

APPLICATION GUIDE

**GAS MASTRRR SERIES 32PT
CHEMICAL INDUCTION UNITS 2-25 HP**

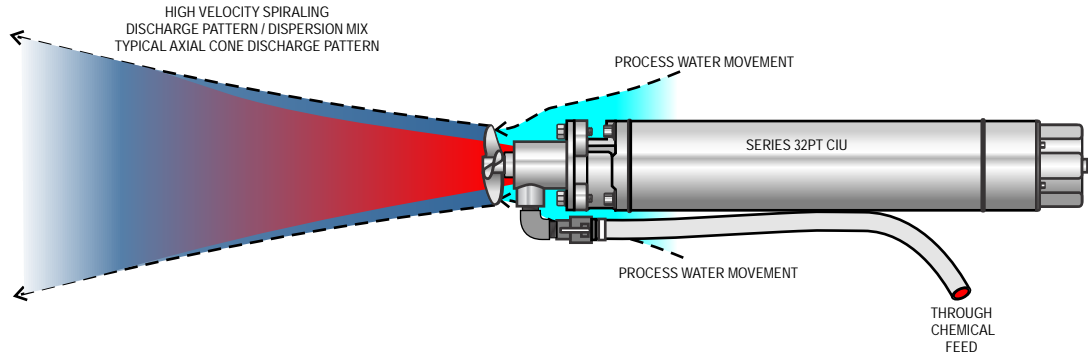
**NaOCl
Al₂(SO₄)
FeCl₃
NaHSO₃**



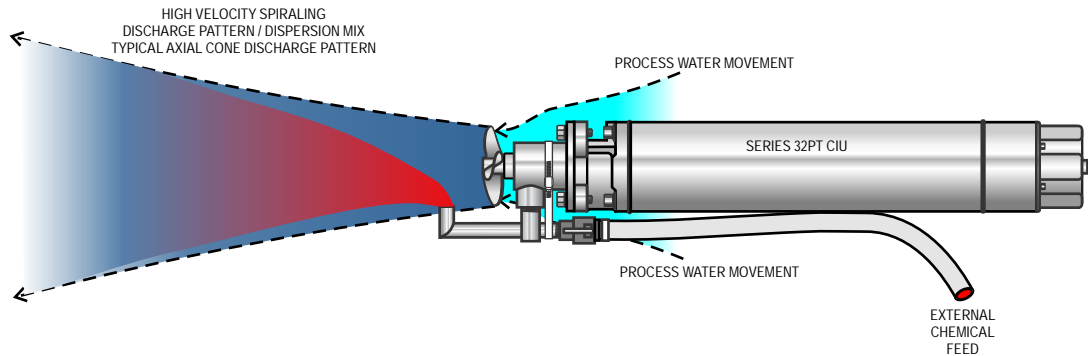
**MAKING A WORLD OF DIFFERENCE IN CHEMICAL FEED TECHNOLOGY
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The GAS MASTRRR series 32PT non-vacuum style axil dispersion chemical mixer receives the chemical product to be mixed into the process stream from the positive pressure of the chemical metering pumps. The chemical is induced at the hub of the propeller rotating at 3450 RPM and discharges the induced chemical product in an axil pattern with ideal velocity shear above 60 FPS. For chemical applications with a high probability of scaling, the 32PT can be supplied with the external feed pipe assembly below the rotating propeller. This feed design allows the chemical to be fed external to the unit. The chemical is dispersed away from the unit without making contact with the propeller, housing or motor. The series 32PT can be supplied with a dual through/external chemical feed design for multiple chemical feed applications.

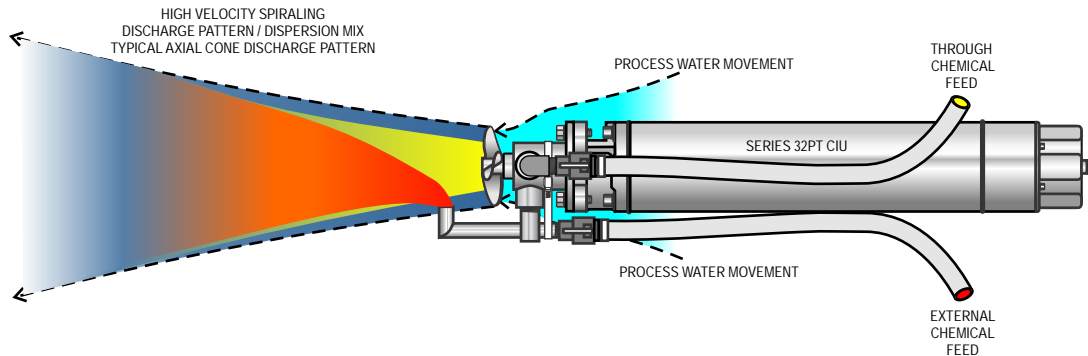
THROUGH CHEMICAL FEED



EXTERNAL CHEMICAL FEED



DUAL THROUGH/EXTERNAL CHEMICAL FEED

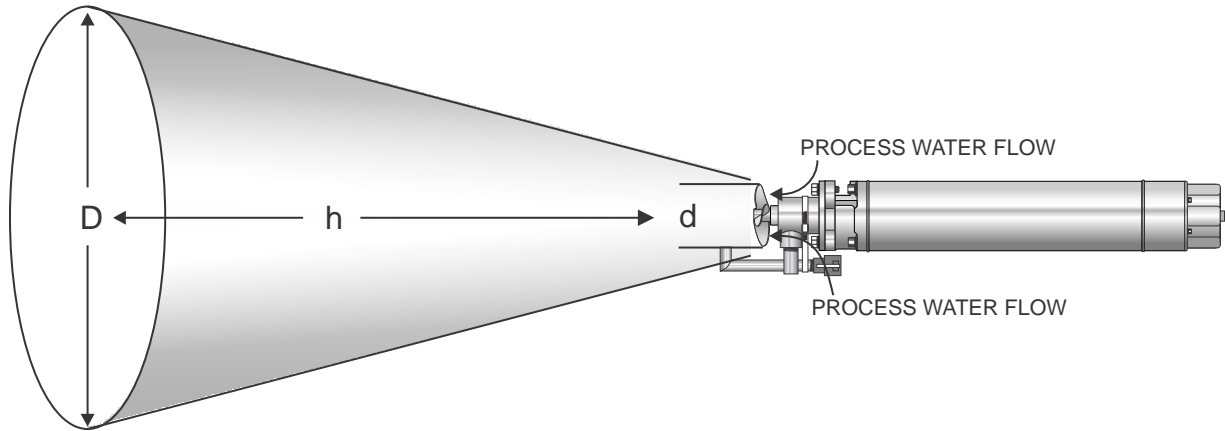


This axil chemical discharge pattern is important when designing and locating chemical induction units in applications where heavy scaling occurs, chemical compatibility with 316 S.S. is a problem, or axil dispersion is required in large CSO basins.

APPLICATION GUIDE PERFORMANCE TABLE 2 - 25 HP

| HP | OPTIMUM FEED RATE NOT MAXIMUM | PROPELLER DIAMETER (d) inches | EXIT/CHEMICAL SHEAR VELOCITY f/s | DISCHARGE RATE FROM MIXING ELEMENT (AXIAL) | | | PROPELLER DISCHARGE OPTIMUM DISTANCE NOT MAXIMUM | |
|-----|-------------------------------|----------------------------------|-------------------------------------|--|------|--------------|--|-------------------|
| | NON-VACUUM LIQUID GPM | | | GPM | CFS | VELOCITY f/s | AXIL (h) FEET | DIAMETER (D) FEET |
| 2 | 15 | 4 | 60.2 | 725 | 1.61 | 18.4 | 4 | 4.9 |
| 3 | 20 | 4.75 | 71.5 | 1050 | 2.33 | 18.9 | 5 | 6.1 |
| 5 | 25 | 5 | 75.2 | 1150 | 2.56 | 19.2 | 6 | 7.3 |
| 7.5 | 30 | 5.5 | 82.7 | 1565 | 3.48 | 21.1 | 7 | 8.5 |
| 10 | 40 | 5.75 | 86.5 | 1775 | 3.95 | 21.9 | 7.5 | 9.1 |
| 15 | 50 | 6 | 90.3 | 1985 | 4.42 | 22.5 | 8 | 9.75 |
| 20 | 60 | 6.25 | 94 | 2275 | 5.07 | 23.75 | 8.5 | 10.4 |
| 25 | 70 | 6.5 | 97.8 | 2565 | 5.71 | 24.75 | 9 | 11 |

HIGH VELOCITY SPIRALING AXIAL DISPERSION
(CHEMICAL AND PROCESS WATER)



| THRUST CALCULATIONS: | | HP | AXIAL THRUST (lbs.) |
|--|--|-----|---------------------|
| $T_i = T / (D/85\%) / (\tan\theta)$ T_i = Propeller thrust T = Propeller torque = hp X 63025 / rpm rpm = 3450 D = Propeller diameter, inch θ = Propeller angle, degrees (1.0 pitch propeller is 25 degrees) | | 2 | 16 |
| | | 3 | 21 |
| | | 5 | 33 |
| | | 7.5 | 45 |
| | | 10 | 58 |
| | | 15 | 83 |
| | | 20 | 106 |
| | | 25 | 128 |

APPLICATION GUIDE G-VALUE TABLE 2 - 7.5 HP

When determining a HP range for large inflow pipe or wide channel application a "G value" velocity gradient calculation is helpful. The mean velocity gradient (G in sec⁻¹) or measurement of the intensity of the mix represented by:

$$G = \sqrt{\frac{P}{MV}}$$

And expressed as the Square Root of the work (P) in Foot Pounds Per Second (550 ft-lbs/sec) by a pump motor during mixing of the chemical into the process water regime, divided by the Viscosity (M) absolute of the process water at ambient (70°F), times the volume (V) in Ft³ (cubic feet) of the mixing regime.

P = Horsepower X 550
M = .0000235
V = Water volume in discharge mixing zone Ft³ (cubic feet)
G = Velocity Gradient (G-Value)

D = Diameter of outer axial dispersion mix pattern (zone of influence)
d = Propeller outside diameter (inches)
h = Vertical distance away from the propeller (feet)

HIGH VELOCITY SPIRALING AXIAL DISPERSION
(CHEMICAL AND PROCESS WATER)

2 HP GAS MASTRRR 32PT WITH 4.0" PROPELLER

| h (ft) | d (in) | D (ft) | V (ft ³) | G (sec(-1)) |
|--------|--------|--------|----------------------|-------------|
| 1 | 4.0 | 1.488 | .665 | 7,928 |
| 2 | 4.0 | 2.641 | 4.07 | 3,390 |
| 3 | 4.0 | 3.797 | 12.30 | 1,950 |
| 4 | 4.0 | 4.952 | 27.43 | 1,306 |
| 5 | 4.0 | 6.106 | 51.51 | 953 |
| 6 | 4.0 | 7.261 | 86.66 | 734 |
| 7 | 4.0 | 8.416 | 134.5 | 590 |
| 8 | 4.0 | 9.57 | 198.6 | 485 |
| 9 | 4.0 | 10.72 | 279.5 | 409 |
| 10 | 4.0 | 11.88 | 380.0 | 350 |

3 HP GAS MASTRRR 32PT WITH 4.75" PROPELLER

| h (ft) | d (in) | D (ft) | V (ft ³) | G (sec(-1)) |
|--------|--------|--------|----------------------|-------------|
| 1 | 4.75 | 1.548 | .670 | 10,219 |
| 2 | 4.75 | 2.704 | 4.31 | 4,033 |
| 3 | 4.75 | 3.858 | 12.85 | 2,337 |
| 4 | 4.75 | 5.012 | 28.38 | 1,572 |
| 5 | 4.75 | 6.16 | 52.9 | 1,152 |
| 6 | 4.75 | 7.32 | 88.79 | 889 |
| 7 | 4.75 | 8.476 | 137.9 | 713 |
| 8 | 4.75 | 9.632 | 202.4 | 589 |
| 9 | 4.75 | 10.78 | 284.3 | 496 |
| 10 | 4.75 | 11.94 | 385.8 | 426 |
| 11 | 4.75 | 13.09 | 509 | 371 |
| 12 | 4.75 | 15.4 | 655.9 | 327 |

5 HP GAS MASTRRR 32PT WITH 5.0" PROPELLER

| h (ft) | d (in) | D (ft) | V (ft ³) | G (sec(-1)) |
|--------|--------|--------|----------------------|-------------|
| 1 | 5 | 1.575 | .681 | 13,110 |
| 2 | 5 | 2.725 | 4.38 | 5,164 |
| 3 | 5 | 3.879 | 13.02 | 2,996 |
| 4 | 5 | 5.03 | 28.72 | 2,012 |
| 5 | 5 | 6.189 | 53.53 | 1,478 |
| 6 | 5 | 7.343 | 89.55 | 1,143 |
| 7 | 5 | 8.498 | 138.9 | 917 |
| 8 | 5 | 9.653 | 203.7 | 757 |
| 9 | 5 | 10.80 | 258.6 | 672 |
| 10 | 5 | 11.96 | 387.8 | 549 |
| 11 | 5 | 13.11 | 511.4 | 478 |
| 12 | 5 | 15.42 | 658.9 | 421 |

7.5 HP GAS MASTRRR 32PT WITH 5.5" PROPELLER

| h (ft) | d (in) | D (ft) | V (ft ³) | G (sec(-1)) |
|--------|--------|--------|----------------------|-------------|
| 1 | 5.5 | 1.612 | .879 | 14,150 |
| 2 | 5.5 | 2.76 | 4.76 | 6,074 |
| 3 | 5.5 | 3.92 | 13.67 | 3,583 |
| 4 | 5.5 | 5.07 | 29.65 | 2,433 |
| 5 | 5.5 | 6.231 | 54.83 | 1,789 |
| 6 | 5.5 | 7.386 | 91.35 | 1,386 |
| 7 | 5.5 | 8.54 | 141.2 | 1,114 |
| 8 | 5.5 | 9.694 | 206.5 | 921 |
| 9 | 5.5 | 10.85 | 289.6 | 778 |
| 10 | 5.5 | 12.0 | 391.9 | 669 |
| 11 | 5.5 | 13.15 | 516.5 | 582 |
| 12 | 5.5 | 14.31 | 664.9 | 513 |
| 13 | 5.5 | 15.46 | 839.1 | 457 |
| 14 | 5.5 | 16.62 | 1041 | 410 |
| 15 | 5.5 | 17.77 | 1113 | 397 |

APPLICATION GUIDE G-VALUE TABLE 10 - 25 HP

When determining a HP range for large inflow pipe or wide channel application a "G value" velocity gradient calculation is helpful. The mean velocity gradient (G in sec⁻¹) or measurement of the intensity of the mix represented by:

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V = Water volume in discharge mixing zone Ft³ (cubic feet)
G = Velocity Gradient (G-Value)

D = Diameter of outer axial dispersion mix pattern (zone of influence)
d = Propeller outside diameter (inches)
h = Vertical distance away from the propeller (feet)

HIGH VELOCITY SPIRALING AXIAL DISPERSION
(CHEMICAL AND PROCESS WATER)

10 HP GAS MASTRRR 32PT WITH 5.75" PROPELLER

| h (ft) | d (in) | D (ft) | V (ft ³) | G (sec(-1)) |
|--------|--------|--------|----------------------|-------------|
| 1 | 5.75 | 1.658 | 1.00 | 15,298 |
| 2 | 5.75 | 2.808 | 4.99 | 6,850 |
| 3 | 5.75 | 4.008 | 14.39 | 4,033 |
| 4 | 5.75 | 5.117 | 30.36 | 2,776 |
| 5 | 5.75 | 6.275 | 55.98 | 2,045 |
| 6 | 5.75 | 7.475 | 94.03 | 1,578 |
| 7 | 5.75 | 8.583 | 143.3 | 1,278 |
| 8 | 5.75 | 9.783 | 211.2 | 1,053 |
| 9 | 5.75 | 10.89 | 292.9 | 894 |
| 10 | 5.75 | 12.05 | 396.6 | 768 |
| 11 | 5.75 | 13.30 | 529.3 | 665 |
| 12 | 5.75 | 14.41 | 675.8 | 588 |
| 13 | 5.75 | 15.51 | 846.0 | 526 |
| 14 | 5.75 | 16.67 | 1050 | 472 |
| 15 | 5.75 | 17.82 | 1283 | 427 |

15 HP GAS MASTRRR 32PT WITH 6.0" PROPELLER

| h (ft) | d (in) | D (ft) | V (ft ³) | G (sec(-1)) |
|--------|--------|--------|----------------------|-------------|
| 1 | 6.0 | 1.695 | .672 | 22,850 |
| 2 | 6.0 | 2.85 | 4.81 | 8,544 |
| 3 | 6.0 | 4.01 | 14.09 | 4,991 |
| 4 | 6.0 | 5.16 | 30.6 | 3,382 |
| 5 | 6.0 | 6.313 | 55.6 | 2,490 |
| 6 | 6.0 | 7.48 | 94.02 | 1,932 |
| 7 | 6.0 | 8.63 | 144.8 | 1,556 |
| 8 | 6.0 | 9.78 | 211.2 | 1,289 |
| 9 | 6.0 | 10.93 | 292.9 | 1,090 |
| 10 | 6.0 | 12.08 | 399.5 | 937 |
| 11 | 6.0 | 13.24 | 525.9 | 817 |
| 12 | 6.0 | 14.43 | 676 | 720 |
| 13 | 6.0 | 15.55 | 852.2 | 641 |
| 14 | 6.0 | 16.7 | 1055.9 | 576 |
| 15 | 6.0 | 17.86 | 1291 | 521 |

20 HP GAS MASTRRR 32PT WITH 6.25" PROPELLER

| h (ft) | d (in) | D (ft) | V (ft ³) | G (sec(-1)) |
|--------|--------|--------|----------------------|-------------|
| 1 | 6.25 | 1.737 | .646 | 26,990 |
| 2 | 6.25 | 2.891 | 4.936 | 9,742 |
| 3 | 6.25 | 4.04 | 14.43 | 5,694 |
| 4 | 6.25 | 5.201 | 31.35 | 3,864 |
| 5 | 6.25 | 6.355 | 57.57 | 2,851 |
| 6 | 6.25 | 7.511 | 95.5 | 2,213 |
| 7 | 6.25 | 8.665 | 146.94 | 1,784 |
| 8 | 6.25 | 9.819 | 214.08 | 1,478 |
| 9 | 6.25 | 10.975 | 299.13 | 1,250 |
| 10 | 6.25 | 12.129 | 403.98 | 1,076 |
| 11 | 6.25 | 13.283 | 530.81 | 939 |
| 12 | 6.25 | 14.439 | 681.9 | 828 |
| 13 | 6.25 | 15.593 | 859 | 738 |
| 14 | 6.25 | 16.747 | 1,064.3 | 663 |
| 15 | 6.25 | 17.9 | 1,606.9 | 540 |

25 HP GAS MASTRRR 32PT WITH 6.5" PROPELLER

| h (ft) | d (in) | D (ft) | V (ft ³) | G (sec(-1)) |
|--------|--------|--------|----------------------|-------------|
| 1 | 6.5 | 1.779 | 1.22 | 21,888 |
| 2 | 6.5 | 2.934 | 5.67 | 10,160 |
| 3 | 6.5 | 4.088 | 15.43 | 6,157 |
| 4 | 6.5 | 5.243 | 32.61 | 4,235 |
| 5 | 6.5 | 6.398 | 59.32 | 3,140 |
| 6 | 6.5 | 7.553 | 97.61 | 2,448 |
| 7 | 6.5 | 8.707 | 149.6 | 1,977 |
| 8 | 6.5 | 9.862 | 217.4 | 1,640 |
| 9 | 6.5 | 11.01 | 303.1 | 1,389 |
| 10 | 6.5 | 12.17 | 408.6 | 1,196 |
| 11 | 6.5 | 13.32 | 536.5 | 1,044 |
| 12 | 6.5 | 14.48 | 688.3 | 922 |
| 13 | 6.5 | 15.63 | 866.4 | 822 |
| 14 | 6.5 | 16.79 | 1073 | 738 |
| 15 | 6.5 | 17.94 | 1310 | 668 |

**TYPICAL MOUNTING ARRANGEMENT
GAS MASTRRR SERIES 32PT 2-25 HP**

Typical water & wastewater applications for the submersible series 32PT require the unit to be mounted in a vertical or horizontal position. The following diagrams illustrate the minimum submergence and distances for proper operation of the 2 - 25 HP units. Units require submergence at all times for motor cooling. Units should never run dry for any reason. Rotation checks can be made by bumping the starter. Never run the unit dry for more than 1 or 2 seconds.

