



BOSCH

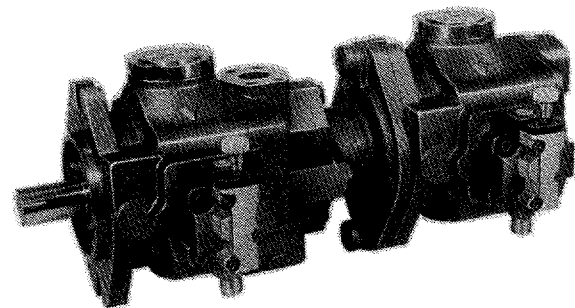
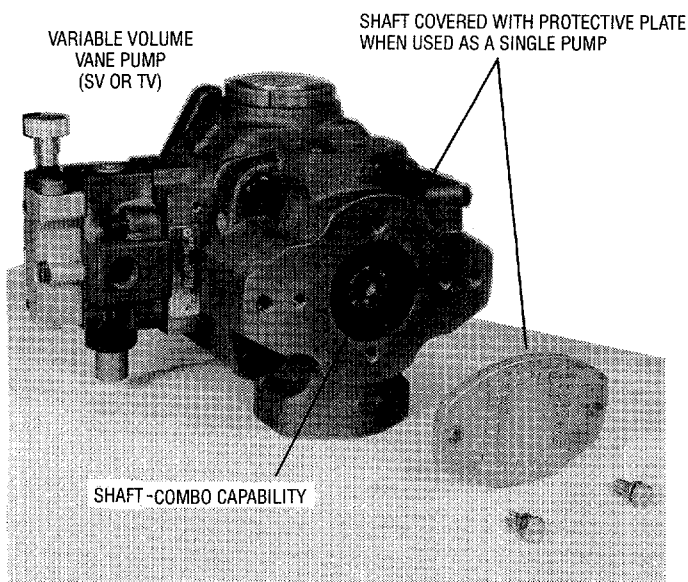
Engineering Data

ADAPTORS FOR TANDEM MOUNTING SV-60 & 62 SERIES

SPECIFICATIONS

RACINE COMBINATION METHOD — All flange mounted, side-ported SILENTVANE (SV) and TWINVANE (TV) pumps have the capability of mounting pumps in tandem on the rear cover. In order to drive the trailing pumps, the standard shaft is made longer and a keyway is machined in. The cover itself is machined to accept an adaptor which is required to mount any trailing pumps. When used as a single pump, a plate is bolted over the cavity in the cover to seal off the shaft.

VARIABLE VANE/VARIABLE VANE COMBINATIONS — To simplify multi-pump power unit design, all flange mounted (side-ported) SV and TV pumps have the capability of having pumps mounted in tandem on the rear cover. The cover is machined to accept an adaptor which is required to mount the trailing pump and the shaft is keyed and uses a tang coupling to drive the trailing pump.



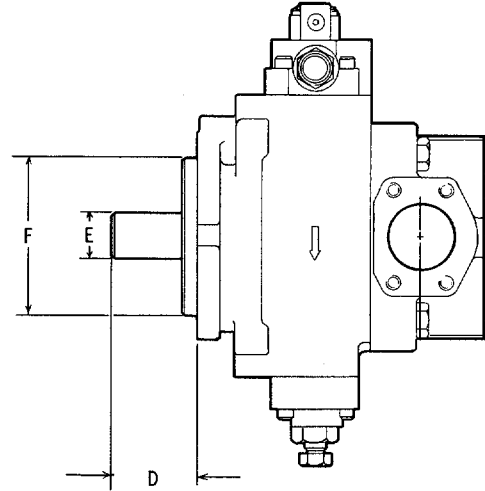
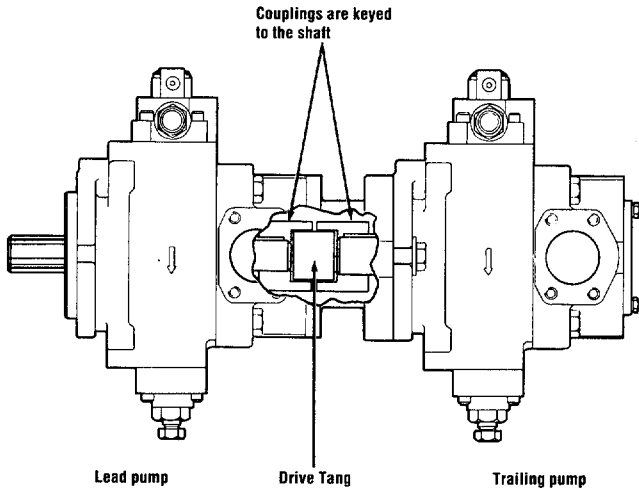
The rear surface of the adaptor is machined to standard SAE two-bolt mounting flange dimensions, while the front of the adaptor is machined to match the cover on the lead pump. Shaft alignment is maintained on the rear end of the adaptor by the hole machined for the pilot on the mounting flange of the trailing pump while, on the other end of the adaptor, two roll pins are used to properly position the adaptor on the cover of the lead pump. Two steel coupling halves are installed onto the keyed shafts and a drive tang is placed in the slots provided for engagement. When the pumps are bolted together, the coupling is held captive between the two shafts.

The lead pump for most combinations is our variable volume vane pump, either SILENTVANE or TWINVANE. Mounted in tandem to the Racine variable volume vane pump can be additional vane pumps, axial piston pumps, radial piston pumps or gear pumps. It should be noted that, although Racine offers all of the pumps mentioned above, our mounting system will work for pumps of different manufacturers.

PRODUCT LITERATURE DISCLAIMER

SPECIFICATIONS AND/OR DIMENSIONS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE. PLEASE CONSULT FACTORY.

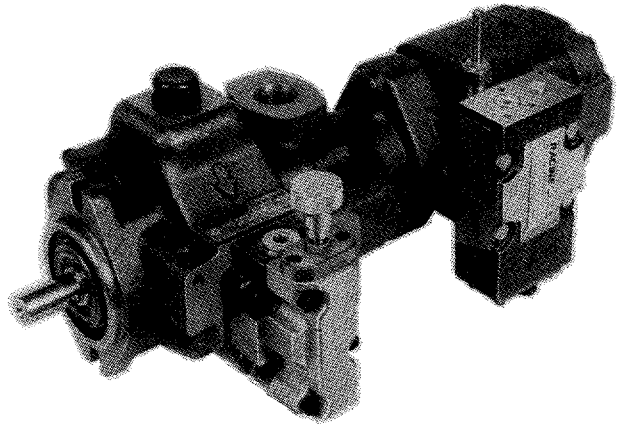
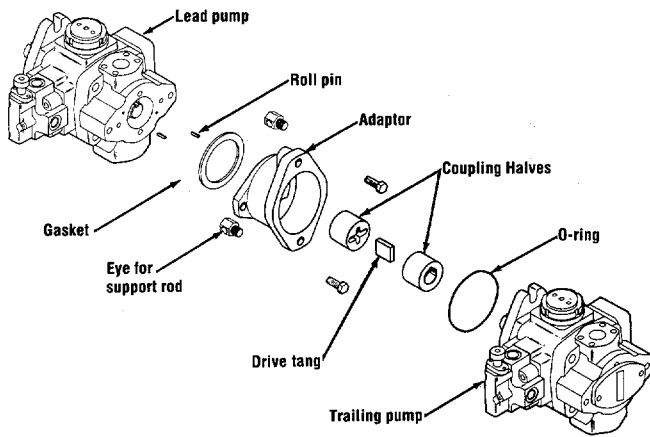
TRAILING PUMP DIMENSIONS



Fluid in the body of the lead pump will flow into the adaptor and lubricate the coupling but is isolated from the trailing pump by the shaft seal. To prevent leakage, a gasket is placed between the cover of the lead pump and the adaptor, while an o-ring is used on the pilot of the trailing pump. Pumps which have voids on the pilot, which is common on some gear pumps, should not be used because the o-ring will not seal at the void.

Lead Pump	Trailing Pump Mounting Flange	Trailing Pump Dim D	Trailing Pump Dim E	Trailing Pump Dim F	Use Kit #
SV-10/15 (SAE A)	SAE A	1.75	.750	3.25	956101
SV-20/25 (SAE B)	SAE A	1.75	.750	3.25	956103
SV-20/25 (SAE B)	SAE B	2.35	.875	4.00	956104
SV-40 (SAE C)	SAE A	1.75	.750	3.25	956109
SV-40 (SAE C)	SAE B	2.35	.875	4.00	956110
SV-40 (SAE C)	SAE C	2.18	1.250	5.00	956106
SV-80/100 (SAE D)	SAE A	1.75	.750	3.25	956109
SV-80/100 (SAE D)	SAE B	2.35	.875	4.00	956110
SV-80/100 (SAE D)	SAE C	2.18	1.250	5.00	956106
SV-80/100 (SAE D)	SAE D	3.22	1.750	6.00	956105

Consult factory for trailing pump shaft dimensions dissimilar to those stated above.



VARIABLE VANE/SAE A, B, C, OR D MOUNTING FLANGES

—Adaptors are available to mount pumps which have the same size mounting flange as the lead pump or smaller. For example, the SV-40 has a SAE C flange. Adaptors are available to mount pumps with SAE A, B, C, and the NFPA 4-bolt (tang drive) mounting flange. The trailing pump does not have to be an SV pump. Any pump which has a standard SAE 2-bolt mounting flange can be mounted, provided the shaft has the same dimensions as those used on the SV or TV pumps. Specifically, the trailing pump shaft must be as follows:

HORSEPOWER & WEIGHT CONSIDERATIONS — More than two pumps can be mounted in tandem; however, the key in the drive shaft of the lead pump limits the amount of horsepower that can be transmitted. The system is designed to transmit full horsepower of the leading pump to the trailing pump or pumps. For example, an SV-20 requires 20 horsepower to drive the pump at full flow and pressure. The horsepower required to drive the trailing pump or pumps should not exceed 20 horsepower. The following table indicates the maximum horsepower that can be transmitted for each pump size at 1800 RPM. Allowable horsepower at 1200 RPM is two-thirds the value at 1800 RPM.

Maximum Horsepower Of Pumps Mounted In Tandem

Lead Pump	Max. H.P. @ 1800 RPM Of Trailing Pump	Max. H.P. @ 1800 RPM Of All Pumps
SV-10	11 HP	22 HP
SV-15	11 HP	22 HP
TV-15	11 HP	22 HP
SV-20	20 HP	40 HP
SV-25	20 HP	40 HP
TV-25	20 HP	40 HP
SV-40	60 HP	100 HP
TV-40	*40 HP	*67 HP
SV-80	70 HP	130 HP
SV-100	70 HP	130 HP
TV-80	*46.5 HP	*93 HP

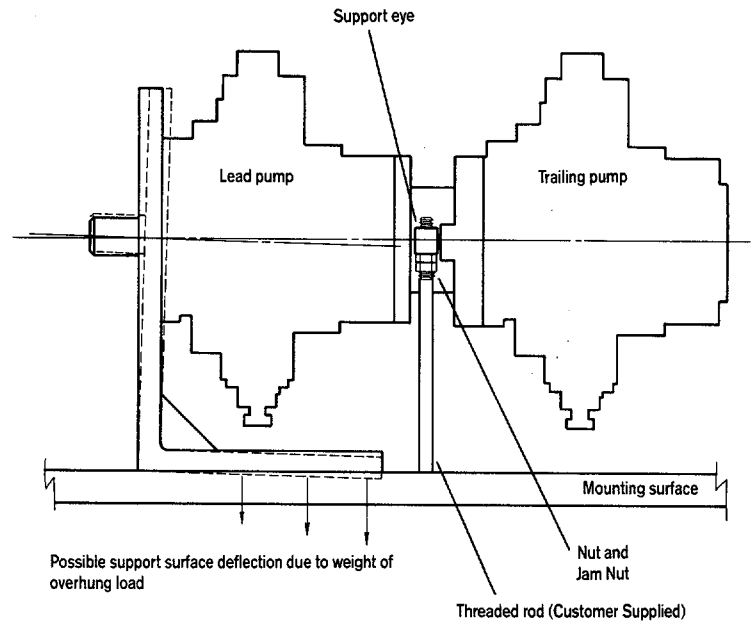
*1200 RPM

When pumps are mounted in tandem, the increased weight may cause the mounting surface or the bracket to deflect which will misalign the coupling. The RACINE mounting brackets (all sizes) are designed to support the lead pump and adaptor plus 65 pounds (equivalent to an SV-20). If the weight is greater than 65 pounds or deflection of the base is a problem, the two bolt holes used for mounting the trailing pump are drilled and tapped all the way through. Extra material was added to this adaptor casting to lengthen the holes so a support eye can be threaded in from the opposite end. A clearance hole (not threaded) is provided in the eye into which a threaded rod can be installed and a nut on the rod adjusted to support the weight. A jam nut should be used to lock it into position. The size of the hole in the support eye is indicated in the table below.

CAUTION: When adding a pump or pumps in combination the use of external support(s) is **required** when the total weight exceeds 65 lbs. (29.5 kg).

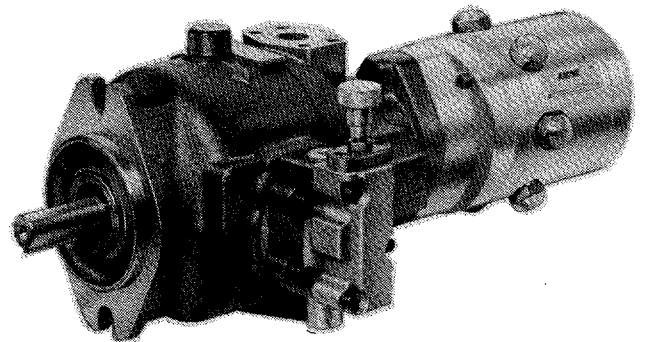
Rod Size To Be Used With Support Eyes

Mounting Flange	Clearance Hole (inches)	Rod Size (inches)
SAE A	15/32	3/8
SAE B	15/32	3/8
SAE C	9/16	1/2
SAE D	11/16	5/8



VARIABLE VANE/RADIAL PISTON COMBINATIONS — Adaptor kits are available to mount E055, 20L, 20H, 80L, 80M or 80H radial piston pumps to the rear of any SV or TV pump. The variable vane/radial piston combinations have many potential applications in high-low pump circuits; a large displacement SV would be used for rapid movement and the low volume, high pressure radial piston pump would be valved in to provide high pressure for clamping or pressing.

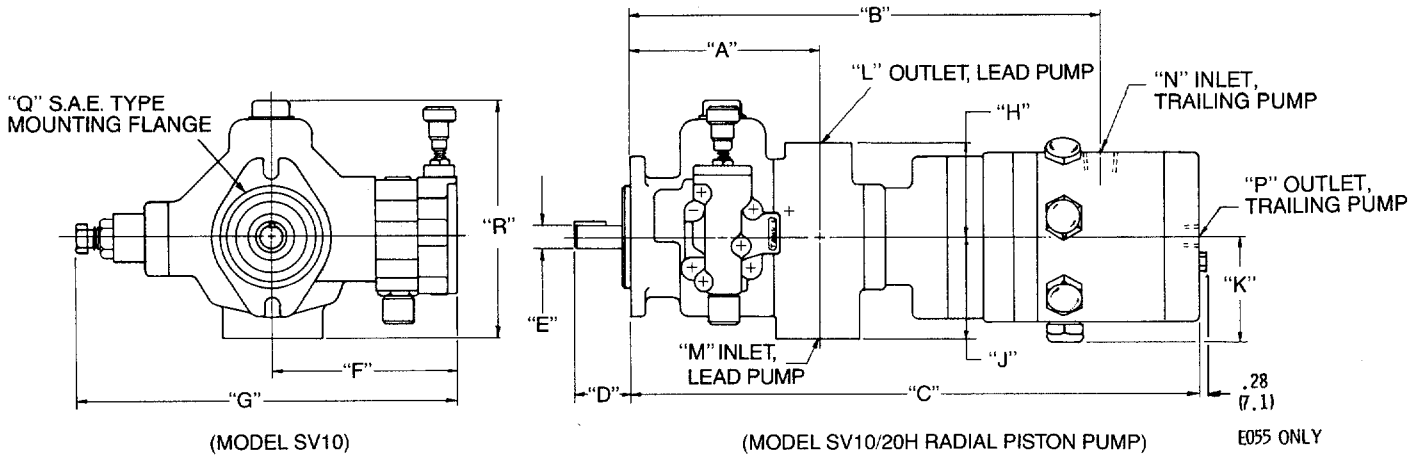
To use a standard Racine radial piston pump as a trailing pump, a SAE "A" flange kit is required (which is included in the 9 adaptor kits listed below.)



SV/radial piston pump adaptor kits are as follows:

Lead Pump	Trailing Pump	Use Kit #
SV-10/15	E055	956177
SV-10/15	20L, H	956178
SV-10/15	80L, M, H	956179
SV-20/25	E055	856180
SV-20/25	20L, H	956181
SV-20/25	80L, M, H	956182
SV-40 or SV-80/100	E055	956183
SV-40 or SV-80/100	20L, H	956184
SV-40 or SV-80/100	80L, M, H	956185

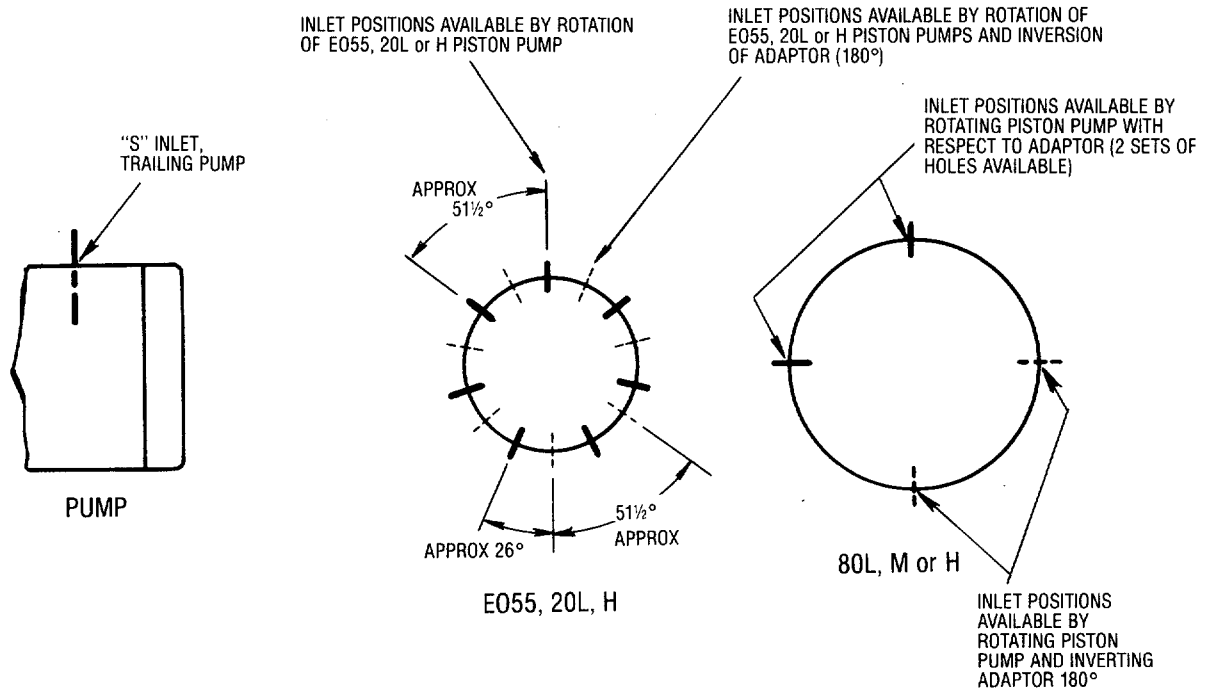
VARIABLE VANE/RADIAL PISTON COMBINATION



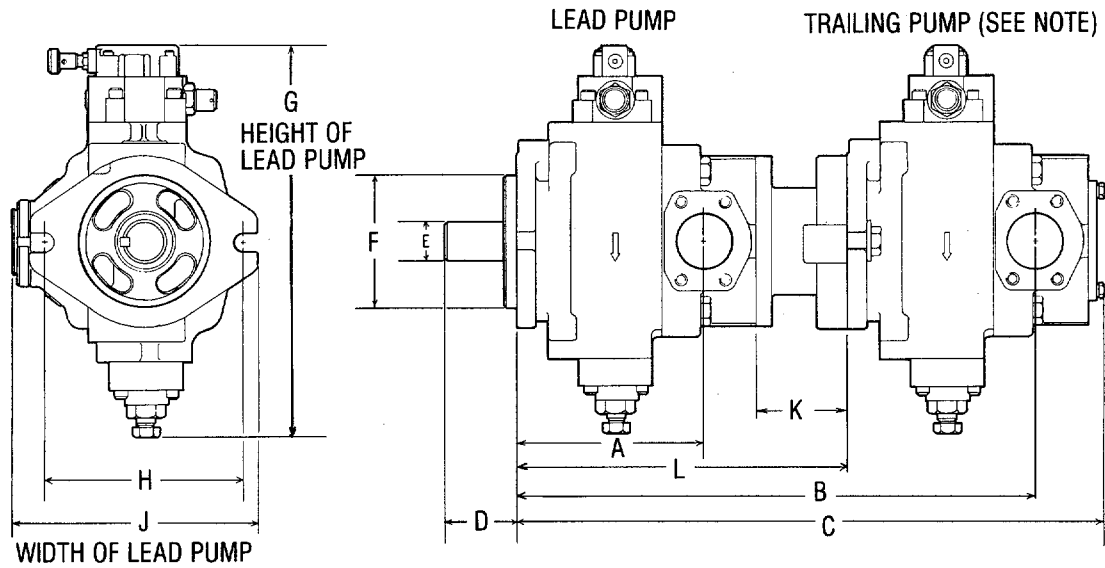
LEAD PUMP	TRAILING PUMP	A	B	C	D	E	F	G	H	J	K	L	M	N	P	O	R
SV10/15	E055	5.85	12.50	13.88	1.75	.750	5.94	12.07	3.00	3.25	2.47	#12 SAE STR. TH'D.	#20 SAE STR. TH'D.	3/8 NPTF	1/4 NPTF	A	7.66
SV10/15	20L, H	5.85	13.25	15.44	1.75	.750	5.94	12.07	3.00	3.25	2.47	#12 SAE STR. TH'D.	#20 SAE STR. TH'D.	3/8 NPTF	1/4 NPTF	A	7.66
SV10/15	80L, M, H	5.85	14.89	17.95	1.75	.750	5.94	12.07	3.00	3.25	3.30	#12 SAE STR. TH'D.	#20 SAE STR. TH'D.	3/4 NPTF	3/8 NPTF	A	7.66
SV20/25	E055	6.54	13.28	14.66	2.35	.875	6.48	13.15	3.62	4.00	2.47	1" SAE 4 BOLT FLANGE	1 1/2" SAE 4 BOLT FLANGE	3/8 NPTF	1/4 NPTF	B	8.55
SV20/25	20L, H	6.54	14.03	16.22	2.35	.875	6.48	13.15	3.62	4.00	2.47	1" SAE 4 BOLT FLANGE	1 1/2" SAE 4 BOLT FLANGE	3/8 NPTF	1/4 NPTF	B	8.55
SV20/25	80L, M, H	6.54	15.67	18.73	2.35	.875	6.48	13.15	3.62	4.00	3.30	1" SAE 4 BOLT FLANGE	1 1/2" SAE 4 BOLT FLANGE	3/4 NPTF	3/8 NPTF	B	8.55
SV40	E055	7.50	14.74	16.12	2.18	1.250	7.67	15.75	3.50	4.12	2.47	1 1/4" SAE 4 BOLT FLANGE	2" SAE 4 BOLT FLANGE	3/8 NPTF	1/4 NPTF	C	8.94
SV40	20L, H	7.50	15.49	17.68	2.18	1.250	7.67	15.75	3.50	4.12	2.47	1 1/4" SAE 4 BOLT FLANGE	2" SAE 4 BOLT FLANGE	3/8 NPTF	1/4 NPTF	C	8.94
SV40	80L, M, H	7.50	17.13	20.19	2.18	1.250	7.67	15.75	3.50	4.12	3.30	1 1/4" SAE 4 BOLT FLANGE	2" SAE 4 BOLT FLANGE	3/4 NPTF	3/8 NPTF	C	8.94
SV80/100	E055	8.51	16.12	17.50	3.22	1.750	8.79	18.06	4.50	4.50	2.47	1 1/2" SAE 4 BOLT FLANGE	2 1/2" SAE 4 BOLT FLANGE	3/8 NPTF	1/4 NPTF	D	11.16
SV80/100	20L, H	8.51	16.87	19.06	3.22	1.750	8.79	18.06	4.50	4.50	2.47	1 1/2" SAE 4 BOLT FLANGE	2 1/2" SAE 4 BOLT FLANGE	3/8 NPTF	1/4 NPTF	D	11.16
SV80/100	80L, M, H	8.51	18.51	21.57	3.22	1.750	8.79	18.06	4.50	4.50	3.30	1 1/2" SAE 4 BOLT FLANGE	2 1/2" SAE 4 BOLT FLANGE	3/4 NPTF	3/8 NPTF	D	11.16

NOTE: UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE NOMINAL (INCHES).

ALTERNATE INLET POSITIONS FOR RADIAL PISTON PUMP



VARIABLE VANE/SAE A, B, C OR D MOUNTING FLANGES

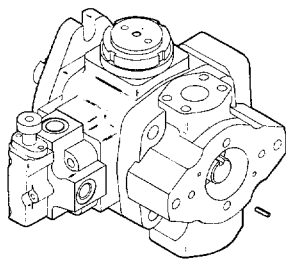


LEAD PUMP	TRAILING PUMP	A	B	C	D	E	F	G	H	J	K	L	KEY WIDTH	APP. WEIGHT
SV-10/15	SV-10/15 (SAE A)	5.85	15.83	17.93	1.75	.750	3.25	11.94	4.19	6.91	2.69	9.95	.1875 Sq	102 LBS.
SV-10/15	PSQ (SAE A)	5.85	13.56	14.64	1.75	.750	3.25	11.94	4.19	6.91	2.69	9.95	.1875 Sq	65 LBS.
SV-20/25	SV-20/25 (SAE B)	6.54	17.88	20.11	2.35	.875	4.00	13.02	5.73	7.69	3.27	11.32	.250 Sq	159 LBS.
SV-20/25	SV-10/15 (SAE A)	6.54	16.60	18.73	2.35	.875	4.00	13.02	5.73	7.69	2.69	10.74	.250 Sq	129 LBS.
SV-20/25	PSQ (SAE A)	6.54	14.34	15.42	2.35	.875	4.00	13.02	5.73	7.69	2.69	10.74	.250 Sq	92 LBS.
SV-40	SV-40 (SAE C)	7.50	20.33	23.07	2.18	1.250	5.00	15.63	7.06	8.98	3.319	12.82	.312 Sq	223 LBS.
SV-40	SV-20/25 (SAE B)	7.50	19.34	21.57	2.18	1.250	5.00	15.63	7.06	8.98	3.277	12.78	.312 Sq	195 LBS.
SV-40	SV-10/15 (SAE A)	7.50	18.06	20.18	2.18	1.250	5.00	15.63	7.06	8.98	2.69	12.19	.312 Sq	164 LBS.
SV-40	PSQ (SAE A)	7.50	15.78	16.86	2.18	1.250	5.00	15.63	7.06	8.98	2.69	12.19	.312 Sq	127 LBS.
SV-80/100	SV-80/100 (SAE D)	8.50	23.54	25.92	3.22	1.750	6.00	17.93	9.00	11.06	4.157	15.04	.437 Sq	385 LBS.
SV-80/100	SV-40 (SAE C)	8.50	21.70	23.70	3.22	1.750	6.00	17.93	9.00	11.06	3.319	14.20	.437 Sq	305 LBS.
SV-80/100	SV-20/25 (SAE B)	8.50	20.72	22.22	3.22	1.750	6.00	17.93	9.00	11.06	3.277	14.16	.437 Sq	265 LBS.
SV-80/100	SV-10/15 (SAE A)	8.50	19.42	20.82	3.22	1.750	6.00	17.93	9.00	11.06	2.69	13.57	.437 Sq	234 LBS.
SV-80/100	PSQ (SAE A)	8.50	17.16	18.24	3.22	1.750	6.00	17.93	9.00	11.06	2.69	13.57	.437 Sq	197 LBS.

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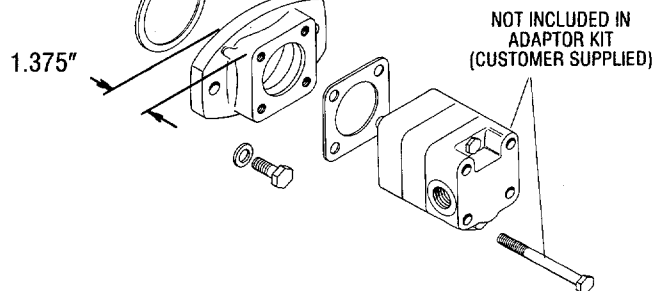
Note: If the trailing pump is different than a Racine SV or TV you will need to know the dimensions of that pump to determine port locations, overall lengths, etc. Our combination kits will work for any trailing pump that has SAE A, B, C, or D mounting pads provided the shaft has the same dimensions as those used on the SV or TV pumps. (Refer to chart on page 2). For different shaft dimensions please consult the factory.

NFPA 4F17 4 BOLT MOUNTING FLANGE (also known as AA mounting flange)



Kit with NFPA 4F17 4-Bolt Tang Drive Adaptor

Lead Pump	Trailing Pump	Use Kit #
SV-10 or 15	Tang Drive	956100
SV-20 or 25	Tang Drive	956102
SV-40, 80, or 100	Tang Drive	956107



**ADAPTOR KITS FOR
SAE A, B, C, OR D
MOUNTING PADS**

VARIABLE VANE/VARIABLE VANE

Adaptor Kits		
Lead Pump	Trailing Pump	Use Kit #
SV-10-15	SV-10/15	956101
SV-10/15	PSQ	956101
SV-20/25	SV-20/25	956104
SV-20/25	SV-10/15	956103
SV-20/25	PSQ	956103
SV-40	SV-40	956106
SV-40	SV-20/25	956110
SV-40	SV-10/15	956109
SV-40	PSQ	956109
SV-80/100	SV-80/100	956105
SV-80/100	SV-40	956106
SV-80/100	SV-20/25	956110
SV-80/100	SV-10/25	956109
SV-80/100	PSQ	956109

VARIABLE VANE/SAE A, B, C OR D

Adaptor Kits		
Lead Pump	Trailing Pump Mounting Flange	Use Kit #
SV-10-15	SAE A	956101
SV-20/25	SAE A	956103
SV-20/25	SAE B	956104
SV-40	SAE A	956109
SV-40	SAE B	956110
SV-40	SAE C	956106
SV-80/100	SAE A	956109
SV-80/100	SAE B	956110
SV-80/100	SAE C	956106
SV-80/100	SAE D	956105

Note: All TWINVANE pumps are identical in outward appearance and dimensions to their SILENTVANE counterparts.

TYPICAL VANE PUMP COMBINATIONS

SV-10/15 or TV 15 AS LEAD PUMP

Pump Models	Maximum Power Transmitted to Trailing Pump(s)	Total Rated Power All Pumps
SV-10	11 Hp	22 Hp
SV-15	11 Hp	22 Hp
TV-15	11 Hp	22 Hp

Lead Pump	Second Pump	Third Pump	Fourth Pump	Total Power
SV-10 @ 11 Hp (2000 psi)	SV-10 @ 11 Hp (2000 psi)			22 Hp
SV-10 @ 11 Hp (2000 psi)	SV-10 @ 5 Hp (1000 psi)			16 Hp
SV-10 @ 8.5 Hp (1500 psi)	SV-15 @ 11 Hp (1500 psi)			19.5 Hp
SV-10 @ 11 Hp (2000 psi)	SV-10 @ 5.5 Hp (1000 psi)	PSQ @ 5 Hp (1000 psi)		21.5 Hp
SV-15 @ 7.5 Hp (1000 psi)	SV-15 @ 7.5 Hp (1000 psi)	PSQ @ 2.5 Hp (500 psi)		17.5 Hp
SV-10 @ 11 Hp (2000 psi)	SV-10 @ 3.3 Hp (500 psi)	SV-10 @ 3.3 Hp (500 psi)	SV-10 @ 3.3 Hp (500 psi)	20.9 Hp
TV 15 @ 7.5 Hp (1000 psi)	TV 15 @ 7.5 Hp (1000 psi)			15 Hp
TV 15 @ 7.5 Hp (1000 psi)	TV 15 @ 7.5 Hp (1000 psi)	PSQ @ 5 Hp (1000 psi)		20 Hp
TV 15 @ 4.5 Hp (500 psi)	TV 15 @ 4.5 Hp (500 psi)	TV 15 @ 4.5 Hp (500 psi)		13.5 Hp

SV-40 or TV 40 AS LEAD PUMP

Pump Models	Maximum Power Transmitted to Trailing Pump(s)	Total Rated Power All Pumps
SV-40	60 Hp	100 Hp
TV-40	40 Hp	56 Hp

Lead Pump	Second Pump	Third Pump	Fourth Pump	Total Power
SV-40 @ 41 Hp (2000 psi)	SV-40 @ 41 Hp (2000 psi)			82 Hp
SV-40 @ 41 Hp (2000 psi)	SV-40 @ 41 Hp (2000 psi)	SV-20 @ 18 Hp (1800 psi)		100 Hp
SV-40 @ 41 Hp (2000 psi)	SV-20 @ 20 Hp (2000 psi)	SV-20 @ 20 Hp (2000 psi)		81 Hp
SV-40 @ 41 Hp (2000 psi)	SV-20 @ 20 Hp (2000 psi)	SV-10 @ 11 Hp (2000 psi)		72 Hp
SV-40 @ 41 Hp (2000 psi)	SV-20 @ 20 Hp (2000 psi)	SV-10 @ 11 Hp (2000 psi)	PSQ @ 5 Hp (1000 psi)	77 Hp
SV-40 @ 41 Hp (2000 psi)	SV-20 @ 20 Hp (2000 psi)	SV-10 @ 11 Hp (2000 psi)	SV-10 @ 11 Hp (2000 psi)	83 Hp
TV 40 @ 15.5 Hp (1000 psi)	TV 25 @ 7.5 Hp (1000 psi)			23 Hp
TV 40 @ 15.5 Hp (1000 psi)	TV 40 @ 15.5 Hp (1000 psi)			31 Hp
TV 40 @ 15.5 Hp (1000 psi)	TV 40 @ 15.5 Hp (1000 psi)	TV 40 @ 15.5 Hp (1000 psi)		46.5 Hp

SV-20/25 or TV 25 AS LEAD PUMP

Pump Models	Maximum Power Transmitted to Trailing Pump(s)	Total Rated Power All Pumps
SV-20	20 Hp	40 Hp
SV-25	20 Hp	40 Hp
TV-25	13.5 Hp	21.5 Hp

Lead Pump	Second Pump	Third Pump	Fourth Pump	Total Power
SV-20 @ 20 Hp (2000 psi)	SV-20 @ 20 Hp (2000 psi)			40 Hp
SV-20 @ 20 Hp (2000 psi)	SV-10 @ 11 Hp (2000 psi)	PSQ @ 5 Hp (1000 psi)		36 Hp
SV-20 @ 20 Hp (2000 psi)	SV-10 @ 10 Hp (1800 psi)	SV-10 @ 10 Hp (1800 psi)		40 Hp
SV-25 @ 14 Hp (1000 psi)	SV-25 @ 14 Hp (1000 psi)	SV-10 @ 5.5 Hp (1000 psi)		33.5 Hp
SV-20 @ 20 Hp (2000 psi)	SV-25 @ 8 Hp (500 psi)	SV-10 @ 3.3 Hp (500 psi)	SV-10 @ 3.3 Hp (500 psi)	34.6 Hp
SV-20 @ 20 Hp (2000 psi)	SV-10 @ 10 Hp (1800 psi)	SV-10 @ 5 Hp (900 psi)	PSQ @ 5 Hp (1000 psi)	40 Hp
TV 25 @ 7.5 Hp (1000 psi)	TV 25 @ 7.5 Hp (1000 psi)			15 Hp
TV 25 @ 7.5 Hp (1000 psi)	TV 15 @ 4.5 Hp (1000 psi)			12 Hp
TV 25 @ 7.5 Hp (1000 psi)	TV 25 @ 7.5 Hp (1000 psi)	PSQ @ 3.5 Hp (1000 psi)		18.5 Hp

SV-80/100 or TV 80 AS LEAD PUMP

Pump Models	Maximum Power Transmitted to Trailing Pump(s)	Total Rated Power All Pumps
SV-80	70 Hp	130 Hp
SV-100	70 Hp	130 Hp
TV-80	46.5 Hp	75 Hp

Lead Pump	Second Pump	Third Pump	Fourth Pump	Total Power
SV-80 @ 62 Hp (1500 psi)	SV-80 @ 62 Hp (1500 psi)			124 Hp
SV-80 @ 62 Hp (1500 psi)	SV-80 @ 62 Hp (1500 psi)	SV-10 @ 6 Hp (1200 psi)		130 Hp
SV-80 @ 62 Hp (1500 psi)	SV-40 @ 41 Hp (2000 psi)	SV-40 @ 27 Hp (1300 psi)		130 Hp
SV-100 @ 51 Hp (1000 psi)	SV-100 @ 51 Hp (1000 psi)	SV-20 @ 11 Hp (1000 psi)		113 Hp
SV-80 @ 62 Hp (1500 psi)	SV-40 @ 41 Hp (2000 psi)	SV-20 @ 20 Hp (2000 psi)	SV-10 @ 7 Hp (1400 psi)	130 Hp
TV 80 @ 27 Hp (1000 psi)	TV 40 @ 15.5 Hp (1000 psi)			42.5 Hp
TV 80 @ 27 Hp (1000 psi)	TV 80 @ 27 Hp (1000 psi)			54 Hp
TV 80 @ 27 Hp (1000 psi)	TV 80 @ 27 Hp (1000 psi)	TV 40 @ 15.5 Hp (1000 psi)		69.5 Hp

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HPUS AKY 003/7 US (7.94)

