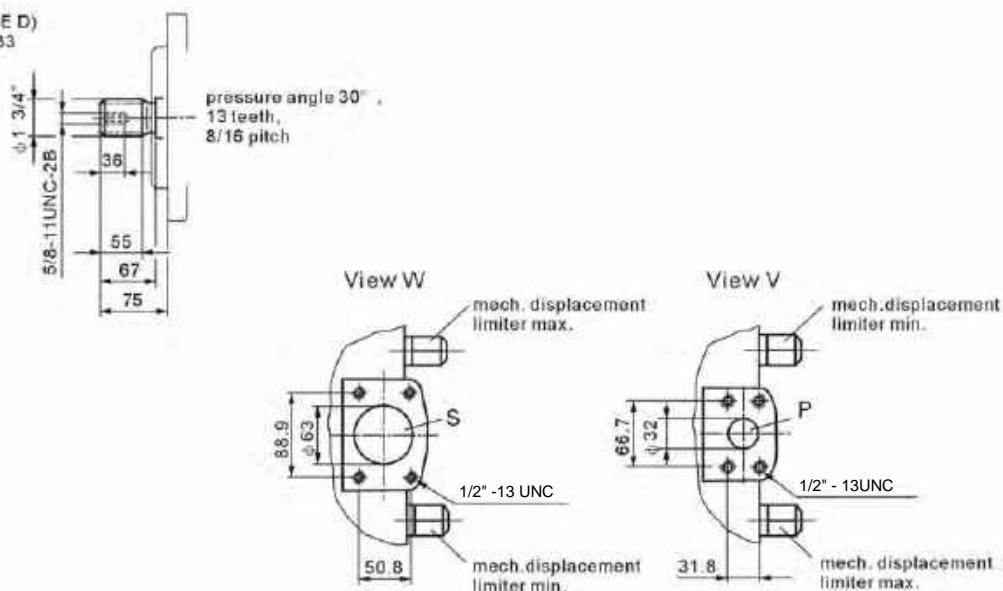
TPV-1-140-xxx - xxx - x - N62

Shaft K  
SAE D



Shaft S13

Shaft 44-4; (SAE D)  
SAE J744 OCT 83



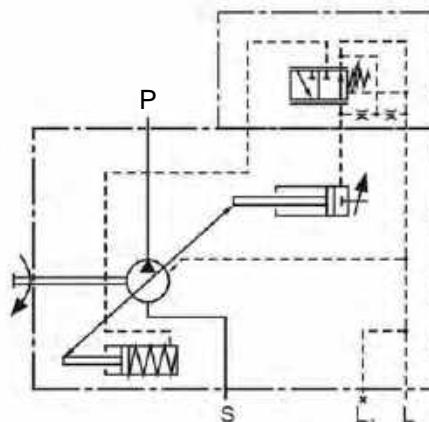
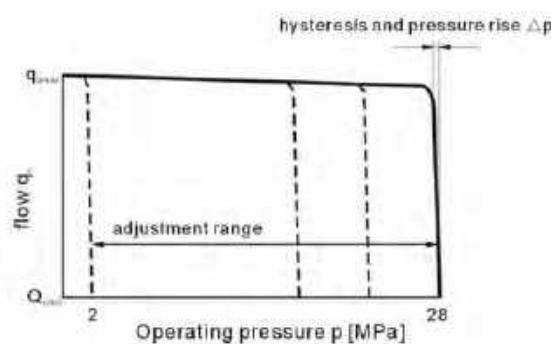
P	Pressure port	SAE 1 1/4"	(High pressure range)
S	Suction port	SAE 2 1/2"	(Standard pressure range)
L/L	Case drain port	1 1/16 -12 UNO	(L, plugged at factory)

## P Pressure Control

The pressure controller serves to maintain a constant pressure in a hydraulic system within the control range of the pump. The pump therefore supplies only the amount of hydraulic fluid required by the system. Pressure may be steplessly set at the control valves.

### Static operating curve

(at  $n = 1500 \text{ rpm}$ ;  $t_{\text{m}} = 50^\circ\text{C}$ )

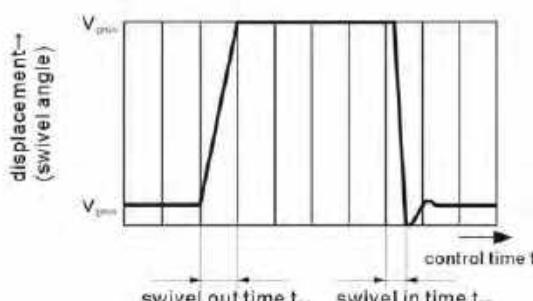
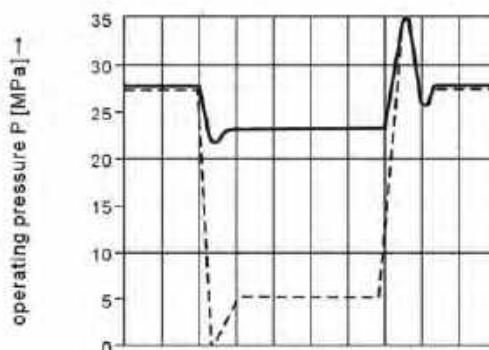


### Dynamic Operating Curves

The operating curves are mean values measured under test conditions with the unit mounted inside the tank.

Conditions:  $n = 1500 \text{ rpm}$   
 $t_{\text{m}} = 50^\circ\text{C}$   
Main relief set at 35 MPa

Load steps were obtained by suddenly opening and closing the pressure line with a pressure relief valve as load valve 1 m from the output flange of the pump.



### Ports

P	Pressure port
S	Suction port
L, L <sub>1</sub>	Case drain ports (L <sub>1</sub> plugged)

### Controller Data

Hysteresis and repetitive accuracy  $\Delta P$  \_\_\_\_\_ max. 0.3 MPa

Max. pressure rise

Size	28	45	71	100	140
$\Delta P$	MPa	0.4	0.6	0.8	1.0

Pilot oil requirement \_\_\_\_\_ Max. approx 3 L/min

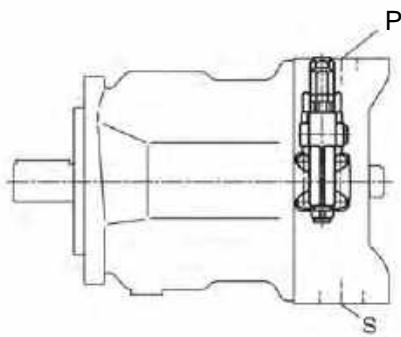
### Control Times

Size	$t_{\text{sw}}$ (ms) again 5 MPa	$t_{\text{sw}}$ (ms) again 22 MPa	$t_{\text{sw}}$ (ms) again 28 MPa
28	60	30	20
45	80	40	20
71	100	50	25
100	125	90	30
140	130	110	30

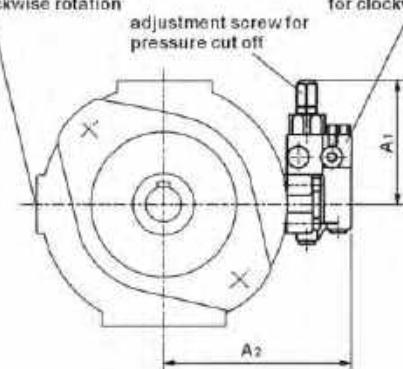
## Installation Dimensions

TPV - 1 - xx - P - xxx - x - N62

Sizes 28...100



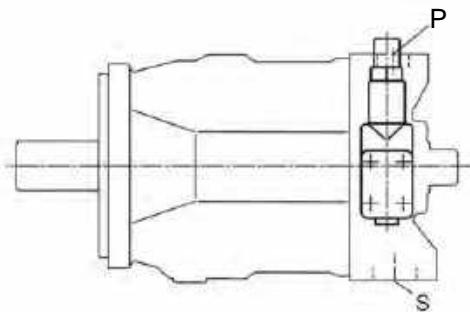
Control valve installed here  
for anti-clockwise rotation



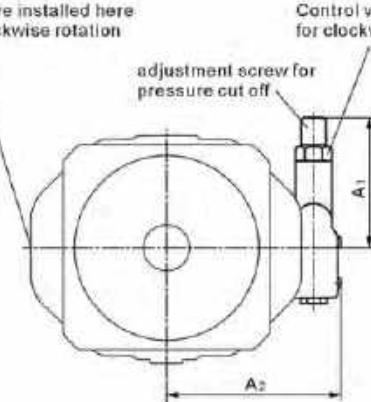
For pressure compensated control  
screw the standby adjustment  
all the way in and plug the port 'X'.

Control valve installed here  
for clockwise rotation

Size 140



Control valve installed here  
for anti-clockwise rotation



Control valve installed here  
for clockwise rotation

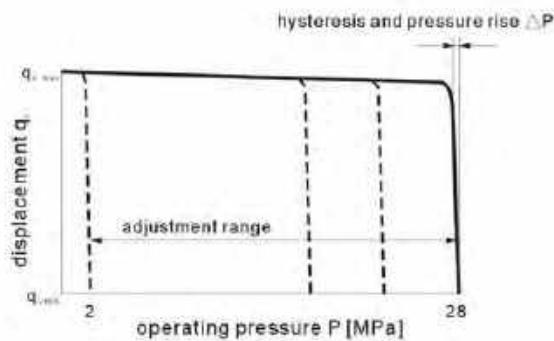
Size	A <sub>1</sub>	A <sub>2</sub>
28	109	136
45	106	146
71	106	160
100	106	165
140	127	169

## PRG Pressure Controller, Remote Control

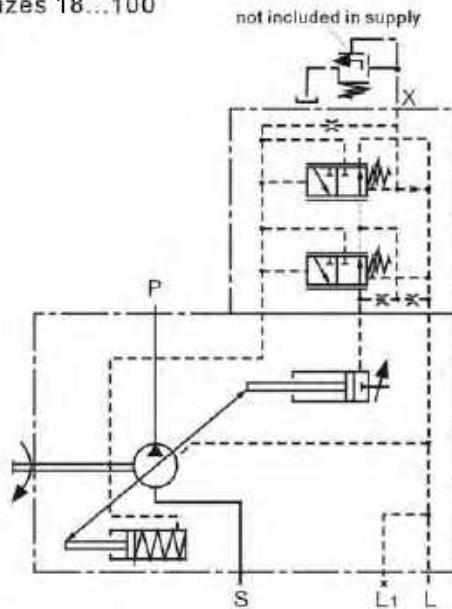
A pressure relief valve can be connected to port X for remote control applications; this is not included in the items supplied with the PRG control.

The standard pressure differential setting at the control valve is 2 MPa. A pilot oil flow of approx. 1.5 L/min is then used. If an other setting (range 1-2.2 MPa) is required please indicate in clear text.

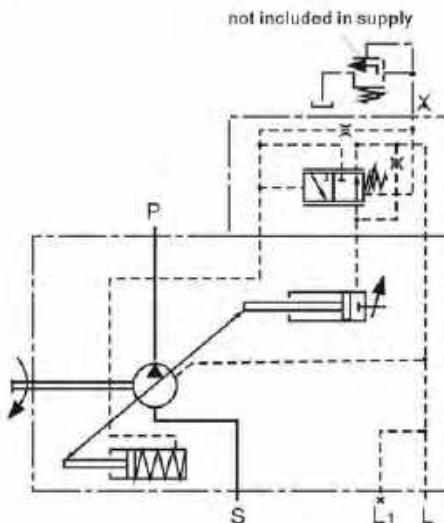
### • Static Operating Curve (at $n=1500$ rpm; $t_{\text{eff}}=50^\circ\text{C}$ )



Sizes 18...100



Size 140



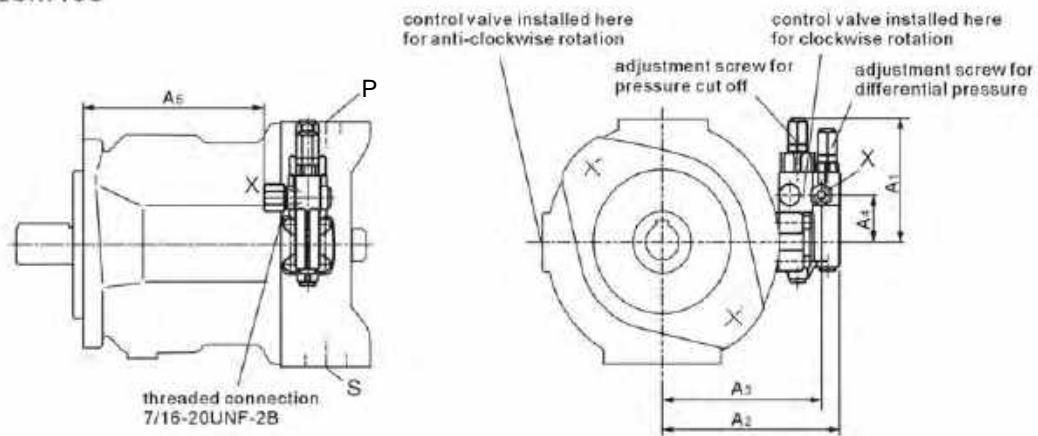
### Ports

P	Pressure port
S	Suction port
L, L <sub>1</sub>	Case drain ports (L <sub>1</sub> plugged)
X	Pilot pressure port

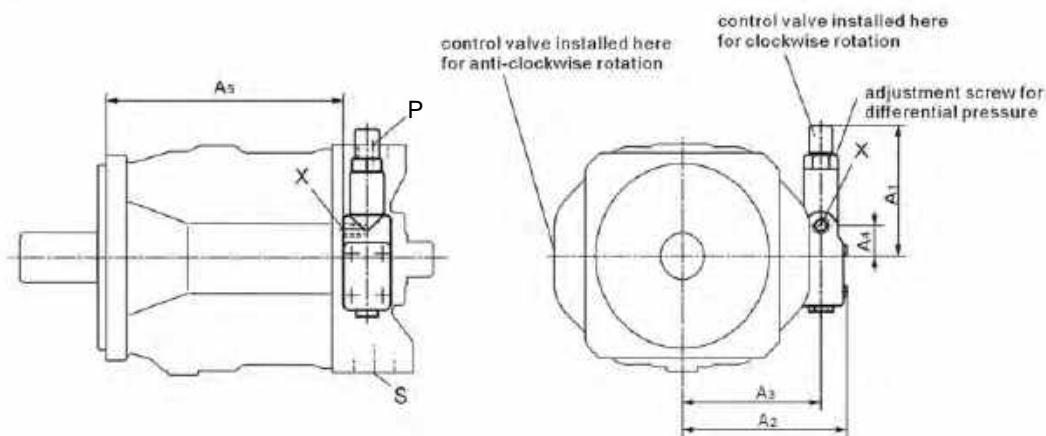
## Installation Dimensions

TPV-xxx - PRG - 1 - xxx - x - N62

Sizes 28..100



Size 140



Size	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>	A <sub>5</sub>	Port X
28	109	136	119	40	119	7/16 - 20 UNF-2B x 12 deep
45	106	146	129	40	134	
71	106	160	143	40	162	
100	106	165	148	40	229	
140	127	169	143	27	244	

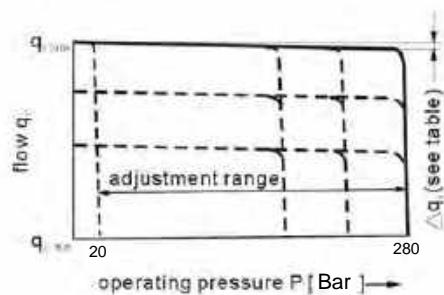
## PF/PF1 Pressure / Flow Control

In addition to the pressure control function, the pump flow may be varied by means of a differential pressure over an orifice or valvespool, installed in the service line. The pump flow is equal to the actual required flow by the actuator.

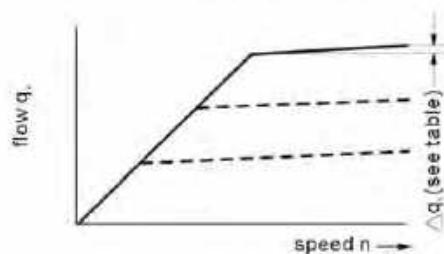
The PF1-valve has no connection between X and the tank. For function of pressure control see pages 11/12.

### • Static operating curve

(at  $n=1500$  rpm;  $t_{\text{ad}}=50^\circ\text{C}$ )

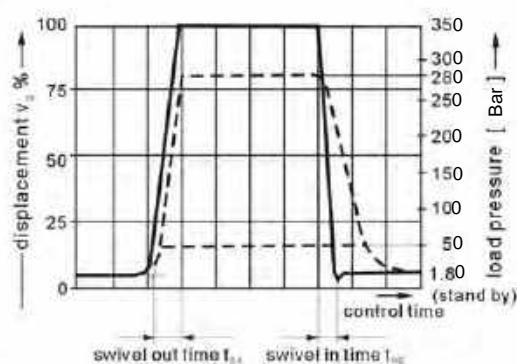


### • Static operating curve at variable speed

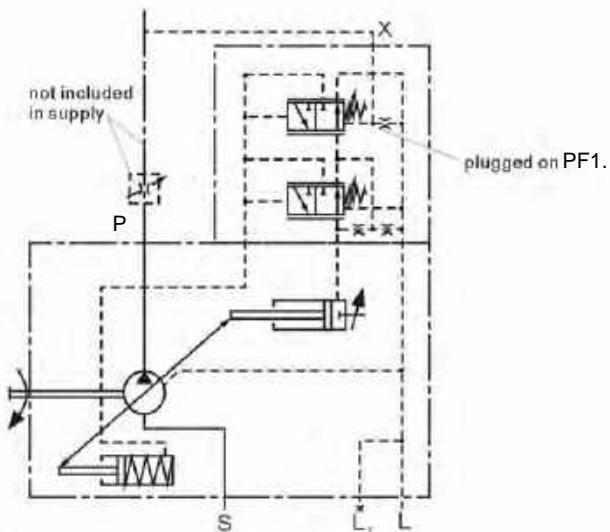


### • Dynamic flow control operating curve

The operating curves are average values measured under test conditions with the unit mounted inside the tank.



Size	$t_{\text{sa}}$ (ms)	$t_{\text{in}}$ (ms)	$t_{\text{se}}$ (ms)
	stand by-280 Bar	280 Bar-stand by	50 Bar-stand by
28	40	20	40
45	50	25	50
71	60	30	60
100	120	60	120
140	130	60	130



### Ports

- P Pressure port
- S Suction port
- L, L Case drain ports(L, plugged)
- X Pilot pressure port

### • Differential Pressure $\Delta P$

Adjustable between 10 and 22 bar  
(higher valves on request).

Standard setting: 14 Bar. If a different setting is required please indicate in clear text.

When port X is unloaded to tank a "zerostroke pressure" of  $P = 18 \pm 0.2$  Bar (stand by) results (dependent on  $\Delta P$ ).

### • Controller Data

Data pressure controller see page 11.  
Max. Flow variation (hysteresis and increase) measured at drive speed  $n=1500$  rpm

Size	28	45	71	100	140
$\Delta q_{\text{max}}$	L/min	1.0	1.8	2.8	4.0

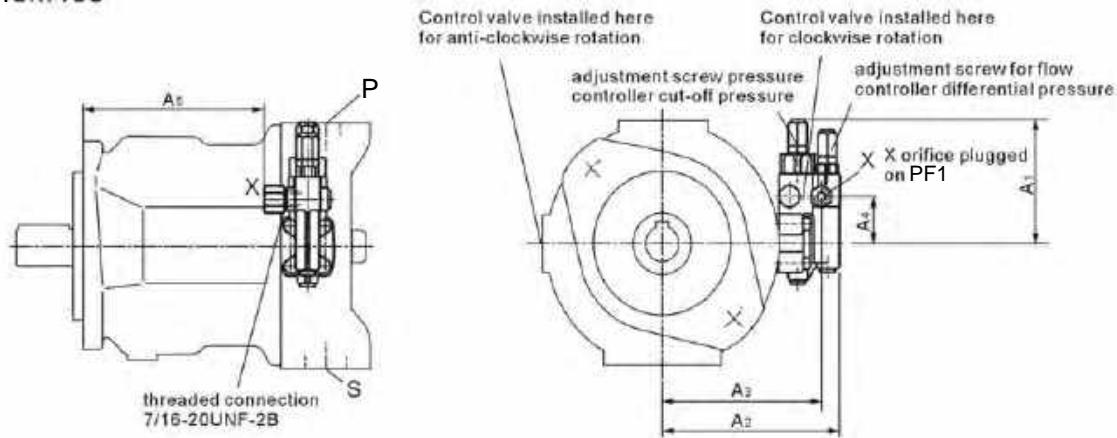
PF pilot oil consumption max. approx. 3...4.5 L/min

PF1 pilot oil consumption max. approx. 3 L/min

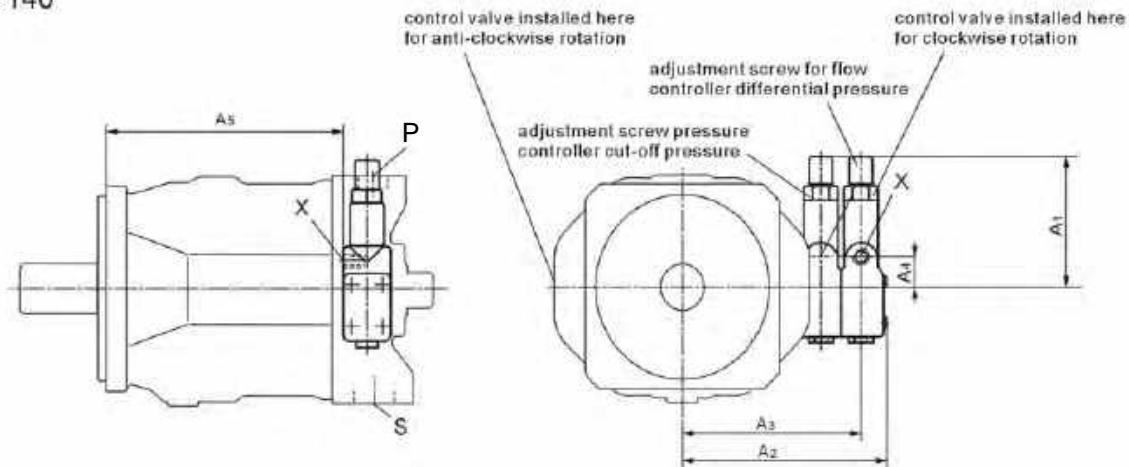
## Installation Dimensions

TPV-1- xxx PF - xxx - x - N62  
 TPV-1- xxx PF1- xxx - x - N62

Sizes 18...100



Size 140



Size	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>	A <sub>5</sub>	Port X
28	109	136	119	40	119	7/16 - 20 UNF - 2Bx12 deep
45	106	146	129	40	134	
71	106	160	143	40	162	
100	106	165	148	40	229	
140	127	209	183	27	244	

## Through Drive

The TPV pump can be supplied with through drive in accordance with the type code on page 2. The through drive version is designated by the code numbers (TDA - TDD).

### Combination Pump

By building on further pumps it is possible to obtain independent circuits:

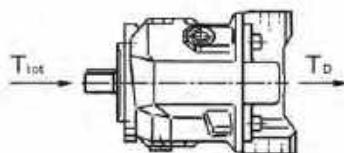
If the combination pump consists of 2 TPV and if these are to be supplied assembled then the two order codes should be linked by means of a "+" sign.

Ordering example:

TPV071 - PF - 1 - S14 - R - TDB - 13\+

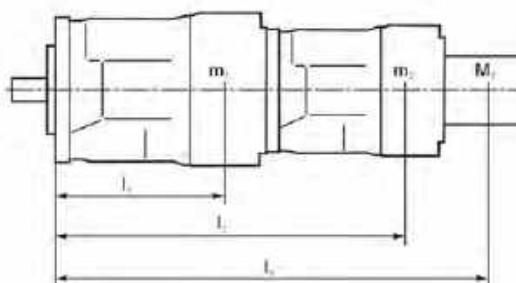
TPV028 - PF1 - 1 - S13 - R - N62

### Maximum permissible input and through drive torque



The split in torque between pump 1 and 2 is optional. The max. permissible input torque  $T_{in}$  as well as the max. permissible through drive torque  $T_o$  may not be exceeded.

### Permissible moment of inertia



$m_1, m_2, m_3$  [kg] Pump mass

$l_1, l_2, l_3$  [mm] distance to center of gravity

$$T_{in} = (m_1 \cdot l_1 + m_2 \cdot l_2 + m_3 \cdot l_3) \cdot \frac{1}{102} [\text{Nm}]$$

Size	18	28	45	71	100	140
Max. permissible input torque at pump 1 with shaft "P"						
$T_{in}$ Nm	137	200	439	857	1206	
Max. permissible through-drive torque $T_o$ Nm	137	200	439	778	1206	
Max. permissible through-drive torque $T_o$ Nm keyed shaft	112	179	283	398	557	

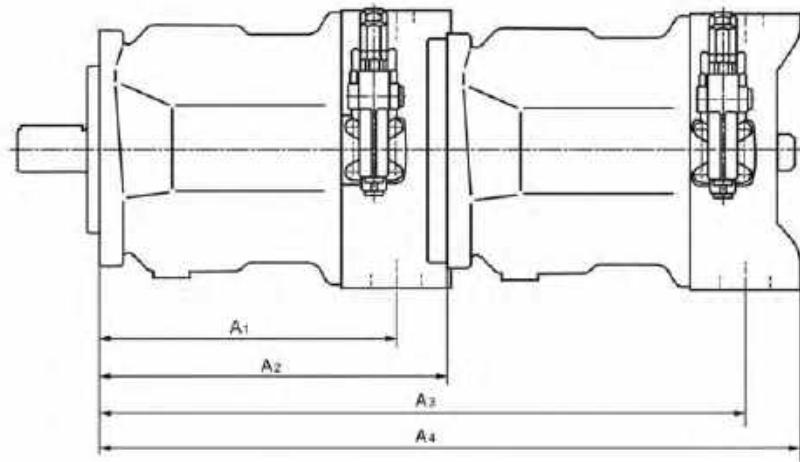
Size	18	28	45	71	100	140
Max. permissible input torque at pump 1 with shaft "S"						
$T_{in}$ Nm	137	319	626	1104	1620	
Max. permissible through-drive torque $T_o$ Nm	160	319	492	778	1266	
Max. permissible through-drive torque $T_o$ Nm keyed shaft	112	179	283	398	557	

Size	18	28	45	71	100	140
Max. permissible input torque at pump 1 with shaft "R"						
$T_{in}$ Nm	225	400	644	-	-	
Max. permissible through-drive torque $T_o$ Nm	176	365	548	-	-	
Max. permissible through-drive torque $T_o$ Nm keyed shaft	112	179	283	-	-	

$T_{in}$  = Max. permissible input torque at pump 1  
 $T_o$  = Max. permissible through-drive torque at through-drive to splined shaft  
 $T_o$  keyed shaft = Max. permissible through-drive torque at through-drive to keyed shaft

## Installation Dimensions

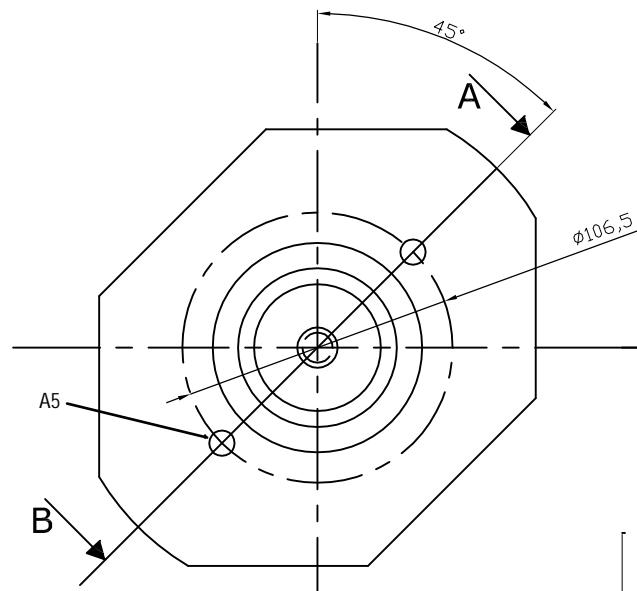
TPV-1 + TPV-1



FRONT PUMP REAR PUMP	TPV028				TPV045				TPV071				TPV100				TPV140			
TPV018																				
TPV028	164	204	368.5	410	-	-	-	-	217	267	431.5	473	275	338	502.5	544	275	350	514	556
TPV045	-	-	-	-	184	229	413	453	217	267	451	491	275	338	522	562	275	350	534	574
TPV071	-	-	-	-	-	-	-	-	217	267	484	524	275	338	555	595	275	350	567	609
TPV100	-	-	-	-	-	-	-	-	-	-	-	-	275	337	613	664	275	350	625	679
TPV140																				

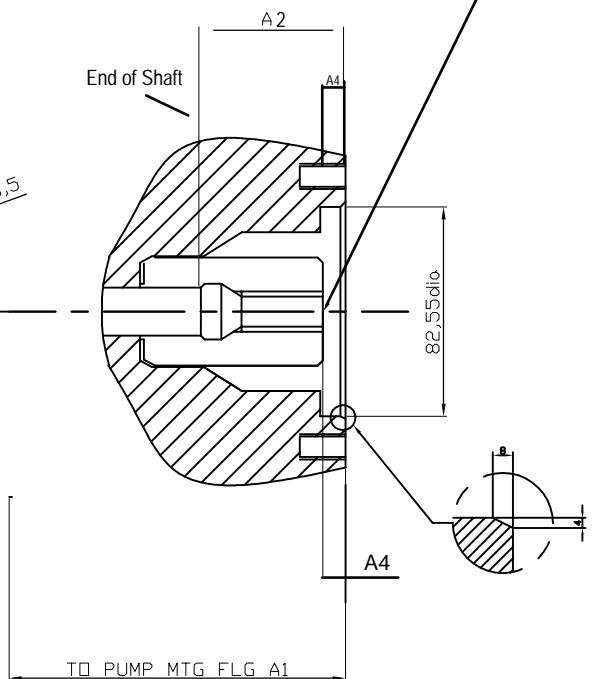
## Installation Dimensions Through Drives TDA & TDB

Flange SAE-A, 2 holes. (splined shaft S9 & S11 )  
Order code TDA-09 or TDA-11



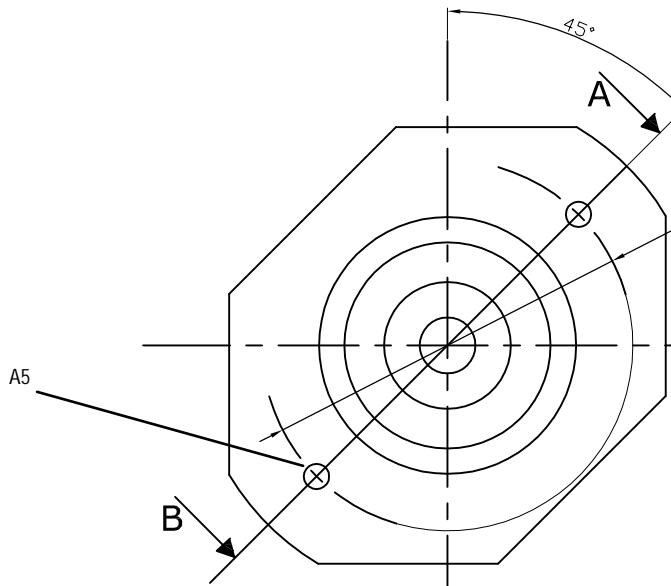
Section A-B

Spline coupling  
5/8" 16/32 DP 9T  
3/4" 16/32 DP 11T



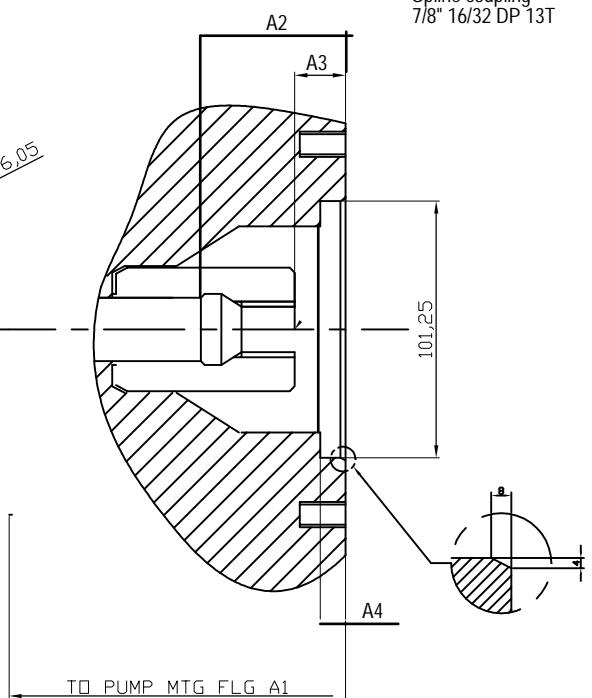
Size of Main Pump	A1	A2	A3	A4	A5
28	204	47	9t 11t		
			8 18.8	10	M10 x 16 deep
45	229	53	8 18.8	10	M10 x 16 deep
71	267	61	8 21.3	10	M10 x 20 deep
100	338	65	8 19.0	10	M10 x 20 deep
140	350	77	8 18.9	10	M10 x 17 deep

Flange SAE-B, 2 holes (splined shaft S13)  
Order code TDB-13



Section A-B

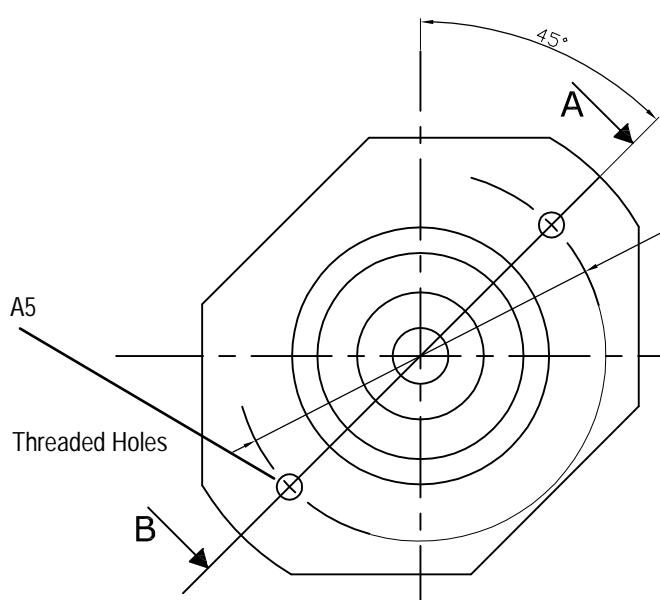
Spline coupling  
7/8" 16/32 DP 13T



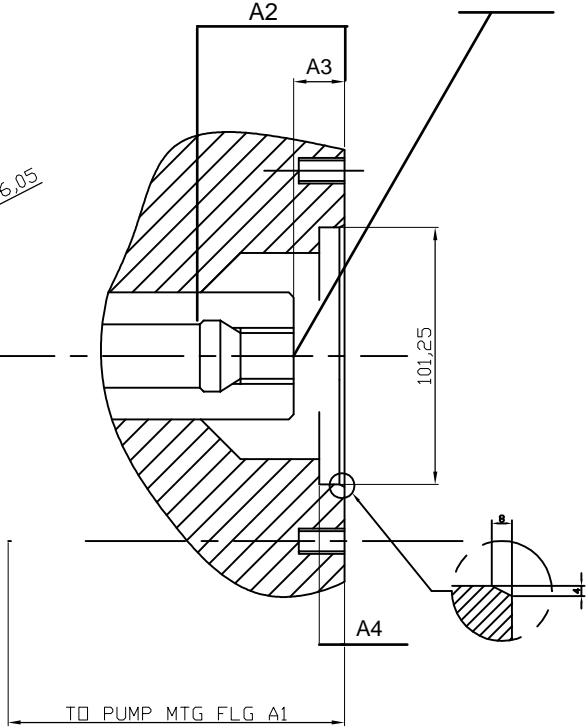
Size of Main Pump	A1	A2	A3	A4	A5
28	204	47	11t		
			17.8	10	M12 x 18 deep
45	229	53	17.8	10	M12 x 18 deep
71	267	61	20.3	10	M12 x 18 deep
100	338	65	18.0	10	M12 x 20 deep
140	350	77	17.9	10	M12 x 20 deep

## Installation Dimensions Through Drives TDB-B & TDC

Flange SAE B-B, 2 holes (splined shaft S15)  
Order code TDB-15

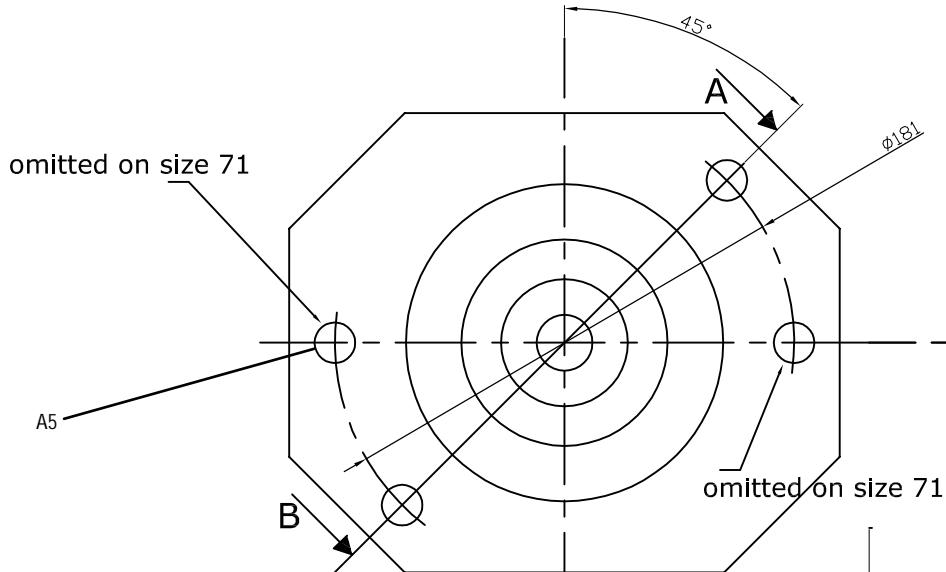


Section A-B  
Spline Coupling 1" 16/32 DP 15T

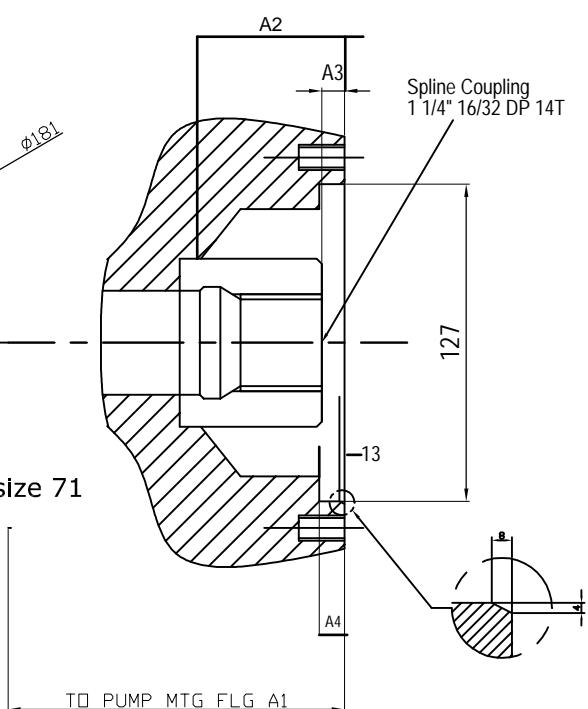


Size of Main Pump	A1	A2	A3	A4	A5
28	229	53	18.4	10	M12 x 18 deep
45	267	61	20.8	10	M12 x 20 deep
71	338	65	18.2	10	M12 x 20 deep
100	350	77	18.4	10	M12 x 20 deep
140					

Flange SAE C, (splined shaft S14)  
Order code TDC-14



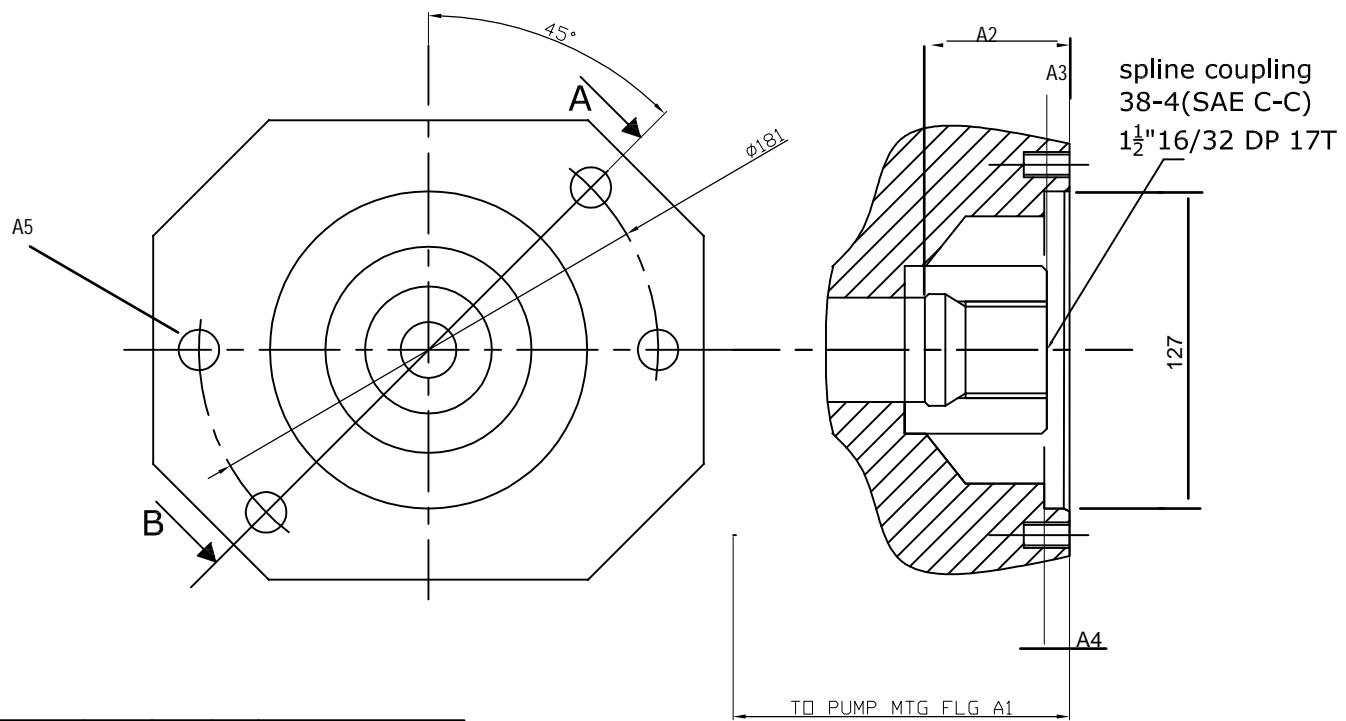
Section A-B



Size of Main Pump	A1	A2	A3	A4	A5
28	267	61	22.0	13	M16 x 18 deep
45	338	65	19.5	13	M16 x 24 deep
71	350	77	19.4	13	M16 x 24 deep
100					
140					

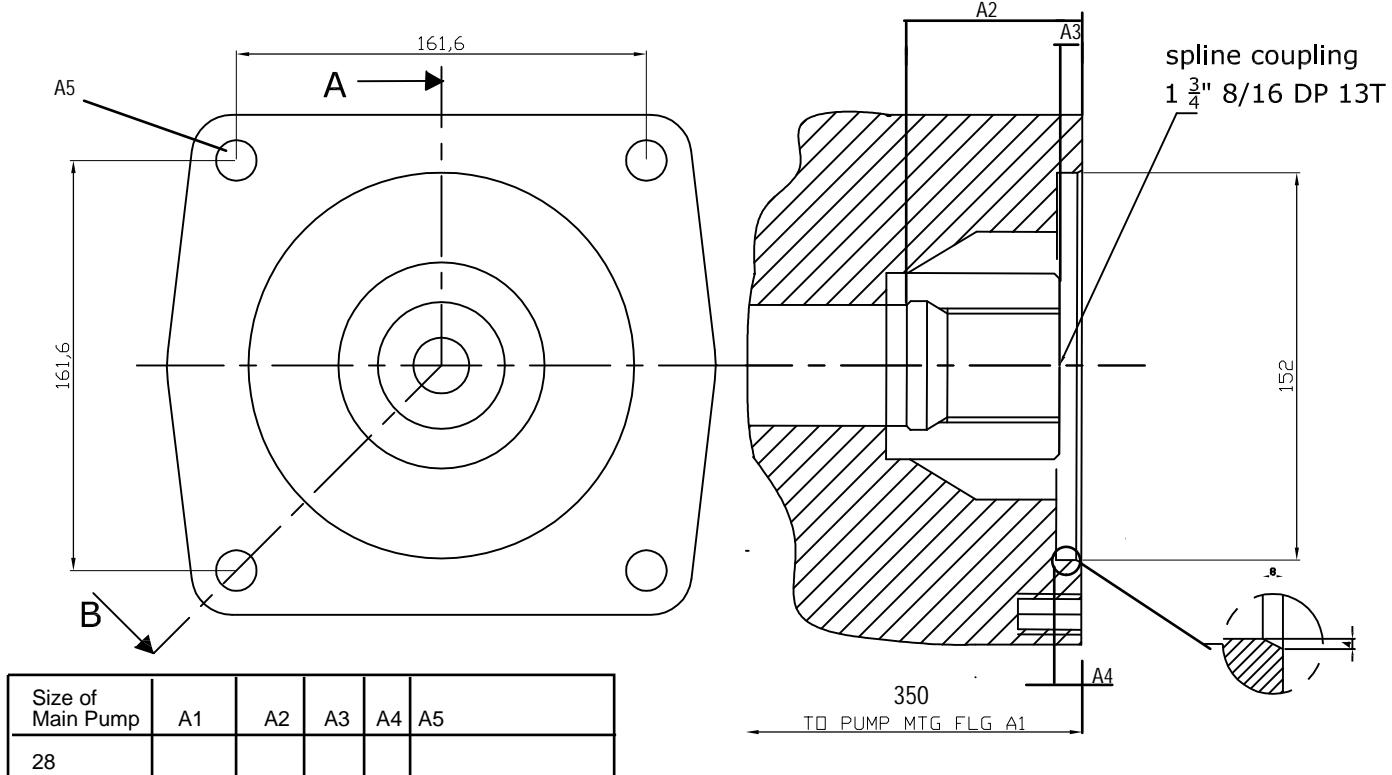
## Installation Dimensions Through Drives TDC-C & TDD

Flange SAE C, 2 holes (splined shaft S17)  
Order code TDC-17



Size of Main Pump	A1	A2	A3	A4	A5
28					
45					
71					
100	338	65	8	13	M16 x 24 deep
140	350	77	8	13	M16 x 24 deep

Flange SAE D, 4 holes (splined shaft S13)  
Order code TDD-13



Size of Main Pump	A1	A2	A3	A4	A5
28					
45					
71					
100					
140	350	77	10.5	13	M16 x 21 deep

TPV-2-045-xxx-Sxx-R-N64

**TPV-2-060-xxx-Sxx-R-N62**