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Tricam Geometry

Design and Operation

seepex Tricam Geometry is the natural evolution of the already proven **6L** geometry. The unique characteristic of this new design is the double helix screw of the rotor in an elliptical cross section and the stator with a triple internal helix that has a pitch length, 50 % longer than that of the rotor.

With this design, a third cavity is created that progresses through the pump with each rotation.

The Rotor and Stator

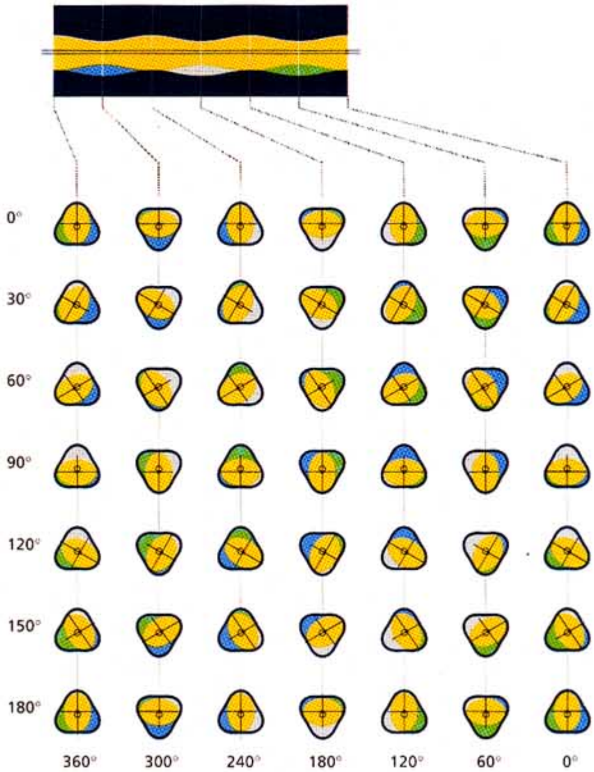
The **Tricam** rotor is of a double helix design that appears as an ellipsis in its cross seciton. The rotor maintains a circular eccentric motion as it rotates. The **Tricam** stator has a triple internal helix, each 120° opposed. Since the fluid cross section is unchanged during the pumping cycle, the **Tricam** design also delivers smooth, non-interrupted, predictable flow.

The Function

The rotor and stator combination creates three sealed cavities within the pump. The sealing lines defining these cavities are continuous, but revolve relative to each other, in their cross section. When the rotor revolves, the sealed cavities progress in a helical motion through the pump, displacing the captured liquids. Since these cavities are completely sealed, positively isolating the suction and discharge conditions from each other, the pump is capable of high suction lifts and high pressures, independent of its operating speed.

Interchangability

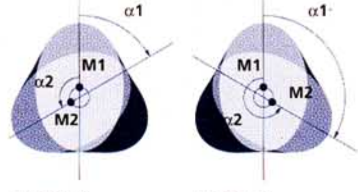
Due to the dimensional similarity of the **6L** and **Tricam** elements, certain sizes of **6L** pumps can be retrofitted with the **Tricam** design. If driver sizing allows, the **Tricam** exchange will deliver a 50 % increase in the pump capacity. Conversely, the pump speed can be reduced by 1/3 and the pump will still deliver the original flow.



Increases Capacity by 50 %

The ratio, $\alpha 2/\alpha 1 = 2$, is the basic operational feature that allows the **Tricam** design to dramatically increase capacity wihtin a confined physical geometry, compared to the 1/2 screw design. Because the eccentric turning angle is twice the rotor turning angle, each of the three Tricam cavities progresses through the pumping elements twice within each rotor revolution. The combined cross sectional fluid area of the 2/3 screw design is only approx. 75 % of the area of the conventional design. Multiplying the 75 % volume times the turning angle ratio of 2:1, provides an increase in total volume per revolution of 50 %.

The Tricam Eccentric Track



	Position 1	**Position 2**
Rotor Turning Angle	*α1 = 60°*	*α1 = 120°*
Eccentric Turning Angle	*α2 = 120°*	*α2 = 240°*
Rotor Center Point	*0° = M1*	*0° = M1*
Rotor Center Point	*60° = M2*	*120° = M2*

Tricam Advantages

Compact Design

The **Tricam** design will increase flow by 50 % when compared with the **6L** geometry of the same physical external dimensions.

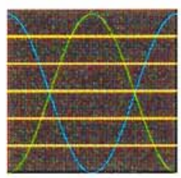
Reduced Surface Velocities and Reduced Axial Forces

Of special interest is the reduced surface velocity of the rotor, at the same capacity, and the slight reduction in axial load.

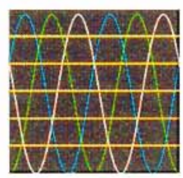
Energy and Raw Materials Savings

The **Tricam** design saves users in two ways. Since smaller pumps can be used, less metal and elastomer is used to manufacture the **Tricam** design. The **Tricam** also has improved mechanical efficiencies. It takes less energy to manufacture and less energy to operate.

Improved Flow Properties



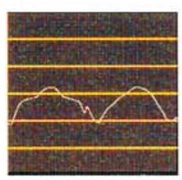
Capacity Curve – 6L



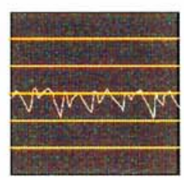
Capacity Curve – Tricam

Because the number of pumping chambers has been increased from two to three, fluid flow is more consistent.

Increased Pressure Stability



Static Pressure Diagram – 6L



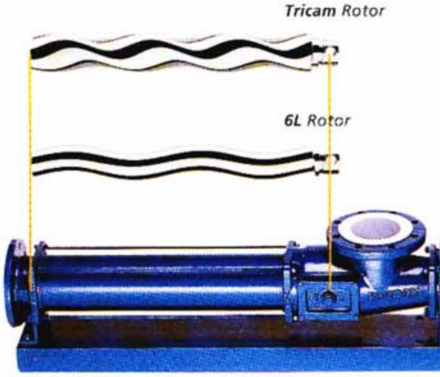
Static Pressure Diagram – Tricam

*The higher pressure stability, specifically at lower operating speeds, makes the **Tricam** especially attractive for metering services.*

Comparison of Technical Specification	6L	Tricam
Eccentric Speed n(e)	n(e) = n	n(e) = 2n
Number of Chambers	2	3
Chamber Volume	100 %	approx. 75 %
Capacity	100 %	approx. 150 %
Power Requirement	100 %	approx. 145 %
Particle Velocity (n = constant)	100 %	200 %
Particle Velocity(Q = constant)	100 %	approx. 140 %
Thrust Load	100 %	approx. 120 %
Maximum Solids Size	100 %	approx. 68 %
Volumetric Efficiency	+	++
Overall Efficiency	+	++
Pulsations	+	++
Physical Size	+	++
Average Surface Velocity (n = constant)	100 %	approx. 110 %
Average Surface Velocity (Q = constant)	100 %	approx. 75 %

*The **Tricam** pumps have the same length and stator tube dimension as the previous design and can be readily interchanged into an existing pump.*

***Tricam** Rotor*



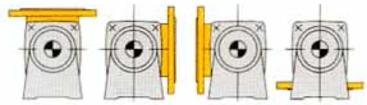
Tricam Dimensions

Dimensions	15-6LT	30-6LT	40-6LT	55-6LT	75-6LT	110-6LT
a	68	73	80	80	80	90
a1	41	43	52	43	43	45
a2	733	912	1059	1088	1196	1370
a3	—	—	—	—	—	—
a4	205	230	260	265	265	310
b	95	105	110	120	120	145
b1	115	125	125	150	150	150
c	12	14	15	15	15	15
f	120	140	145	155	155	185
f1	140	155	160	180	180	200
h	100	125	130	140	140	160
h1	210	245	260	285	290	320
i	86	102	110	120	120	141
k	875	1066	1235	1255	1363	1561
k1	1065	1287	1481	1516	1624	1866
m	48	50	50	50	50	60
m1	134	149	164	164	164	196
n	20	20	20	20	20	20
n1	33	38	44	44	44	56
o1	628	777	921	926	1034	1180
p	410	520	590	645	765	845
q1	G 1/4"	G 3/8"	G 3/8"	G 3/8"	G 3/8"	G 1/2"
q2	G 1/2"	G 1/2"	G 1/2"	G 1/2"	G 3/4"	G 3/4"
s	12	14	14	14	14	18
Drive End						
d	25	30	35	40	40	50
l	50	65	70	75	75	90
t	28	33	38	43	43	53,5
u	8	8	10	12	12	14
Suction Connection ANSI B 16,5 [1]						
DIN	2501	2501	2501	2501	2501	2501
PN	16	16	16	16	16	16
DN1	80	100	100	125	125	150
D1 [2]	200	220	220	250	250	285
K1	160	180	180	210	210	240
S1	18	18	18	18	18	23
Z1	8	8	8	8	8	8
Discharge Connection ANSI 16,5 [1]						
DIN	2501	2501	2501	2501	2501	2501
PN	16	16	16	16	16	16
DN2	65	80	100	100	125	125
D2 [2]	185	200	220	220	250	250
K2	145	160	180	180	210	210
S2	18	18	18	18	18	18
Z2	4	8	8	8	8	8
Weight [lbs] approx.						
BN	37	57	85	104	119	152
NS	39	60	90	110	125	160

Suction Branch Position [1]

Range **BN** viewed from drive end
Range **NS** viewed from pump shaft

Position 1 standard	Position 2	Position 3	Position 4



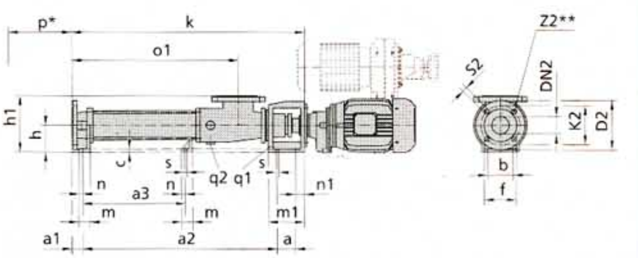
ANSI Pump Flanges

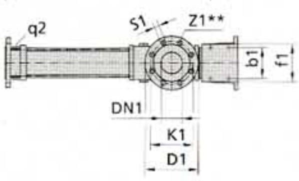
Flange to DIN 2501	Flange to ANSI B16,5 150 lbs			
DN	**DN**	**K1 K2**	**S1 S2**	**Z1 Z2**
65	2 1/2"	139,7	19,1	4
80	3"	152,4	19,1	4
100	4"	190,5	19,1	8
125	5"	215,9	22,4	8
150	6"	241,3	22,4	8

1) For normal operation pump rotation is counterclockwise, suction connection = **DN1**, pressure connection = **DN2**. For reverse flow clockwise rotation the suction and discharge connections are reversed i.e. suction connection now **DN2**, pressure connection now **DN1**.

2) Minor deviations might occur with flange external diameters **D1** and **D2** since larger DIN flange diameters have been machined to ANSI specifications.

Range BN

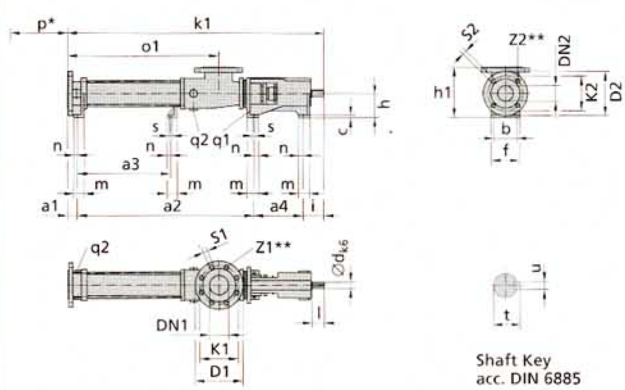




Drive Choice:
Gearmotor
Variable Speed Drive
Hydraulic Motor

* Dimension for Stator Replacement
** Number of Holes

Range NS



Shaft Key
acc. DIN 6885

* Dimension for Stator Replacement
** Number of Holes

Tricam Performance Data

Sizing

Due to the number of variables that must be considered for proper pump sizing; such as, fluid rheology, adhesive or cohesive reactions, suction conditions, viscosity, other physical fluid properties and temperature, all selections should be confirmed by seepex. The sizing of the required driver can be approximated from the table below, regard should be given to the safety factors particularly to the efficiency and torque characteristics of the preferred drive.

The data in the table below is the minimum requirement at the pump shaft. For drive sizing, starting power must be calculated with the following formula:

$$P_A\,[kW] = \frac{M_A\,[Nm]^{*1} \times n\,[min^{-1}]}{9550 \times M_A / M_N^{*2}}$$

*1
The starting torque value is dependent on the product being pumped. Lubricating type materials with low viscosities will require less starting torque then will adhesive, solids laden or viscous materials.

*2
The starting power factor depends on the type of drive selected. Consult the data listed in the drive manufacturer's published literature.

Drive

For the selection of the proper drive, it is necessary to use the higher of the required operating power or the required starting power. Drive efficiency must always be considered. The consideration of starting power requirements is critical due to the compression fit between the rotor and stator in **seepex** pumps. **seepex** strives to maintain an optimum compression to minimize starting power but to maximize volumetric efficiencies, suction lift capabilities, pressure stability and pumping element life.

A pump with compression fit between the pumping elements offers the following advantages over pumps with clearance fits between the pumping elements:

- Minimal internal slippage which results in less wear on the puming elements.
- Improved volumetric efficiencies over a wide speed range at a given differential pressure.
- High suction lift capability (low NPSHr) even at low speeds.

		15-6LT M_A 70 – 100 Nm			**30-6LT** M_A 105 – 150 Nm			**40-6LT** M_A 140 – 200 Nm			**55-6LT** M_A 175 – 250 Nm			**75-6LT** M_A 245 – 350 Nm			**110-6LT** M_A 315 – 450 Nm		
	bar	*2*	*4*	*6*	*2*	*4*	*6*	*2*	*4*	*6*	*2*	*4*	*6*	*2*	*4*	*6*	*2*	*4*	*6*
Q [m³/h]																			
2	upm	54	64	82															
	kW	0,35	0,54	0,86															
3	upm	78	88	106															
	kW	0,51	0,76	1,11															
4	upm	102	112	130															
	kW	0,66	0,95	1,36															
5	upm	126	136	154	58	75	91												
	kW	0,82	1,16	1,62	0,65	1,19	1,89												
7,5	upm	187	197	215	86	103	119	65	81	96									
	kW	1,21	1,67	2,25	0,97	1,65	2,48	0,97	1,73	2,69									
10	upm	247	257	275	114	131	148	86	102	119	64	80	97						
	kW	1,61	2,19	2,89	1,29	2,10	3,06	1,28	2,17	3,27	1,28	2,30	3,61						
12,5	upm	308	318	335	143	159	176	107	123	140	79	96	113	54	71	88			
	kW	2,00	2,70	3,52	1,60	2,55	3,65	1,60	2,62	3,85	1,59	2,74	4,19	1,63	3,20	5,26			
15	upm	368	378	396	171	187	204	128	144	161	95	112	128	65	82	98	54	62	78
	kW	2,39	3,21	4,16	1,92	3,00	4,23	1,91	3,07	4,42	1,90	3,19	4,76	1,95	3,67	5,89	2,05	3,45	5,75
17,5	upm	428	438	456	199	216	232	149	165	182	111	127	144	76	92	109	62	69	85
	kW	2,78	3,73	4,79	2,24	3,45	4,82	2,23	3,51	5,00	2,21	3,63	5,34	2,27	4,15	6,53	2,34	3,87	6,31
20	upm				227	244	260	170	186	203	126	143	159	86	103	119	69	77	93
	kW				2,56	3,90	5,40	2,54	3,96	5,58	2,52	4,08	5,92	2,58	4,62	7,16	2,63	4,29	6,87
25	upm				284	300	317	212	228	245	157	174	191	107	124	140	84	92	108
	kW				3,19	4,80	6,58	3,17	4,85	6,73	3,15	4,97	7,08	3,22	5,57	8,43	3,20	5,14	7,99
30	upm				340	357	373	254	270	287	188	205	222	128	145	162	99	107	123
	kW				3,83	5,71	7,75	3,80	6,74	7,89	3,77	5,86	8,23	3,85	6,52	9,69	3,78	5,99	9,11
40	upm				396	413	430	338	354	371	251	267	284	171	187	204	130	137	153
	kW				4,46	6,61	8,92	5,06	7,53	10,2	5,01	7,64	10,6	5,12	8,42	12,2	4,93	7,68	11,4
50	upm							422	438	455	313	330	346	213	229	246	160	167	184
	kW							6,33	9,31	12,5	6,26	9,42	12,9	6,39	10,3	14,8	6,08	9,38	13,6
60	upm										375	392	408	255	272	288	190	198	214
	kW										7,50	11,2	15,2	7,65	12,2	17,3	7,23	11,1	15,8
70	upm													297	314	331	221	228	244
	kW													8,92	14,1	19,8	8,38	12,8	18,1
80	upm																251	258	274
	kW																9,53	14,5	20,3

All performance data is approximated, based on H_2O @ 20° C, subject to change without notice.

seepex.com
all things flow

And what can we get flowing for you? Your nearest contact:

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