

## How to size the ViscoTwin pump head and a motor to meet your application requirements

1. Go to <https://processtec.com/> and look for the sizing programs.
2. Overwrite the "fill in..." with your fluid descriptions. You can calculate 5 individual applications for the pump plus CIP. Pump head and motor need to fulfill all application requirements.
3. If the highest pressure across all applications remains below 12 bar (174 psi), start with the Model VT104.53. (N-Type Spindle) If the highest pressure is above 12 bar, start with Model T104.36 (H-Type Spindle)
4. Select the unit system:
  - a. SI-Units, standard (International metric units)
  - b. US-Units (..)
5. Type your Media Description into the „fill in“ field
6. Enter for each application, including CIP:
  - a. Flowrate in gpm
  - b. Viscosity in cp
  - c. Discharge Pressure in psi-gauge
  - d. Select suction pressure per drop down in psi-atmospheric
  - e. Fluid temperature in °F
  - f. Select the Horizontal Pipe diameter (Pipe connecting at the pump face)
  - g. Select the Vertical Pipe Diameter (Pipe connecting at the pump housing)
7. Press the CALCULATE button.
8. First Calculation Results:
  - a. The Calculated Shaft Speed needs to be lower than the Cavitation Shaft Speed.
  - b. Sensitive particulates (macaroni, spaghetti, potato junks, carrot pieces) prefer lower speeds (300 to 600 rpm)
  - c. Non-sensitive media between 500 and 2200 rpm
  - d. CIP up to max speed of the standard pump head (exceptions possible):
    - i. VT70: 4000 rpm
    - ii. VT104: 3600 rpm
    - iii. VT130: 3000 rpm
9. The calculated Shaft Torque must be below the Max Shaft Torque:
  - a. VT70: 73 lb-ft
  - b. VT104: 147 lb-ft
  - c. VT130: 295 lb-ft
10. Exchange Pump Heads with Spindle Pitches until the optimal result is found based on:
  - a. Particulate size (consult particulate size chart in Appendix A)
  - b. Cavitation Shaft Speed (flow rate, viscosity)
  - c. Desired Shaft Speed (product handling)
  - d. Max shaft torque (limitation of the pump head)
11. Selecting the motor:
  - a. Find the highest calculated torque value in the ViscoTwin sizing software
  - b. Determine the shaft speed at the highest calculated torque value (+/- 250rpm)
  - c. Find the next highest torque value within the shaft speed range in the correct motor table of the nominal frequency:

- i. Appendix B) NEMA Motors operating in **60Hz** net frequency
  - d. Determine the power and wiring (Poles) of the motor
  - e. Find the motor in the sizing software
  - f. Click the chevron (down arrow) and insure that all operating points in red are below the green line.
  - g. If some operating points are above the green line, find another motor while switching to a different pole number or higher kW value
12. One can adapt the motor abilities to the requirements with the following parameters:
- a. Change the motor poles (from 4-Pole to 6-Pole)
  - b. Install a blower to meet speed below 20Hz.
  - c. Install an encoder to meet speed below 5Hz (avoid very low speed!).
  - d. Install a gearbox. Power in hp = rpm x torque / 5252
  - e. Install a Permanent Magnet motor for high torque and large speed range applications.
  - f. Setup the ELSA wiring system. (Torque Peak at 100Hz)

## Appendix A: Particulate Size Chart:

The cross section is the narrowest area in the pump head. Fibrose and long particulates can pass the pump if they align with the spindle profile. For example, 125mm long spaghetti strings can pass the VT130 with the N (65) -Spindle.

Pump head name (PH)  
 Spindle pitch name (SP)  
 Cross sections (CS) (SP / 2)

The max cross section in mm for N, H & E Spindle Pitches:

PH	SP	CS	SP	CS	SP	CS
VT70	N (43mm)	32mm	H (29mm)	14mm	E (22mm)	11mm
VT104	N (53mm)	26mm	H (36mm)	18mm	E (27mm)	13mm
VT130	N (65mm)	21mm	H (44mm)	22mm	E (33mm)	16mm

## Motor Data:

Nominal-Torque: (Power (W) x 60 sec) / ((2 x pi) x rpm).

Most common motors used with Twin Screw Pumps are 4-Pole and 6-Pole wired.

The motor lists are sorted based on torque at 1000 rpm

- Appendix B: NEMA-Motors **60Hz**, hp, lb-ft

## Appendix B: List of NEMA-Motors 60Hz, lb-ft, hp:

250 rpm	500 rpm	750 rpm	1000 rpm	1500 rpm	2000 rpm	2500 rpm	3000 rpm	3500 rpm	4000 rpm	Power	Wiring
4 lb-ft	4 lb-ft	5 lb-ft	<b>6 lb-ft</b>	7 lb-ft	7 lb-ft	7 lb-ft	7 lb-ft	7 lb-ft	7 lb-ft	<b>5 hp</b>	2-Pole
5 lb-ft	7 lb-ft	8 lb-ft	<b>9 lb-ft</b>	10 lb-ft	11 lb-ft	11 lb-ft	11 lb-ft	11 lb-ft	10 lb-ft	<b>8 hp</b>	2-Pole
7 lb-ft	9 lb-ft	10 lb-ft	<b>12 lb-ft</b>	13 lb-ft	14 lb-ft	15 lb-ft	15 lb-ft	15 lb-ft	13 lb-ft	<b>10 hp</b>	2-Pole
9 lb-ft	12 lb-ft	13 lb-ft	<b>14 lb-ft</b>	15 lb-ft	13 lb-ft	11 lb-ft	9 lb-ft	8 lb-ft	7 lb-ft	<b>5 hp</b>	4-Pole
11 lb-ft	13 lb-ft	16 lb-ft	<b>17 lb-ft</b>	20 lb-ft	21 lb-ft	22 lb-ft	22 lb-ft	22 lb-ft	20 lb-ft	<b>15 hp</b>	2-Pole
13 lb-ft	17 lb-ft	20 lb-ft	<b>21 lb-ft</b>	22 lb-ft	20 lb-ft	16 lb-ft	13 lb-ft	11 lb-ft	10 lb-ft	<b>8 hp</b>	4-Pole
16 lb-ft	20 lb-ft	22 lb-ft	<b>22 lb-ft</b>	18 lb-ft	13 lb-ft	11 lb-ft	9 lb-ft	8 lb-ft	7 lb-ft	<b>5 hp</b>	6-Pole
15 lb-ft	18 lb-ft	21 lb-ft	<b>23 lb-ft</b>	27 lb-ft	29 lb-ft	30 lb-ft	30 lb-ft	30 lb-ft	26 lb-ft	<b>20 hp</b>	2-Pole
23 lb-ft	29 lb-ft	30 lb-ft	<b>26 lb-ft</b>	18 lb-ft	13 lb-ft	11 lb-ft	9 lb-ft	8 lb-ft	7 lb-ft	<b>5 hp</b>	8-Pole
18 lb-ft	23 lb-ft	27 lb-ft	<b>29 lb-ft</b>	30 lb-ft	26 lb-ft	21 lb-ft	18 lb-ft	15 lb-ft	13 lb-ft	<b>10 hp</b>	4-Pole
18 lb-ft	22 lb-ft	26 lb-ft	<b>29 lb-ft</b>	33 lb-ft	36 lb-ft	37 lb-ft	37 lb-ft	37 lb-ft	33 lb-ft	<b>25 hp</b>	2-Pole
24 lb-ft	30 lb-ft	33 lb-ft	<b>34 lb-ft</b>	26 lb-ft	20 lb-ft	16 lb-ft	13 lb-ft	11 lb-ft	10 lb-ft	<b>8 hp</b>	6-Pole
22 lb-ft	27 lb-ft	31 lb-ft	<b>35 lb-ft</b>	40 lb-ft	43 lb-ft	44 lb-ft	45 lb-ft	45 lb-ft	39 lb-ft	<b>30 hp</b>	2-Pole
35 lb-ft	43 lb-ft	45 lb-ft	<b>39 lb-ft</b>	26 lb-ft	20 lb-ft	16 lb-ft	13 lb-ft	11 lb-ft	10 lb-ft	<b>8 hp</b>	8-Pole
27 lb-ft	35 lb-ft	40 lb-ft	<b>43 lb-ft</b>	45 lb-ft	39 lb-ft	32 lb-ft	26 lb-ft	23 lb-ft	20 lb-ft	<b>15 hp</b>	4-Pole
31 lb-ft	40 lb-ft	44 lb-ft	<b>45 lb-ft</b>	35 lb-ft	26 lb-ft	21 lb-ft	18 lb-ft	15 lb-ft	13 lb-ft	<b>10 hp</b>	6-Pole
29 lb-ft	36 lb-ft	42 lb-ft	<b>46 lb-ft</b>	53 lb-ft	57 lb-ft	59 lb-ft	60 lb-ft	60 lb-ft	53 lb-ft	<b>40 hp</b>	2-Pole
46 lb-ft	57 lb-ft	60 lb-ft	<b>53 lb-ft</b>	35 lb-ft	26 lb-ft	21 lb-ft	18 lb-ft	15 lb-ft	13 lb-ft	<b>10 hp</b>	8-Pole
36 lb-ft	46 lb-ft	53 lb-ft	<b>57 lb-ft</b>	60 lb-ft	53 lb-ft	42 lb-ft	35 lb-ft	30 lb-ft	26 lb-ft	<b>20 hp</b>	4-Pole
37 lb-ft	45 lb-ft	52 lb-ft	<b>58 lb-ft</b>	66 lb-ft	71 lb-ft	74 lb-ft	75 lb-ft	75 lb-ft	66 lb-ft	<b>50 hp</b>	2-Pole
47 lb-ft	60 lb-ft	66 lb-ft	<b>67 lb-ft</b>	53 lb-ft	39 lb-ft	32 lb-ft	26 lb-ft	23 lb-ft	20 lb-ft	<b>15 hp</b>	6-Pole
44 lb-ft	54 lb-ft	62 lb-ft	<b>70 lb-ft</b>	80 lb-ft	86 lb-ft	89 lb-ft	89 lb-ft	89 lb-ft	79 lb-ft	<b>60 hp</b>	2-Pole
45 lb-ft	58 lb-ft	66 lb-ft	<b>71 lb-ft</b>	75 lb-ft	66 lb-ft	53 lb-ft	44 lb-ft	38 lb-ft	33 lb-ft	<b>25 hp</b>	4-Pole
70 lb-ft	86 lb-ft	89 lb-ft	<b>79 lb-ft</b>	53 lb-ft	39 lb-ft	32 lb-ft	26 lb-ft	23 lb-ft	20 lb-ft	<b>15 hp</b>	8-Pole
54 lb-ft	70 lb-ft	80 lb-ft	<b>86 lb-ft</b>	89 lb-ft	79 lb-ft	63 lb-ft	53 lb-ft	45 lb-ft	39 lb-ft	<b>30 hp</b>	4-Pole
63 lb-ft	80 lb-ft	88 lb-ft	<b>90 lb-ft</b>	70 lb-ft	53 lb-ft	42 lb-ft	35 lb-ft	30 lb-ft	26 lb-ft	<b>20 hp</b>	6-Pole
93 lb-ft	114 lb-ft	119 lb-ft	<b>105 lb-ft</b>	70 lb-ft	53 lb-ft	42 lb-ft	35 lb-ft	30 lb-ft	26 lb-ft	<b>20 hp</b>	8-Pole
78 lb-ft	100 lb-ft	110 lb-ft	<b>112 lb-ft</b>	88 lb-ft	66 lb-ft	53 lb-ft	44 lb-ft	38 lb-ft	33 lb-ft	<b>25 hp</b>	6-Pole
72 lb-ft	93 lb-ft	106 lb-ft	<b>114 lb-ft</b>	119 lb-ft	105 lb-ft	84 lb-ft	70 lb-ft	60 lb-ft	53 lb-ft	<b>40 hp</b>	4-Pole
116 lb-ft	143 lb-ft	149 lb-ft	<b>131 lb-ft</b>	88 lb-ft	66 lb-ft	53 lb-ft	44 lb-ft	38 lb-ft	33 lb-ft	<b>25 hp</b>	8-Pole
94 lb-ft	120 lb-ft	132 lb-ft	<b>135 lb-ft</b>	105 lb-ft	79 lb-ft	63 lb-ft	53 lb-ft	45 lb-ft	39 lb-ft	<b>30 hp</b>	6-Pole
90 lb-ft	116 lb-ft	133 lb-ft	<b>143 lb-ft</b>	149 lb-ft	131 lb-ft	105 lb-ft	88 lb-ft	75 lb-ft	66 lb-ft	<b>50 hp</b>	4-Pole
139 lb-ft	171 lb-ft	179 lb-ft	<b>158 lb-ft</b>	105 lb-ft	79 lb-ft	63 lb-ft	53 lb-ft	45 lb-ft	39 lb-ft	<b>30 hp</b>	8-Pole
108 lb-ft	139 lb-ft	160 lb-ft	<b>171 lb-ft</b>	179 lb-ft	158 lb-ft	126 lb-ft	105 lb-ft	90 lb-ft	79 lb-ft	<b>60 hp</b>	4-Pole
125 lb-ft	160 lb-ft	176 lb-ft	<b>179 lb-ft</b>	140 lb-ft	105 lb-ft	84 lb-ft	70 lb-ft	60 lb-ft	53 lb-ft	<b>40 hp</b>	6-Pole
185 lb-ft	229 lb-ft	239 lb-ft	<b>210 lb-ft</b>	140 lb-ft	105 lb-ft	84 lb-ft	70 lb-ft	60 lb-ft	53 lb-ft	<b>40 hp</b>	8-Pole
157 lb-ft	200 lb-ft	219 lb-ft	<b>224 lb-ft</b>	175 lb-ft	131 lb-ft	105 lb-ft	88 lb-ft	75 lb-ft	66 lb-ft	<b>50 hp</b>	6-Pole
232 lb-ft	286 lb-ft	298 lb-ft	<b>263 lb-ft</b>	175 lb-ft	131 lb-ft	105 lb-ft	88 lb-ft	75 lb-ft	66 lb-ft	<b>50 hp</b>	8-Pole
188 lb-ft	240 lb-ft	263 lb-ft	<b>269 lb-ft</b>	210 lb-ft	158 lb-ft	126 lb-ft	105 lb-ft	90 lb-ft	79 lb-ft	<b>60 hp</b>	6-Pole
278 lb-ft	343 lb-ft	358 lb-ft	<b>315 lb-ft</b>	210 lb-ft	158 lb-ft	126 lb-ft	105 lb-ft	90 lb-ft	79 lb-ft	<b>60 hp</b>	8-Pole