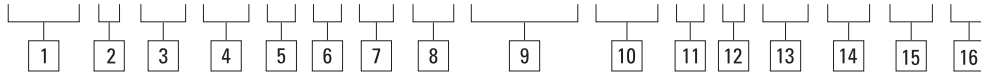


# Model Code VVP Series

## VVP 1 - 20 - (S) R R - M - 30 - CVTCE (03) - B \* - 04 - 15 - 10 - \*\*



### 1 Variable Vane Pump

#### 2 Frame Size / Max. Pressure

1	-	16, 20, 25 cm <sup>3</sup> /r Max. pressure 160 bar (2300 psi)
2	-	31.5, 40, 50 cm <sup>3</sup> /r Max. pressure 160 bar (2300 psi)
3	-	63, 80, 100 cm <sup>3</sup> /r Max. pressure 150 bar (2200 psi)

#### 3 Nominal Size / Geometric Displacement

16	-	16 cm <sup>3</sup> /r (0.98 in <sup>3</sup> /r)
20	-	20 cm <sup>3</sup> /r (1.22 in <sup>3</sup> /r)
25	-	25 cm <sup>3</sup> /r (1.53 in <sup>3</sup> /r)
32	-	31.5 cm <sup>3</sup> /r (1.92 in <sup>3</sup> /r)
40	-	40 cm <sup>3</sup> /r (2.44 in <sup>3</sup> /r)
50	-	50 cm <sup>3</sup> /r (3.05 in <sup>3</sup> /r)
63	-	63 cm <sup>3</sup> /r (3.84 in <sup>3</sup> /r)
80	-	80 cm <sup>3</sup> /r (4.88 in <sup>3</sup> /r)
100	-	100 cm <sup>3</sup> /r (6.10 in <sup>3</sup> /r)

#### 4 Adjust. Max. Displacement Stop

S	-	With stop (Omit if not required.)
---	---	--------------------------------------

#### 5 Mounting Flange / Port Connections

Code	Frame Size	Mounting flange	Port connections
R	Size 1	ISO 3019/2 with straight	G (BSPF) thread keyed shaft
RF	Size 2 or 3	ISO 3019/2 with straight keyed shaft	SAE 4-bolt flange with metric mounting bolts
PS	Size 1	SAE B 4-bolt with straight keyed shaft	SAE UNF thread
PF	Size 2 or 3	SAE C 2-bolt with straight keyed shaft (only available on a primary or single pump)	SAE 4-bolt flange with UNC mounting bolts
PX	Size 2 or 3	ISO 3019/2 with straight keyed shaft (available only on secondary pump)	SAE 4-bolt flange with UNC mounting bolts
B	All	Base plate mounting (available only as single pump)	O-ring sealed

Note: See page 36 for detailed dimensional listing for mounting flanges, shafts and ports.

### 6 Rotation Viewed From Shaft End

R	-	Right hand (clockwise) only
---	---	-----------------------------

#### 7 Seal Type

M	-	Buna N
E	-	Viton

#### 8 Pump Design Number

30	-	All models
----	---	------------

Subject to change. Installation dimensions remain unaltered for designs 30-39.

### 9 Pump Controls

C	-	Standard pressure compensator
CR	-	Remote controlled pressure control
CD1	-	Dual pressure control with non-adjustable min. pressure
CD2	-	Dual adjustable pressure control
CE	-	Proportional pressure control
CVP	-	Load sensing compensator
CVPR	-	Remote controlled load sensing control
CVPD1	-	Load sensing control with dual pressure with fixed minimum pressure
CVPD2	-	Load sensing control with dual adjustable pressure control
CVPCE	-	Load sensing control with proportional pressure control
CVT	-	Torque limiter
CVTR	-	Remote controlled torque limiter
CVTD	-	Torque control with dual adjustable pressure control
CVTCE	-	Torque control with proportional pressure control

### 10 Electrical Rating And Wiring Connection

For CD\*, CVPD\*, CVTD pump controls, five options below apply; for CE, CVPCE, CVTCE, only option 03 applies.

00	-	No control valve fitted
01	-	220V AC 50 Hz with DIN 43650 plug connection
02	-	115V AC 60 Hz with 1/2" NPT conduit box
03	-	24V DC with DIN 43650 plug connection
04	-	115V AC 60 Hz with DIN 43650 plug connection

(Omit if not required.)

### 11 Control Pressure Setting

B	-	30-160 bar (430-2300 psi) (frame sizes 1 and 2)
C	-	30-150 bar (430-2200 psi) (frame size 3)

### 12 Adjustment Device

Omit for CR, CE, CVPR, CVTD, CVPCE and CVTCE pump controls.

K	-	Micrometer knob (standard)
KL	-	Micrometer knob with key lock

### 13 Maximum Power Setting In kW

Applies to CVT pump control only.

**	-	Factory setting of power limit in kilowatt; for example 04 = 4 kW
----	---	---

### 14 Maximum Pressure Setting

Applies to CVT pump control only.

**	-	Factory setting of pressure for zero flow in 10 bar increments; for example 15 = 150 bar
----	---	--

### 15 Control Design Number

10	-	For all models. Subject to change. Installation dimensions remain unaltered for designs 10-19.
----	---	--

### 16 Special Features Suffix

# Technical Data

## VVP Series

Nominal size	Size 1	Size 2	Size 3
<b>Displacement</b> according to ISO 3662 - cm <sup>3</sup> /r (in <sup>3</sup> /r)	16 (0.976)	31.5 (1.922)	63 (3.844)
	20 (1.220)	40 (2.441)	80 (4.882)
	25 (1.526)	50 (3.051)	100 (6.102)
<b>Actual displacement</b> - cm <sup>3</sup> /r (in <sup>3</sup> /r)	17.9 (1.092)	34.5 (2.105)	69 (4.211)
	22.1 (1.349)	42.8 (2.612)	86.2 (5.260)
	26.9 (1.642)	53.1 (3.240)	105.5 (6.438)
<b>Mounting flange type</b> (See model code, page 15.)	ISO 3019/2	ISO 3019/2	ISO 3019/2
	SAE 4-bolt	SAE C 2-bolt	SAE C 2-bolt
	Base plate	Base plate	Base plate
<b>Maximum working pressure</b> - bar (psi)	160 (2300)	160 (2300)	150 (2200)
<b>Allowed maximum drain port pressure</b> - bar (psi)	1 (15)		
<b>Inlet pressure (absolute)</b> - bar (psi)	0.8 to 1.5 [11.6 to 21.8]		
<b>Speed range</b> - r/min	800 to 1800		
<b>Rotation direction</b> (viewed from shaft end)	Right-hand (clockwise)		
<b>Loads on drive shaft</b>	No radial or axial loads allowed		
<b>Maximum torque on primary shaft</b> - Nm (lbf-in)	197 (1744)	400 (3540)	740 (6550)
(See pages 28 and 30 for torque requirements of combined pumps.)			
<b>Hydraulic fluid</b>	Mineral oil - HM according to ISO 6743/4 - HLP according to DIN 51524/2 Organic ester HFD-U according to ISO 6743/4 (QUINTOLUBRIC N-822-300)		
<b>Viscosity range at working pressure</b> - mm <sup>2</sup> /s (cSt)	22 to 68		
<b>Recommended viscosity</b> - mm <sup>2</sup> /s (cSt) at 50°C (122°F)	32		
<b>Viscosity index</b>	100 minimum		
<b>Fluid temperature range</b> - °C (°F)	-10/+50 [14/122]		
<b>Maximum fluid contamination level</b>	Class 9 per NAS 1638, or class 18/15 per ISO 4406		
<b>Weight</b> - kg (lb)	13 (28.7)	33 (72.8)	45 (99.2)

***In case of different operating conditions, contact Eaton Hydraulics.***

# Controls for VVP Pumps

VVP pumps offer a wide selection of electrohydraulic controls for the regulation of pressure and volume.

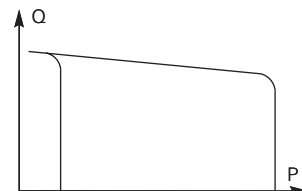
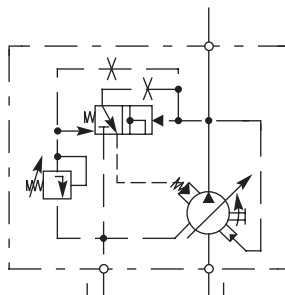
In addition to the various pressure regulating controls, a hydraulic load-sensing control is available to provide pumps with maximum flexibility for use in energy saving systems.

The load sensing compensator control receives a signal pressure directly after an external throttle and before an actuator. When a variation in pressure is sensed (with a fixed fall in pressure  $\Delta p = 20$  bar (300 psi), the control will automatically change the pump's displacement independent of pressure variations that occur in the circuit.

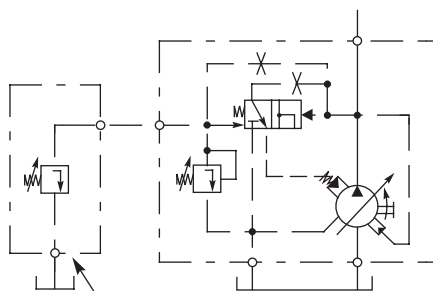
The load sensing control produces a notable reduction in displaced power and is recommended for use in applications where there are notable variations in torque (or force) and speed.

## Pressure Regulation

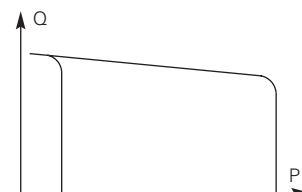
**Pump With Standard  
Pressure Compensator  
Model Code "C"**



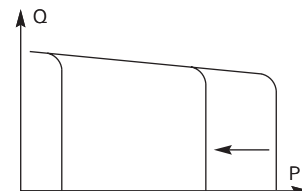
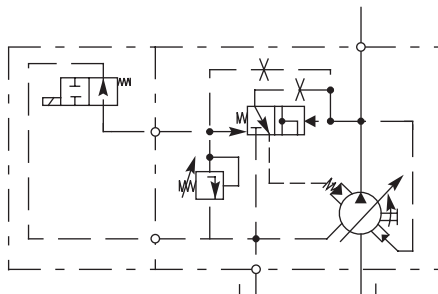
**Pump With  
Remote Pressure Control  
Model Code "CR"**



Remote max. pressure relief valve from 0 to 5 L/min (0 to 1.3 USgpm) not supplied.  
Length of pilot line between compensator and relief valve should not exceed 5m (16 ft).

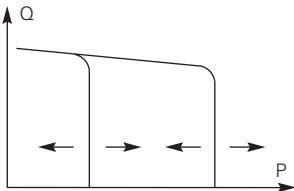
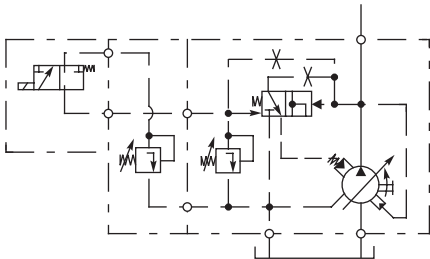


**Pump With Two Stages of  
Pressure of Which One With  
Fixed Setting (At Minimum  
Pressure Level of Pump)  
Model Code "CD1"**

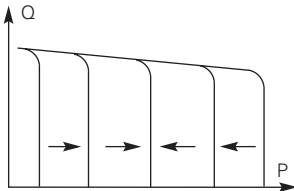
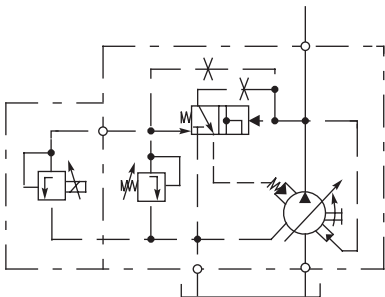


# Controls for VVP Pumps (continued)

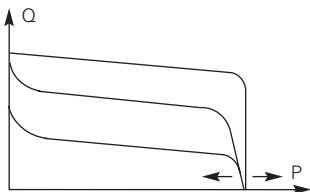
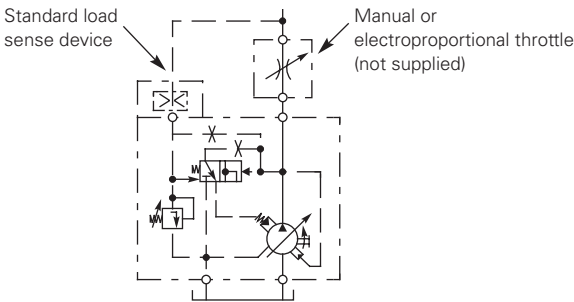
**Pump With Two Adjustable Stages of Pressure**  
Model Code "CD2"



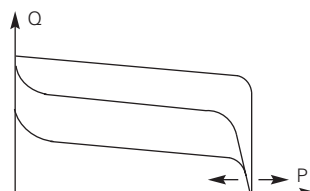
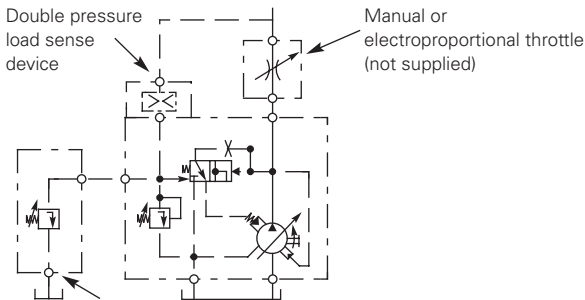
**Pump With Proportional Pressure Control**  
Model Code "CE"



**Load Sensing and Pressure Regulation**  
Load Sensing Pump for Standard Flow Control  
Model Code "CVP"



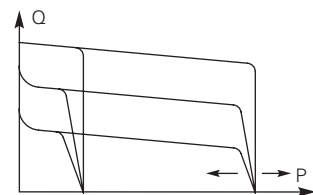
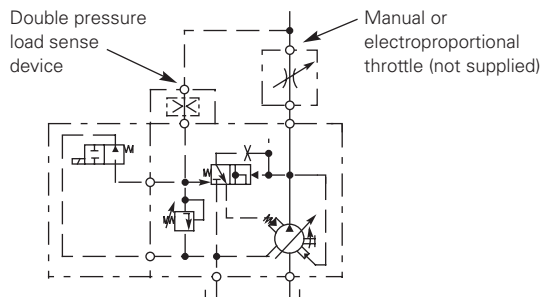
**Load Sensing Pump With Remote Pressure Control**  
Model Code "CVPR"



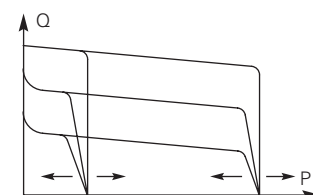
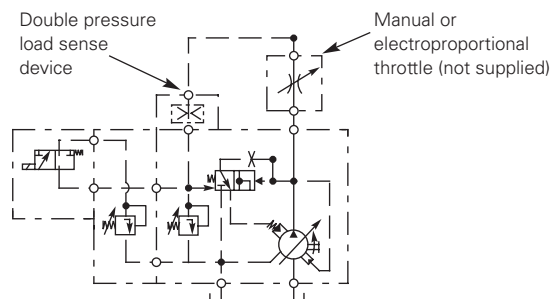
Max. pressure relief valve from 0 to 5 L/min (0 to 1.3 USgpm) not supplied.  
Length of pilot line between compensator and relief valve should not exceed 5m (16 ft).

# Controls for VVP Pumps (continued)

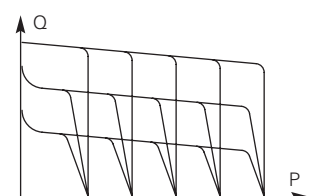
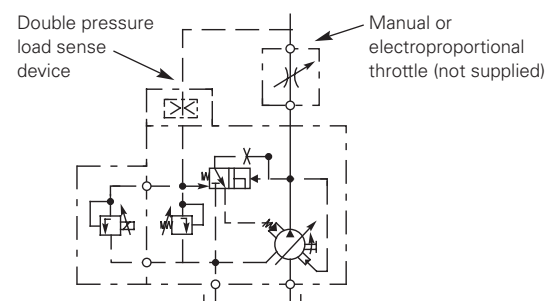
## Load Sensing Pump With Two Stages of Pressure of Which One With Fixed Setting (At Min. Pressure Level of Pump) Model Code "CVPD1"



## Load Sensing Pump With Two Adjustable Stages of Pressure Model Code "CVPD2"

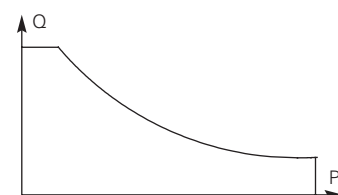
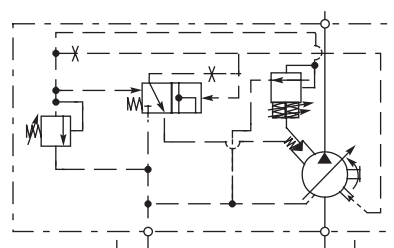


## Load Sensing Pump With Proportional Pressure Control Model Code "CVPCE"



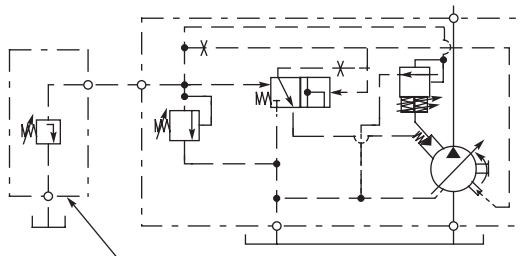
## Pressure Regulation with Torque Sensing

### Torque Limiter Model Code "CVT"

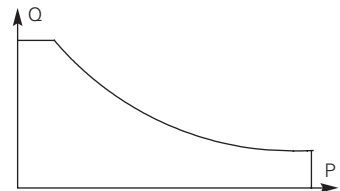


# Controls for VVP Pumps (continued)

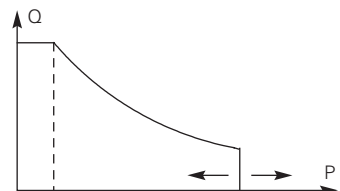
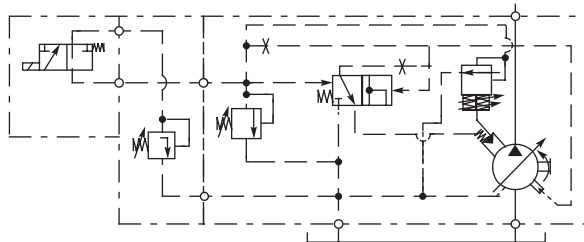
## Remote Controlled Torque Limiter Model Code "CVTR"



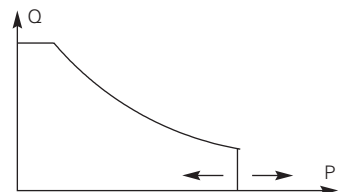
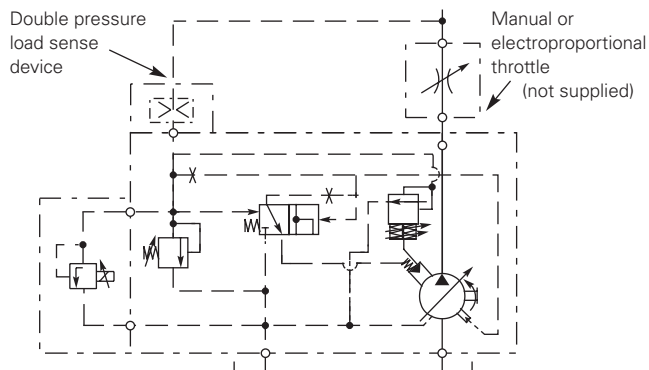
Remote max. pressure relief valve from 0 to 5 L/min (0 to 1.3 USgpm) not supplied. Length of pilot line between compensator and relief valve should not exceed 5m (16 ft).



## Torque Control With Dual Pressure Control Model Code "CVTD" (Fixed Minimum Pressure)



## Torque Control With Proportional Pressure Control Model Code "CVTCE"



# Performance Characteristics

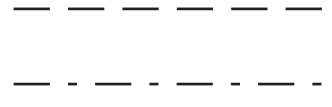
## VVP1

### Performance with:

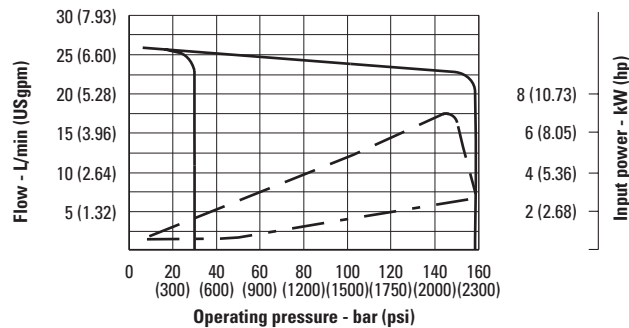
Speed 1450 r/min  
 Oil per ISO 6743/4  
 Viscosity 32 mm<sup>2</sup>/s (cSt)  
 Temperature 50°C (122°F)

Power consumption with maximum flow

Power consumption with zero flow setting

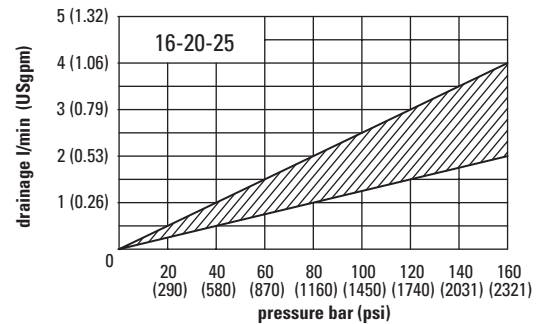


### VVP1-16

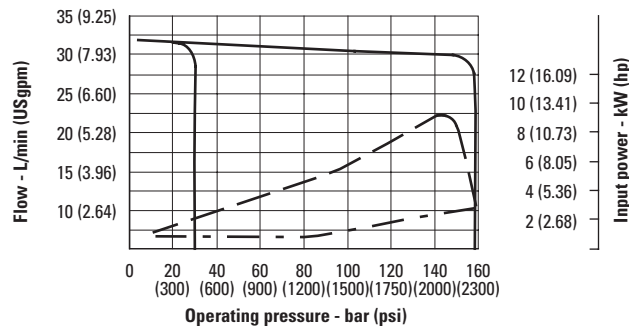


### VVP1-16, -20, -25

Values established with zero flow setting

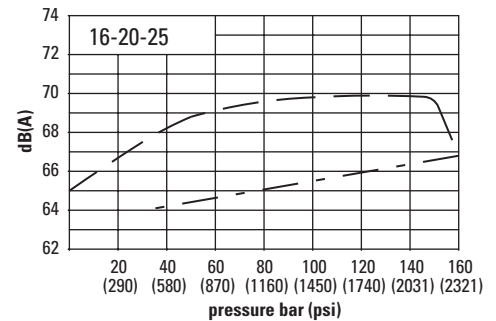


### VVP1-20

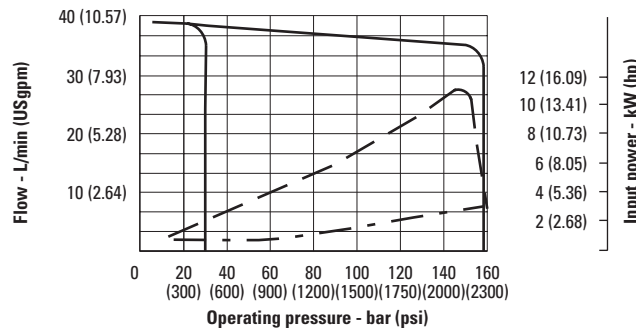


### VVP1-16, -20, -25

Maximum noise level measured with sound-level meter placed at 1 meter [39.37"] from pump, flexible coupling.

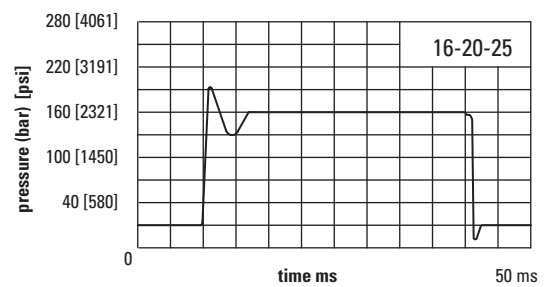


### VVP1-25



### VVP1-16, -20, -25

Response time and pressure peak



# Performance Characteristics

## VVP2

### Performance with:

Speed 1450 r/min

Oil per ISO 6743/4

Viscosity 32 mm<sup>2</sup>/s (cSt)

Temperature 50°C (122°F)

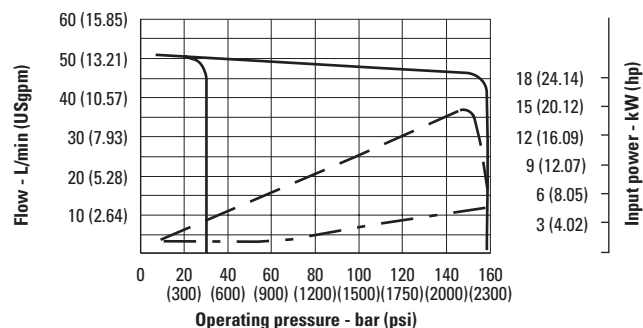
Power consumption with maximum flow

-----

Power consumption with zero flow setting

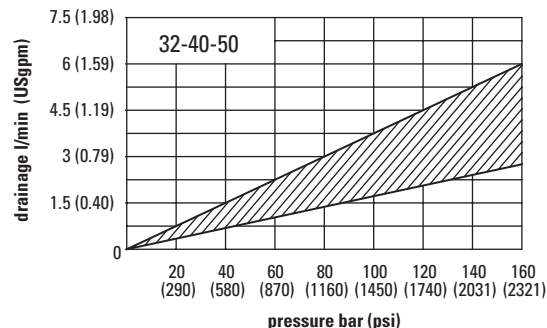
- - - - -

### VVP2-32

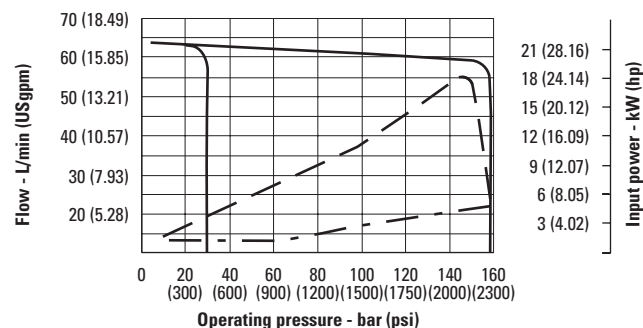


### VVP2-32, -40, -50

Values established with zero flow setting

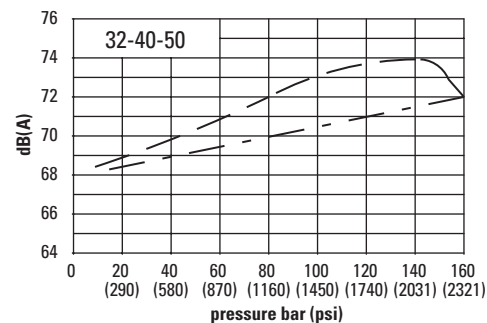


### VVP2-40

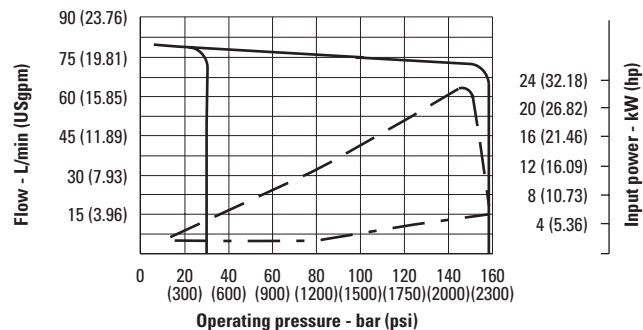


### VVP2-32, -40, -50

Maximum noise level measured with sound-level meter placed at 1 meter [39.37"] from pump, flexible coupling.

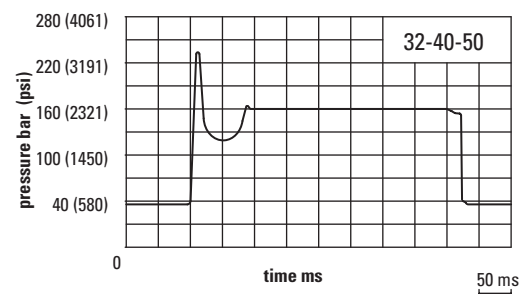


### VVP2-50



### VVP2-32, -40, -50

Response time and pressure peak



# Performance Characteristics

## VVP3

### Performance with:

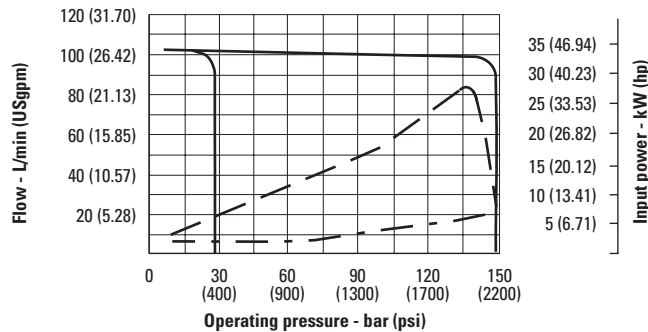
Speed 1450 r/min  
Oil per ISO 6743/4  
Viscosity 32 mm<sup>2</sup>/s (cSt)  
Temperature 50°C (122°F)

Power consumption with maximum flow

Power consumption with zero flow setting

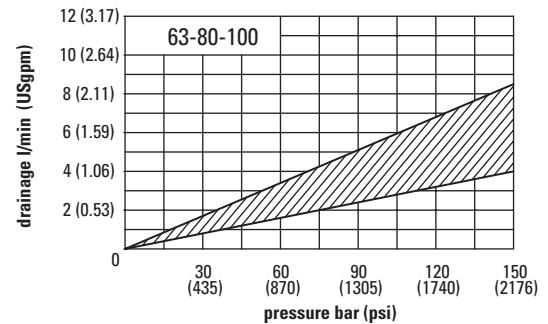


### VVP3-63

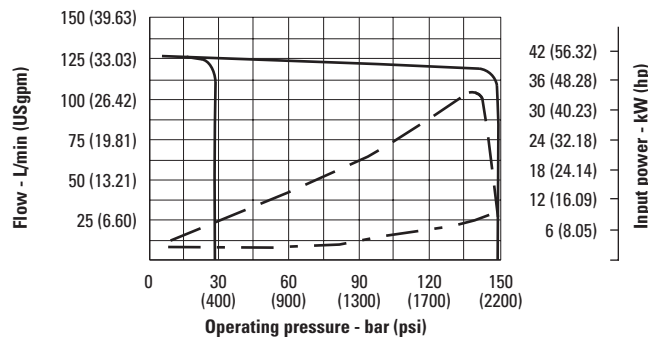


### VVP3-63, -80, -100

Values established with zero flow setting

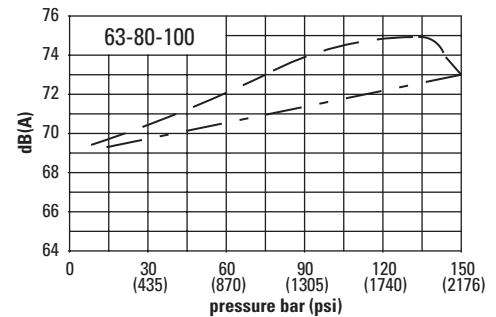


### VVP3-80

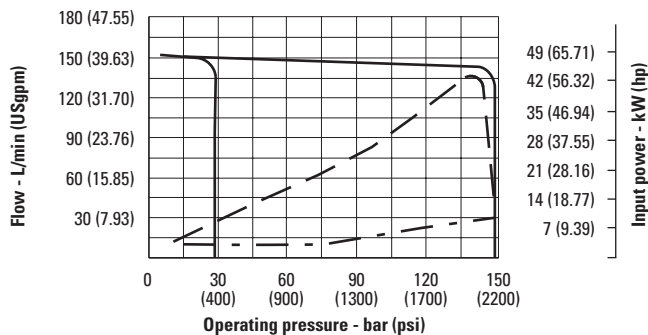


### VVP3-63, -80, -100

Maximum noise level measured with sound-level meter placed at 1 meter [39.37"] from pump, flexible coupling.

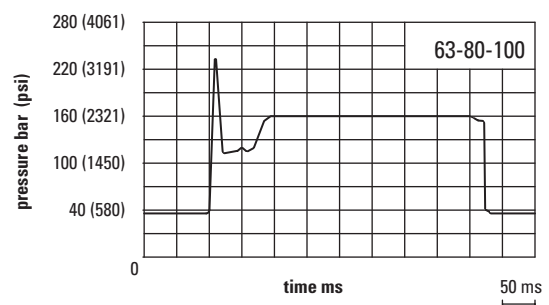


### VVP3-100



### VVP3-63, -80, -100

Response time and pressure peak



# VVP1

## With ISO or SAE Mounting Flange

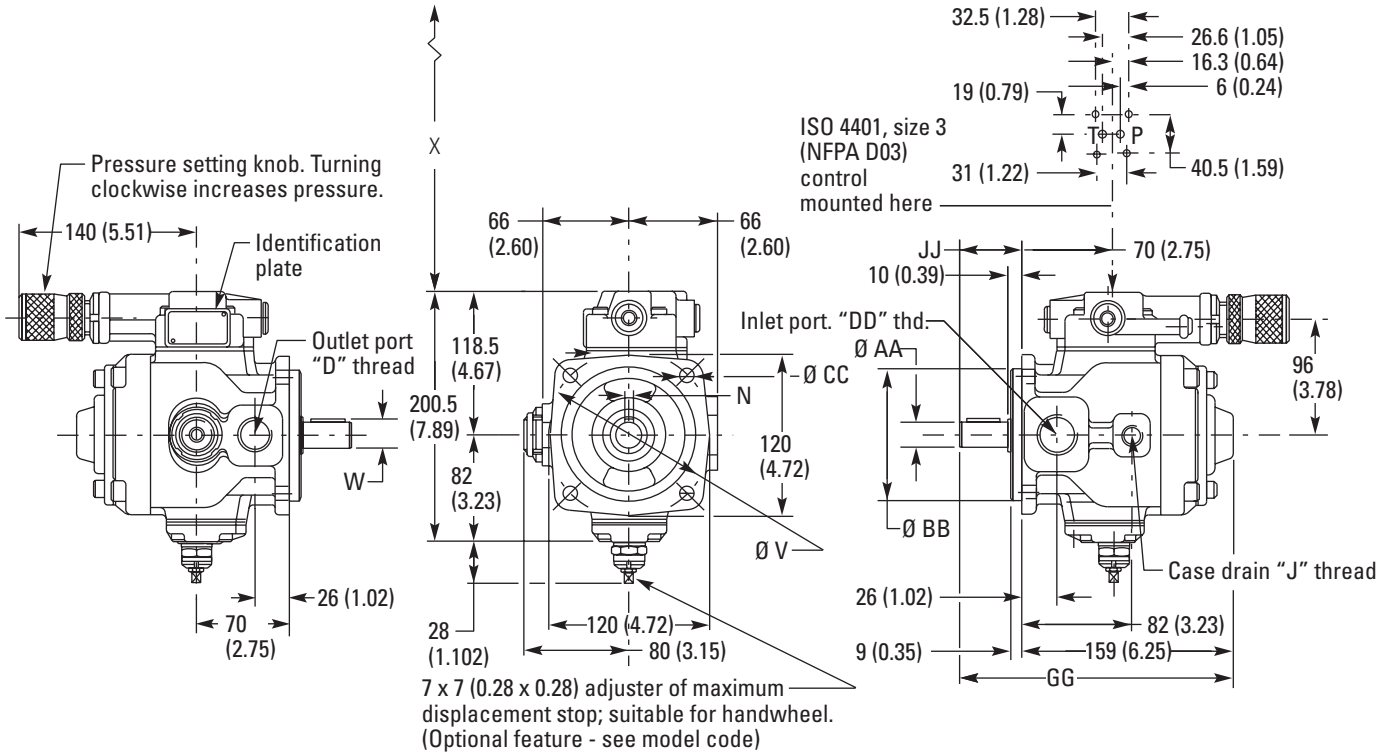
Installation Dimensions  
in mm (in)

All mounting flange, port and shaft options are listed on page 36.



### "C" Control With "K" Adjustment

"KL" adjustment is shown on page 35.



Thread for remote control connection, type CR = dimension "F".  
Thread for load sense connection, type CV\* = dimension "F".

#### MOUNTING FLANGE AND PORTS CODE ▲

	D	F	J	N	Ø V	W	Ø AA	Ø BB	Ø CC	DD	GG	JJ
R (ISO)	3/4" BSP	1/4" BSP	3/8" BSP	8 (0.315)	125 (4.921)	28 (1.102)	25 (0.984)	100 (3.937)	11.0 (0.433)	1" BSP	205 (8.07)	46 (1.81)
PS (SAE)	1.0625-12 UNF-2B	0.500-20 UNF-2B	0.5625-18 UNF-2B	6.35 (0.250)	127 (5.000)	28.17 (1.109)	25.4 (1.000)	101.6 (4.000)	14.3 (0.56)	1.3125-12 UNF-2B	207 (8.15)	48 (1.89)

▲ See model code, page 15.

#### VVP CONTROL

	CR	CD1	CD2	CE	CVP	CVPR	CVPD1	CVPD2	CVPCE	CVT(*)
Dimension "X"	20.0 (0.79)	100.0 ♦ (3.94) ♦	146.0 ♦ (5.75) ♦	125.5 ♦ (4.94) ♦	20.0 (0.79)	40.0 (1.57)	120.0 ♦ (4.72) ♦	166.0 ♦ (6.54) ♦	145.5 ♦ (5.73) ♦	115.0 (4.55)

♦ Includes 13 (0.51) for removal of DIN connector.

# VVP2 and VVP3

## With ISO Mounting Flange

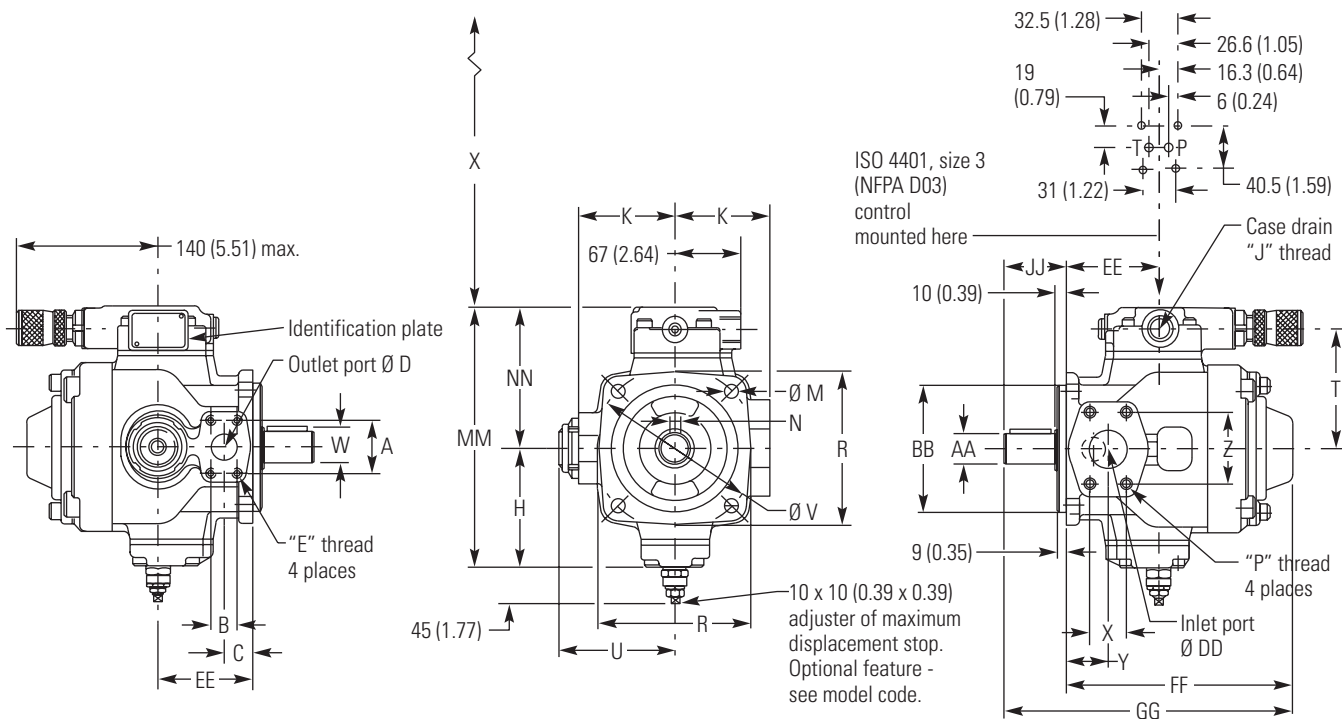
Installation Dimensions  
in mm (in)

All mounting flange, port and shaft options are listed on page 36.



### "C" Control With "K" Adjustment

"KL" adjustment is shown on page 35.



Thread for remote control or load sense connection, type CR or CV\* = 1/4" BSP.

MODEL	A	B	C	D	E	H	J	K	Ø M	N	P	R	T
VVP2	52.4 (2.06)	26.2 (1.03)	30 (1.18)	25 (0.98)	M10 or 0.375-16 UNC-2B ▲	110 (4.33)	3/4" BSP or 1.0625-12 UNF-2B ▲	95 (3.74)	14 (0.55)	10 (0.39)	M12 or 0.500-13 UNC-2B ▲	150 (5.91)	123 (4.84)
VVP3	58.7 (2.31)	30.2 (1.19)	35 (1.378)	32 (1.26)	M10 or 0.4375-14 UNC-2B ▲	120 (4.72)	3/4" BSP or 1.0625-12 UNF-2B ▲	105 (4.13)	18 (0.71)	12 (0.47)	M12 or 0.500-13 UNC-2B ▲	185 (7.28)	133 (5.24)

▲ See mounting flange/port connections codes RF and PX, page 15.

MODEL	U	Ø V	W	X	Y	Z	Ø AA	Ø BB	Ø DD	EE	FF	GG	JJ	MM	NN
VVP2	114 (4.49)	160 (6.30)	35 (1.38)	35.7 (1.41)	40 (1.58)	70 (2.76)	32 (1.26)	125 (4.92)	38 (1.50)	91 (3.58)	219 (8.62)	279 (10.98)	60 (2.36)	255.5 (10.06)	145.5 (5.728)
VVP3	123 (4.84)	200 (7.87)	43 (1.69)	43 (1.69)	46 (1.81)	77.8 (3.06)	40 (1.57)	160 (6.30)	51 (2.01)	105 (4.13)	245 (9.65)	313 (12.32)	68 (2.68)	275.5 (10.85)	155.5 (6.12)

VVP CONTROL	CR	CD1	CD2	CE	CVP	CVPR	CVPD1	CVPD2	CVPCE	CVT(*)
Dimension "X"	20.0 (0.79)	100.0 ◆ (3.94) ◆	146.0 ◆ (5.75) ◆	125.5 ◆ (4.94) ◆	20.0 (0.79)	40.0 (1.57)	120.0 ◆ (4.72) ◆	166.0 ◆ (6.54) ◆	145.5 ◆ (5.73) ◆	115.0 (4.55)

◆ Includes 13 (0.51) for removal of DIN connector.

# VVP2 and VVP3

## With SAE Mounting Flange

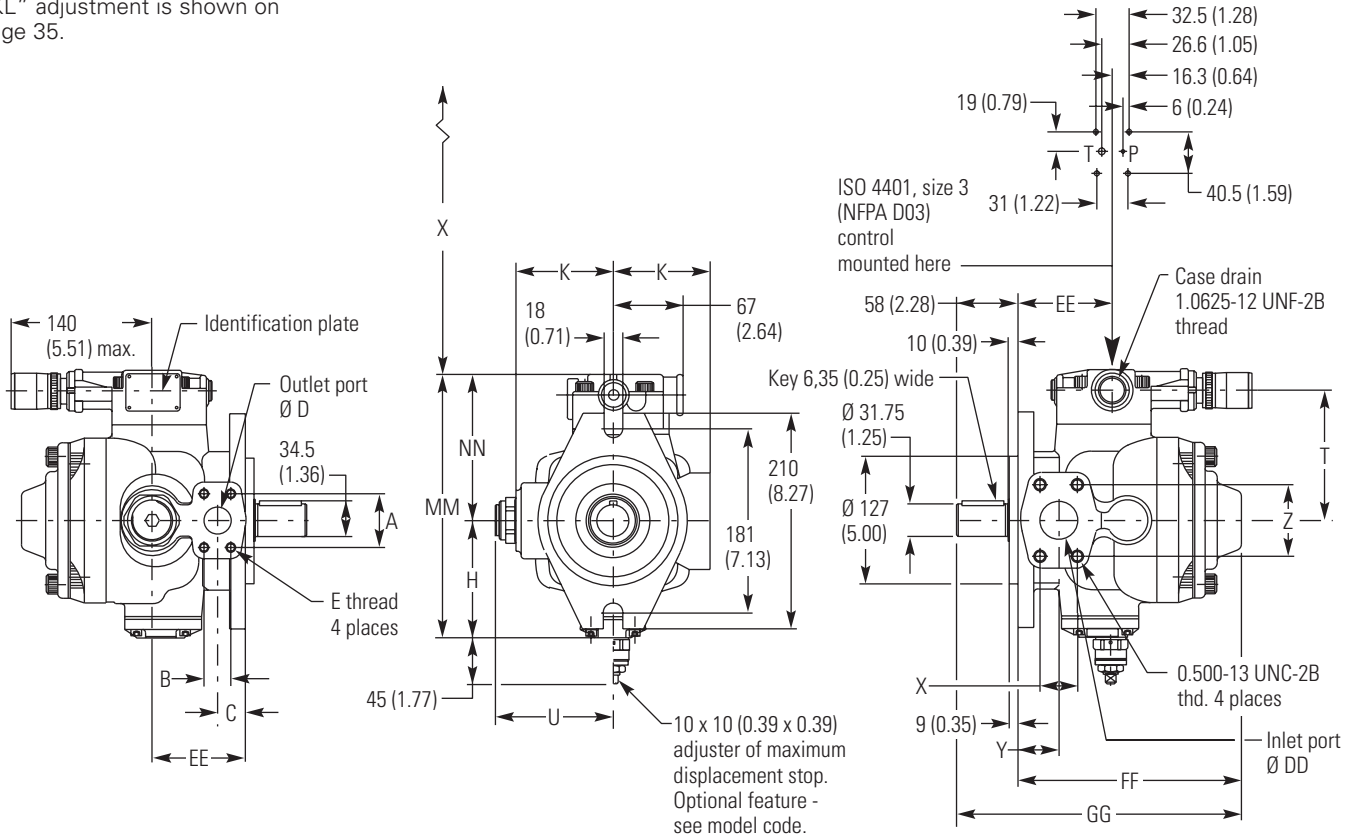
Installation Dimensions  
in mm (in)

All mounting flange, port and shaft options are listed on page 36.



### "C" Control With "K" Adjustment

"KL" adjustment is shown on page 35.



Thread for remote control or load sense connection, type CR or CV\* = 0.500-20 UNF-2B

MODEL	A	B	C	D	E	H	K	T	U
VVP2	52.4 (2.06)	26.2 (1.03)	27 (1.06)	25 (0.98)	0.375-16 UNC-2B	110 (4.33)	95 (3.74)	123 (4.84)	114 (4.49)
VVP3	58.7 (2.31)	30.2 (1.19)	35 (1.38)	32 (1.26)	0.4375-14 UNC-2B	120 (4.72)	105 (4.13)	133 (5.24)	123 (4.84)

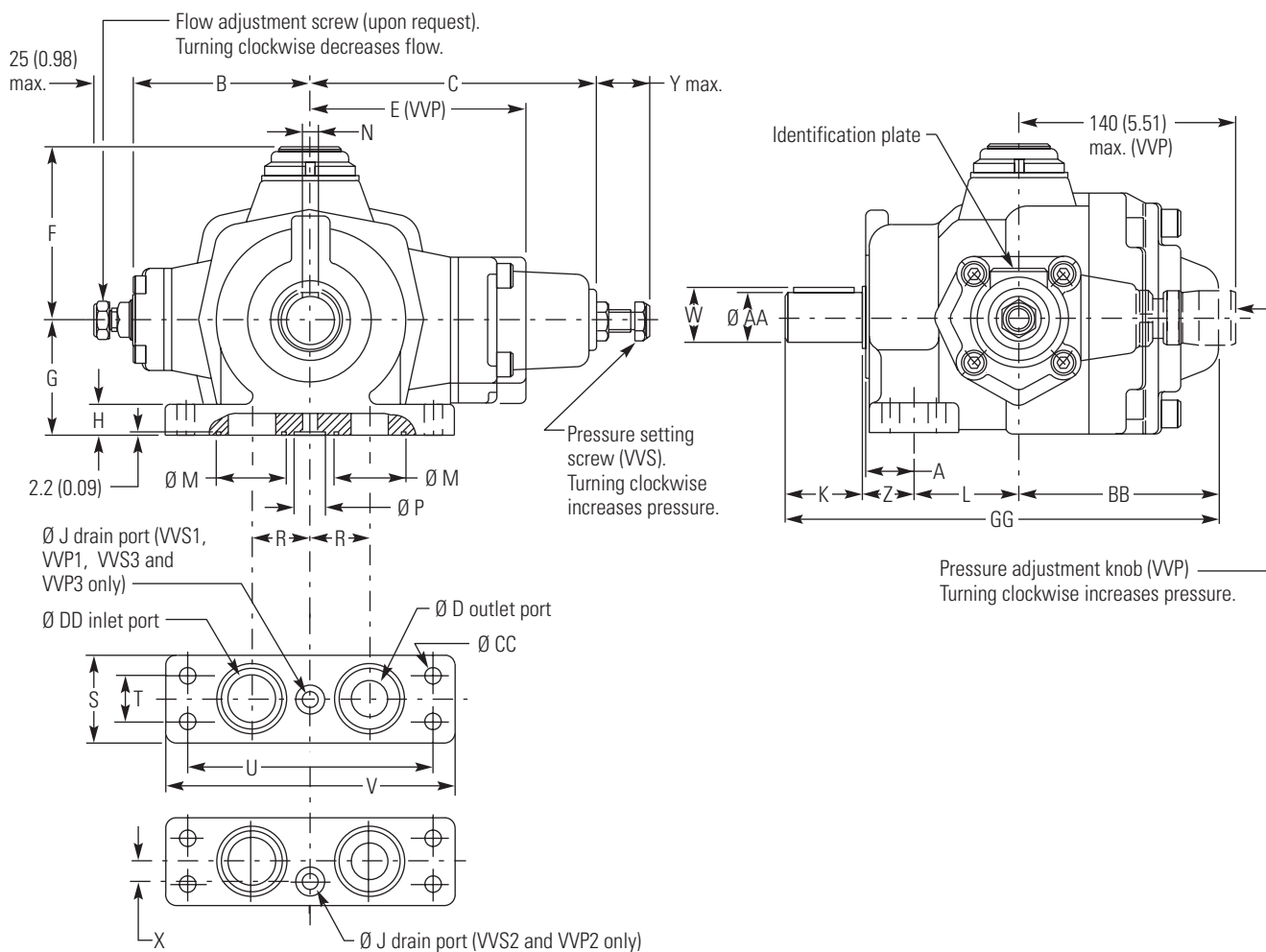
MODEL	X	Y	Z	Ø DD	EE	FF	GG	MM	NN
VVP2	35.7 (1.41)	40 (1.58)	70 (2.76)	38 (1.50)	91 (3.58)	219 (8.62)	279 (10.98)	256 (10.08)	145.5 (5.73)
VVP3	43 (1.69)	46 (1.81)	77.8 (3.06)	51 (2.00)	105 (4.13)	245 (9.65)	303 (11.93)	275.5 (10.85)	155.5 (6.12)

VVP CONTROL	CR	CD1	CD2	CE	CVP	CVPR	CVPD1	CVPD2	CVPCE	CVT(*)
Dimension "X"	20.0 (0.79)	100.0 ♦ (3.94) ♦	146.0 ♦ (5.75) ♦	125.5 ♦ (4.94) ♦	20.0 (0.79)	40.0 (1.57)	120.0 ♦ (4.72) ♦	166.0 ♦ (6.54) ♦	145.5 ♦ (5.73) ♦	115.0 (4.55)

♦ Includes 13 (0.51) for removal of DIN connector.

# VVS and VVP Based Mounted

Installation Dimensions  
in mm (in)



MODEL	A	B	C	Ø D	E	F	G	H	Ø J	K	L	Ø M	N	Ø P
VVS1	25	82	131	14	118.5	80	54	13	6	32	52.5	32.5	5	14
VVP1	(0.98)	(3.23)	(5.16)	(0.55)	(4.67)	(3.15)	(2.13)	(0.51)	(0.24)	(1.26)	(2.07)	(1.28)	(0.20)	(0.55)
VVS2	31	110	175	24	145.5	113	75	20	10	50	68	45.5	10	20.5
VVP2	(1.22)	(4.33)	(6.89)	(0.94)	(5.73)	(4.45)	(2.95)	(0.79)	(0.39)	(1.97)	(2.68)	(1.79)	(0.39)	(0.81)
VVS3	53.5	120	185	28	155.5	123	114	21	13	47	57.5	48	6.35	28
VVP3	(2.11)	(4.72)	(7.28)	(1.10)	(6.12)	(4.84)	(4.49)	(0.83)	(0.51)	(1.85)	(2.26)	(1.89)	(0.25)	(1.10)

MODEL	R	S	T	U	V	W	X	Y	Z	AA	BB	Ø CC	Ø DD	GG
VVS1	25.5	46	25.5	121	140	21	-	30	27	19	89.5	11	21	201
VVP1	(1.00)	(1.81)	(1.00)	(4.76)	(5.51)	(0.83)		(1.18)	(1.06)	(0.75)	(3.52)	(0.43)	(0.83)	(7.91)
VVS2	38	57	30	159	190	35	12.5	40	33	32	129	11	32	280
VVP2	(1.50)	(2.24)	(1.18)	(6.26)	(7.48)	(1.38)	(0.49)	(1.57)	(1.30)	(1.26)	(5.08)	(0.43)	(1.26)	(11.02)
VVS3	57	76	51	247.5	273	27.5	-	40	55.5	25.37	140	13	35	300
VVP3	(2.24)	(2.99)	(2.01)	(9.74)	(10.75)	(1.08)		(1.57)	(2.19)	(1.00)	(5.51)	(0.51)	(1.38)	(11.81)

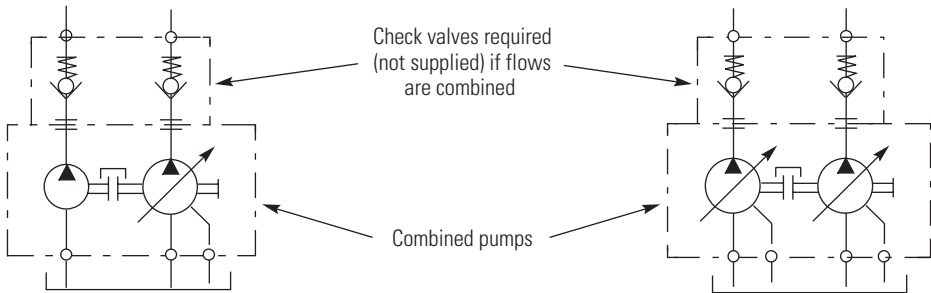
# Combined Pumps

The rotor shaft of Vickers<sup>TM</sup> variable vane pumps is pre-arranged for mounting an additional pump. Simply take off the rear cover to easily attach the secondary pump. (See items A and B on sectional view, page 4.)

Vickers<sup>TM</sup> combined standard pumps (see table below) eliminate the need for many “special application” pumps.

For solutions other than those shown in the table, contact your Eaton representative.

## Typical Pump Combinations



## Components for Combining Pumps

PRIMARY PUMP	SECONDARY PUMP	ADAPTER KIT	PART NO.	MAX. TORQUE ON DRIVE SHAFT FOR SECONDARY PUMP
VV*1-***-R/PS	VVS0-R	AK-VVS/VVP1-0-R	02-358847	55 Nm (487 lbf-in)
	VVS0-PS	AK-VVS/VVP1-0-PS	02-358848	
	VV*1-R	AK-VVS/VVP1-1-R	02-358849	
	VV*1-PS	AK-VVS/VVP1-1-PS	02-358850	
	SAE A 2-bolt ▲	AK-VVS/VVP1-SAE-A	02-358851	
VV*2/3-RF/PF	VVS0-R	AK-VVS/VVP2/3-0-R ●	02-358852	110 Nm (974 lbf-in)
	VVS0-PS	AK-VVS/VVP2/3-0-PS ●	02-358853	
	VV*1-R	AK-VVS/VVP2/3-1-R ●	02-358717	
	VV*1-PS	AK-VVS/VVP2/3-1-PS ●	02-358854	
	VV*2-RF/PX	AK-VVS/VVP2/3-2-RF/PX ●	02-358855	
	SAE A 2-bolt ▲	AK-VVS/VVP2/3-SAE-A ●	02-358856	
	SAE B 2-bolt ▲	AK-VVS/VVP2/3-SAE-B ●	02-358857	
VV*3-RF/PF	VV*3-RF/PX	AK-VVS/VVP3-3-RF/PX	02-358858	180 Nm (1593 lbf-in)

- ▲ SAE A and B 2-bolt are generic interfaces. Secondary pump with SAE A or B mount should conform to dimensions on the following page.
- Adapter kits for same displacements within frame sizes 2 and 3 primary pumps are identical.

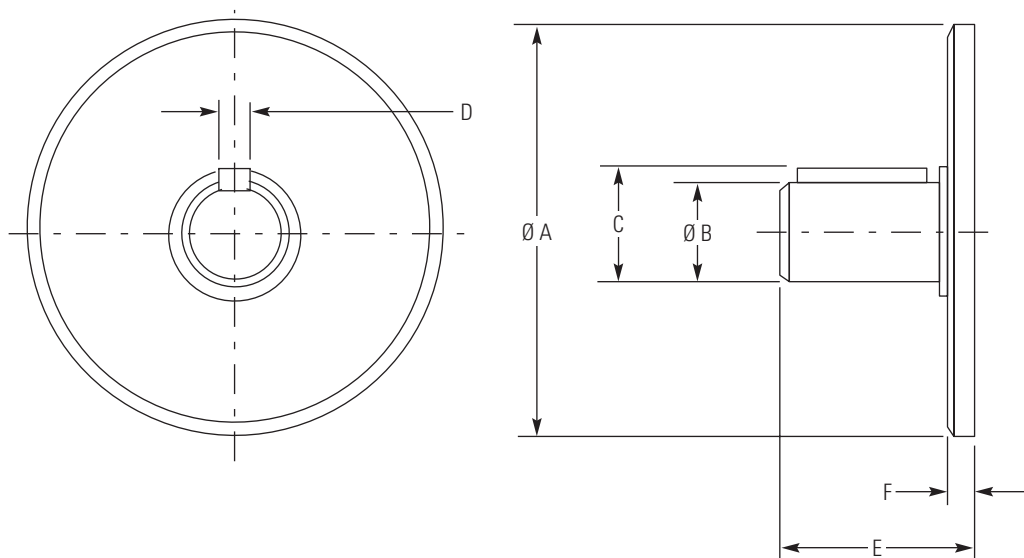
## Ordering Combined Pumps

Order pumps and coupling unit in progressive order of coupling.  
Example:

- One (1) VVP1-20-RR-M-30-CVTCE03B-15-10 Primary Pump
- One (1) AK-VVS/VVP1-0-R Adapter Kit
- One (1) VVS0-10-RR-M-40-CCW-10 Secondary Pump

# Combined Pumps (continued)

Secondary pumps with SAE A or B 2-bolt mounts should conform to the dimensions below. Dimensions in millimeters (inches).



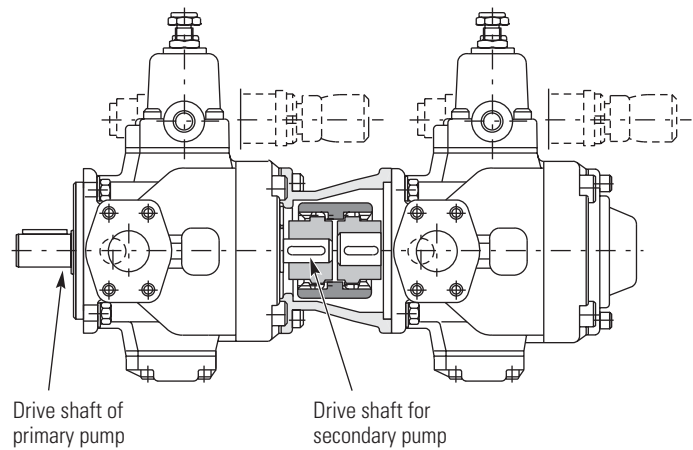
PRIMARY PUMP	2-BOLT FLANGE OF SECONDARY PUMP ▲	ADAPTER KIT	Ø A	Ø B	C	D	E MAX.	F
VVS1 VVP1	SAE A	AK-VVS/VVP1-SAE-A	82.5 (3.25)	19.05 (0.75)	21.1 (0.83)	4.8 (0.19)	50 (1.97)	7 (0.28)
VVS2 VVP2	SAE A	AK-VVS/VVP2/3-SAE-A	82.5 (3.25)	19.05 (0.75)	21.1 (0.83)	4.8 (0.19)	60 (2.36)	7 (0.28)
VVS3 VVP3	SAE B	AK-VVS/VVP2/3-SAE-B	101.6 (4.00)	22.2 (0.87)	25.1 (0.99) ●	6.375 (0.25) ●		9.5 (0.37)
					25.5 (1.00) ●	4.8 (0.19) ●		

▲ Secondary pumps with ISO mounting flange are listed on page 28.

● Both shafts are accommodated within same coupling.

# Torque Requirements Combined Pumps

Combined pumps must be installed in decreasing order of displacement. Torque requirements and limitations of single and combined pumps must not exceed the values shown in the tables below.



## Pump Frame Size 1

PUMP TYPE	REQUIRED TORQUE FOR PRIMARY PUMP Nm (lbf-in)	MAXIMUM TORQUE ON DRIVE SHAFT FOR SECONDARY PUMP Nm (lbf-in)
VVS1-16	30 (266)	
VVS1-20	37 (327)	
VVS1-25	46 (407)	55 (487)
VVP1-16	47 (416)	
VVP1-20	58 (513)	
VVP1-25	73 (646)	

## Pump Frame Size 2

PUMP TYPE	REQUIRED TORQUE FOR PRIMARY PUMP Nm (lbf-in)	MAXIMUM TORQUE ON DRIVE SHAFT FOR SECONDARY PUMP Nm (lbf-in)
VVS2-32	57 (504)	
VVS2-40	73 (646)	
VVS2-50	91 (805)	110 (974)
VVP2-32	92 (814)	
VVP2-40	117 (1036)	
VVP2-50	146 (1292)	

## Pump Frame Size 3

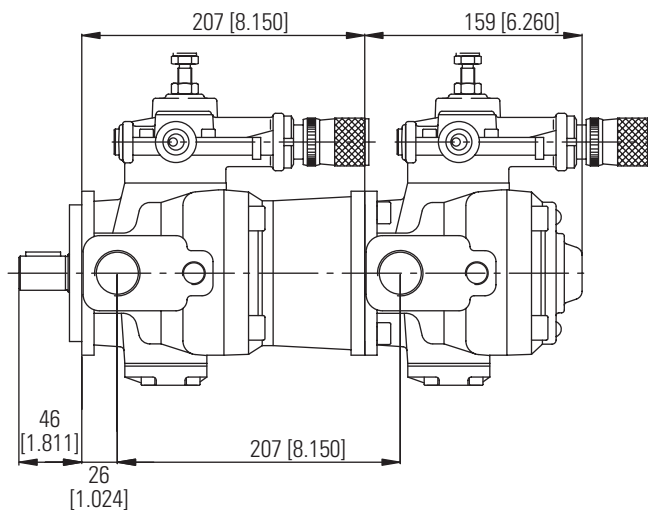
PUMP TYPE	REQUIRED TORQUE FOR PRIMARY PUMP Nm (lbf-in)	MAXIMUM TORQUE ON DRIVE SHAFT FOR SECONDARY PUMP Nm (lbf-in)
VVS3-63	92 (814)	
VVS3-80	117 (1036)	
VVS3-100	146 (1292)	180 (1593)
VVP3-63	172 (1522)	
VVP3-80	219 (1938)	
VVP3-100	273 (2416)	

# Dimensions

## Combined Pumps

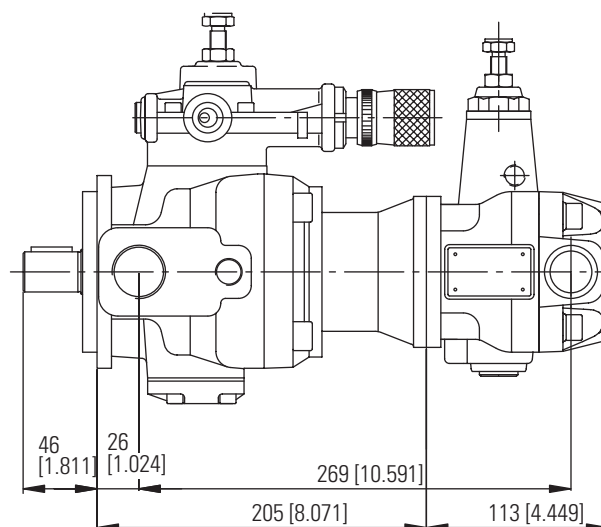
Installation Dimensions  
in mm (in)

### VVS1 or VVP1 Primary Pump With VVS1 or VVP1 Secondary Pump



MOUNTING FLANGE & PORT CODE	A
R	46 (1.81)
PS	48 (1.89)

### VVS1 or VVP1 Primary Pump With VVS0 Secondary Pump

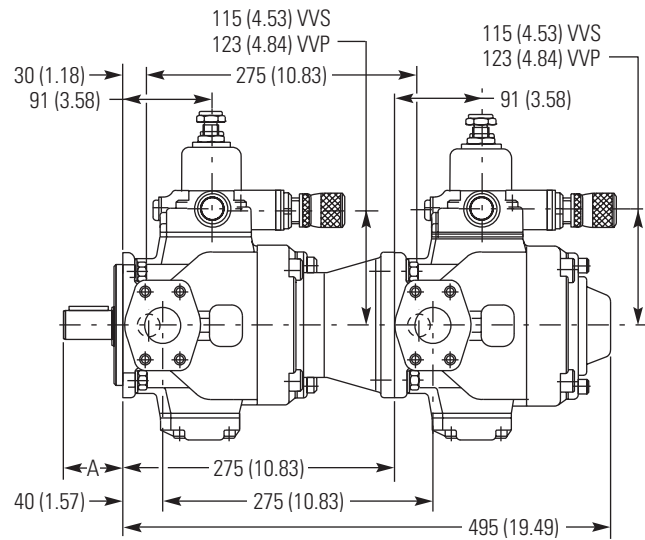


MOUNTING FLANGE & PORT CODE	A
R	46 (1.81)
PS	48 (1.89)

Dimensions  
Combined  
Pumps  
(continued)

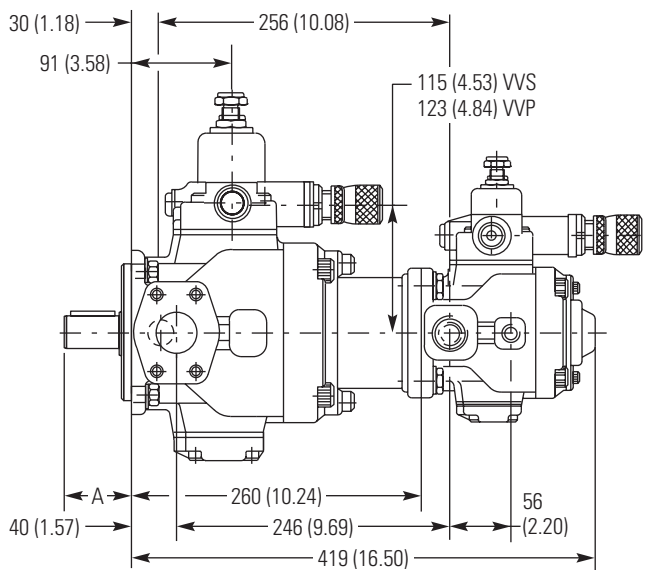
Installation Dimensions  
in mm (in)

VVS2 or VVP2  
Primary Pump With  
VVS2 or VVP2  
Secondary Pump



MOUNTING FLANGE & PORT CODE	A
RF	60 (2.36)
PF	58 (2.28)

VVS2 or VVP2  
Primary Pump With  
VVS1 or VVP1  
Secondary Pump



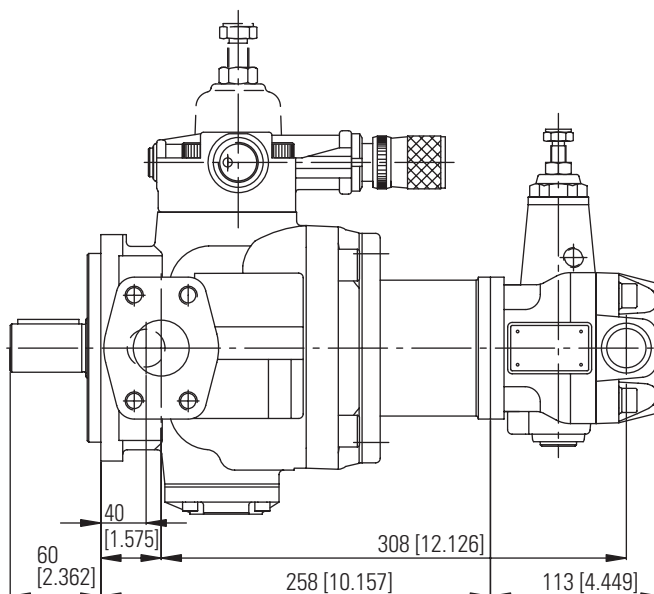
MOUNTING FLANGE & PORT CODE	A
RF	60 (2.36)
PF	58 (2.28)

# Dimensions

## Combined Pumps (continued)

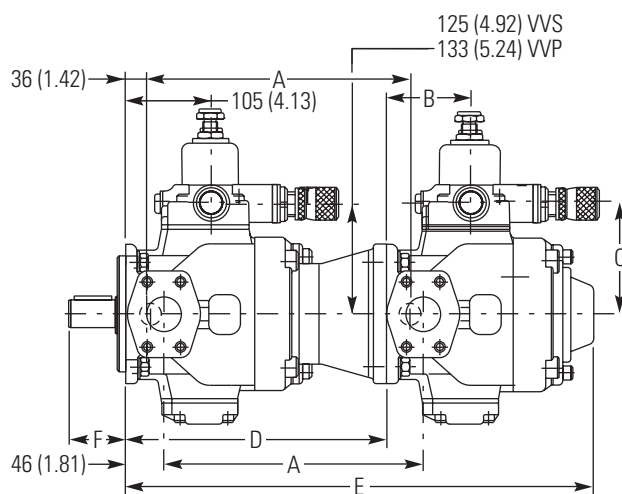
Installation Dimensions  
in mm (in)

### VVS2 or VVP2 Primary Pump With VVS0 Secondary Pump



MOUNTING FLANGE & PORT CODE	A
RF	60 (2.86)
PF	58 (2.28)

### VVS3 or VVP3 Primary Pump With VVS3, VVP3, VVS2 or VVP2 Secondary Pump



MOUNTING FLANGE & PORT CODE	F
RF	68 (2.68)
PF	58 (2.28)

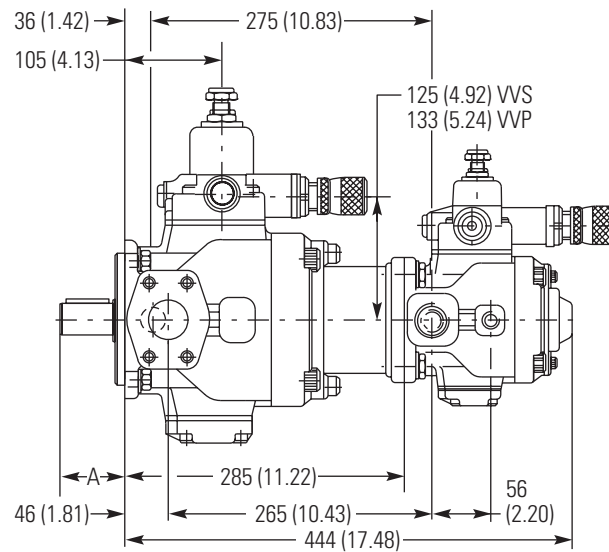
SECONDARY PUMP	A	B	C	D	E
VVS3, VVP3	315 (12.40)	105 (4.13)	125 (4.92) VVS3 133 (5.24) VVP3	315 (12.40)	560 (22.05)
VVS2, VVP2	294 (11.57)	91 (3.58)	115 (4.53) VVS2 123 (4.84) VVP2	300 (11.81)	520 (20.47)

# Dimensions

## Combined Pumps (continued)

Installation Dimensions  
in mm (in)

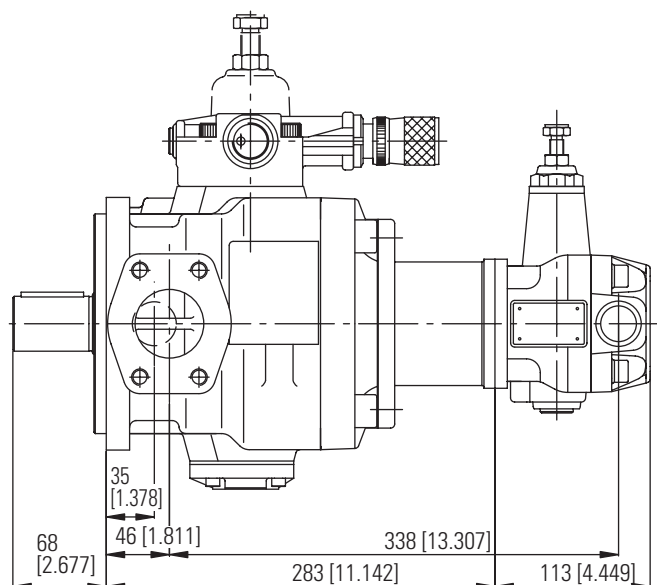
### VVS3 or VVP3 Primary Pump With VVS1 or VVP1 Secondary Pump



**MOUNTING FLANGE  
& PORT CODE**

	<b>A</b>
RF	68 (2.68)
PF	58 (2.28)

### VVS3 or VVP3 Primary Pump With VVS0 Secondary Pump



**MOUNTING FLANGE  
& PORT CODE**

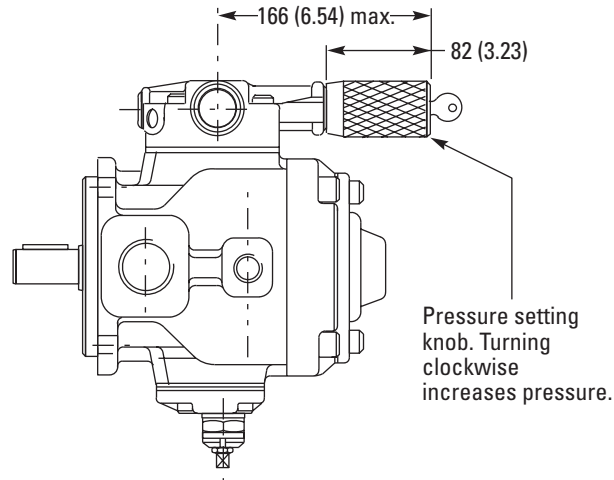
	<b>A</b>
RF	68 (2.68)
PF	58 (2.28)

# Key Lock Adjustment for VVP Pumps

Installation Dimensions  
in mm (in)

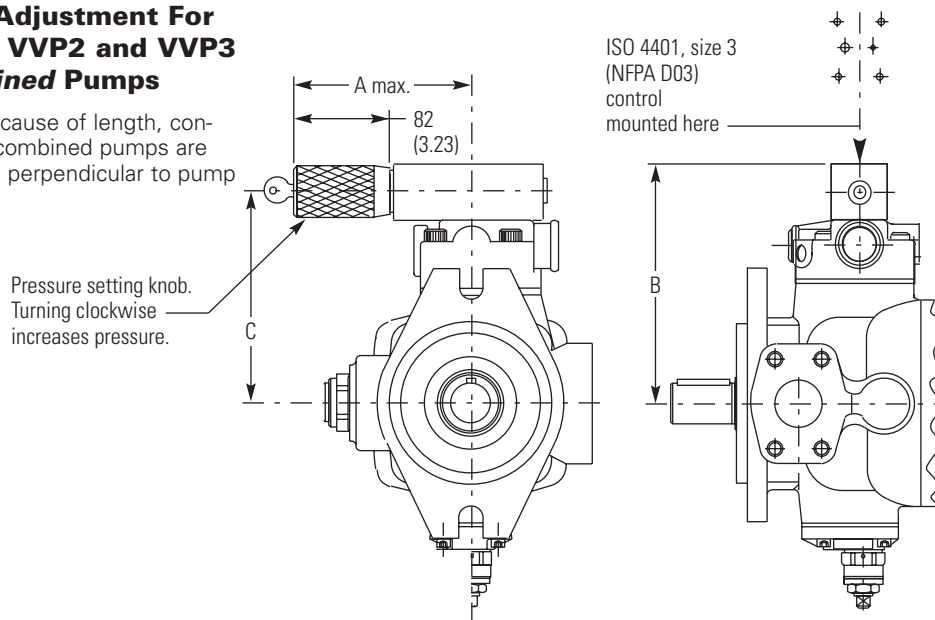


## “KL” Adjustment For VVP1, VVP2 and VVP3 Single Pumps



## “KL” Adjustment For VVP1, VVP2 and VVP3 Combined Pumps

Note: Because of length, controls on combined pumps are mounted perpendicular to pump shaft.



PUMP	A	B	C
VVP1	162 (6.38)	162 (6.38)	139 (5.47)
VVP2	155 (6.10)	189 (7.44)	166 (6.54)
VVP3	155 (6.10)	199 (7.83)	176 (6.93)

# Mounting, Shaft and Port Options

Installation Dimensions  
in mm (in)

## Mountings and Shafts

FRAME SIZE	MTG. FLANGE & PORTS CODE	ISO MOUNTING FLANGE		SAE MOUNTING FLANGE		FRONT END DIAMETER	SHAFT LENGTH	REAR END DIAMETER	SHAFT LENGTH
		PILOT DIA.	BOLT CIRCLE DIA.	PILOT DIA.	BOLT CIRCLE DIA.				
0	R	80 (3.15)	103 (4.06)	-	-	20 (0.79)	36 (1.42)	-	-
	PS	80 (3.15)	103 (4.06)	-	-	15.88 (0.625)	24 (0.938)	-	-
1	B	-	-	-	-	19 (0.75)	32 (1.26)	-	-
	R	100 (3.94)	125 (4.92)	-	-	25 (0.98)	36 (1.42)	20 (0.79)	26 (1.02)
	PS	-	-	101.6 (4.000)	127 (5.000)	25.4 (1.00)	38 (1.50)	20 (0.79)	26 (1.02)
2	B	-	-	-	-	32 (1.26)	50 (1.97)	-	-
	RF	125 (4.92)	160 (6.30)	-	-	32 (1.26)	50 (1.97)	28 (1.10)	45 (1.77)
	PF	-	-	127 (5.000)	180 (7.09)	31.75 (1.25)	48 (1.88)	28 (1.10)	45 (1.77)
	PX	125 (4.92)	160 (6.30)	-	-	32 (1.26)	50 (1.97)	28 (1.10)	45 (1.77)
3	B	-	-	-	-	25.37 (1.00)	47 (1.85)	-	-
	RF	160 (6.30)	200 (7.87)	-	-	40 (1.57)	58 (2.28)	28 (1.10)	45 (1.77)
	PF	-	-	127 (5.000)	180 (7.09)	31.75 (1.25)	48 (1.88)	28 (1.10)	45 (1.77)
	PX	160 (6.30)	200 (7.87)	-	-	40 (1.57)	58 (2.28)	28 (1.10)	45 (1.77)

## Ports

FRAME SIZE	MTG. FLANGE & PORTS CODE	INLET PORT	OUTLET PORT	DRAIN PORT VVS PUMPS	DRAIN PORT VVP PUMPS	REMOTE PRESSURE CONTROL, LOAD SENSING AND DUAL-PRESSURE LOAD SENSING PORTS
0	R	G 3/4" BSP	G 3/8" BSP	G 1/4" BSP	-	-
	PS	1.0625-12 UNF-2B	0.750-16 UNF-2B	0.500-20 UNF-2B	-	-
1	B	21 (0.83)	14 (0.55)	6 (0.24)	6 (0.24)	-
	R	G 1" BSP	G 3/4" BSP	G 3/8" BSP	G 3/8" BSP	G 1/4" BSP
	PS	1.3125-12 UNF-2B	1.0625-12 UNF-2B	0.5625-18 UNF-2B	0.5625-18 UNF-2B	0.500-20 UNF-2B
2	B	32 (1.26)	24 (0.94)	10 (0.39)	10 (0.39)	-
	RF	1.50 SAE 4-bolt flange with M12 x 45 deep mounting holes	1.00 SAE 4-bolt flange with M10 x 35 deep mounting holes	G 1/2" BSP	G 3/4" BSP	G 1/4" BSP
	PF	1.50 SAE 4-bolt flange with 0.500 UNC x 1.75 deep mounting holes	1.00 SAE 4-bolt flange with 0.375-16 UNC x 1.50 deep mounting holes	0.875-14 UNF-2B	1.0625-12 UNF-2B	0.500-20 UNF-2B
	PX					
3	B	35 (1.38)	28 (1.10)	13 (0.51)	13 (0.51)	-
	RF	2.00 SAE 4-bolt flange with M12 x 45 deep mounting holes	1.25 SAE 4-bolt flange with M10 x 40 deep mounting holes	G 1/2" BSP	G 3/4" BSP	G 1/4" BSP
	PF PX	2.00 SAE 4-bolt flange with 0.500 UNC x 1.75 deep mounting holes	1.25 SAE 4-bolt flange with 0.375-16 UNC x 1.75 deep mounting holes	0.875-14 UNF-2B	1.0625-12 UNF-2B	0.500-20 UNF-2B