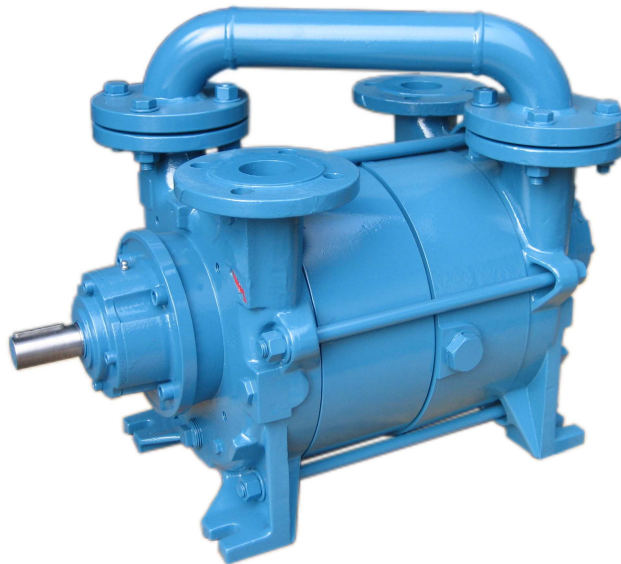
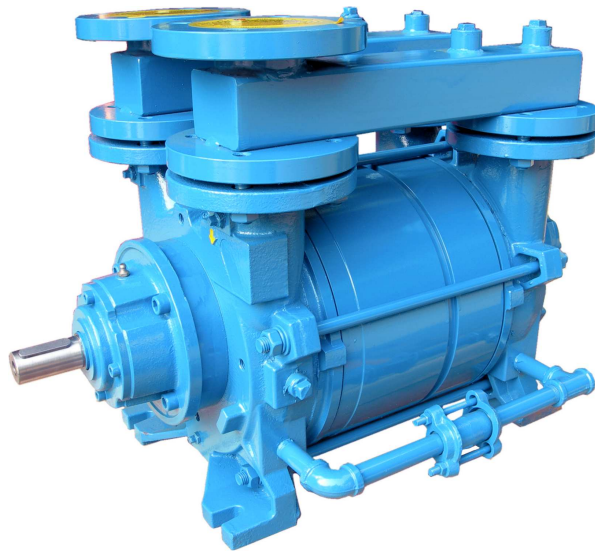


CPV/CPS/CPD 小型真空泵 / 压缩机 操作、维修手册



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内容：

1. 运转原理。
2. 使用与操作条件。
3. 保存。
4. 安装。
5. 运转操作。
6. 维修保养。
7. 故障排除。
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Description :

- 1. Operating principle.**
- 2. Use and working conditions.**
- 3. Storage.**
- 4. Installation.**
- 5. Operation.**
- 6. Maintenance.**
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- 8. Disassembly and reassembly.**
- 8.Safety regulations.**

1.运转原理：

本机型利用一圆型外壳再配合偏心转子,当转子转动时泵中的水因离心力影响而附在外壳内壁,在叶轮吸气侧之入口处气室体积在转动时逐渐变小而产生压缩,至出口时排出,如此不断循环,达到所需之真空.

1. Operating principle :

The pump is applying the one round casing and eccentric rotor.

During the rotor rotates, and the centrifuge force will effected the water in the pump, rest on the liner wall of the casing, in the suction side chamber is gradually small and compression to discharge port when rotates, than compress to discharge side. That's to go round and round till the vacuum you need.

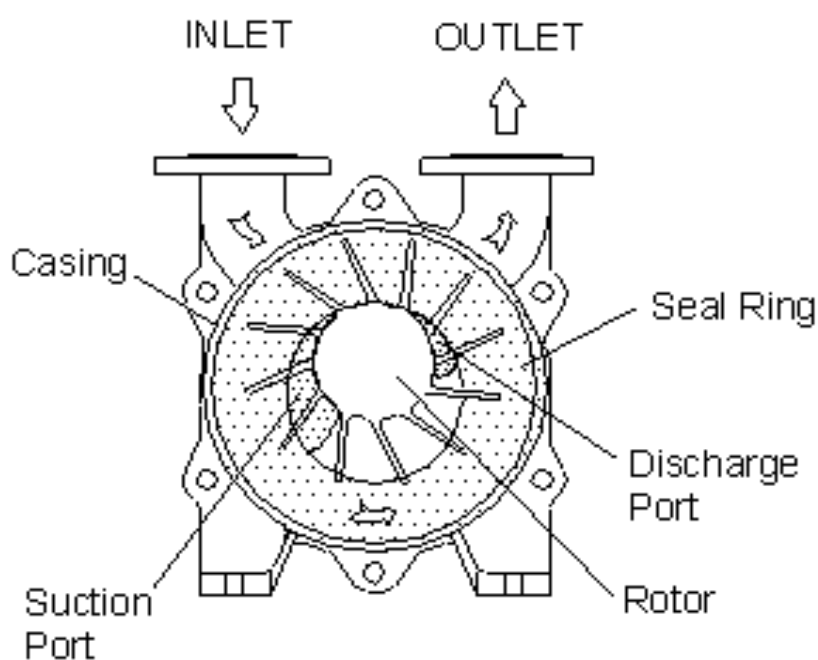


Fig. 1

2. 使用与操作条件

Use and working condition:

CPS/CPV 系列真空泵

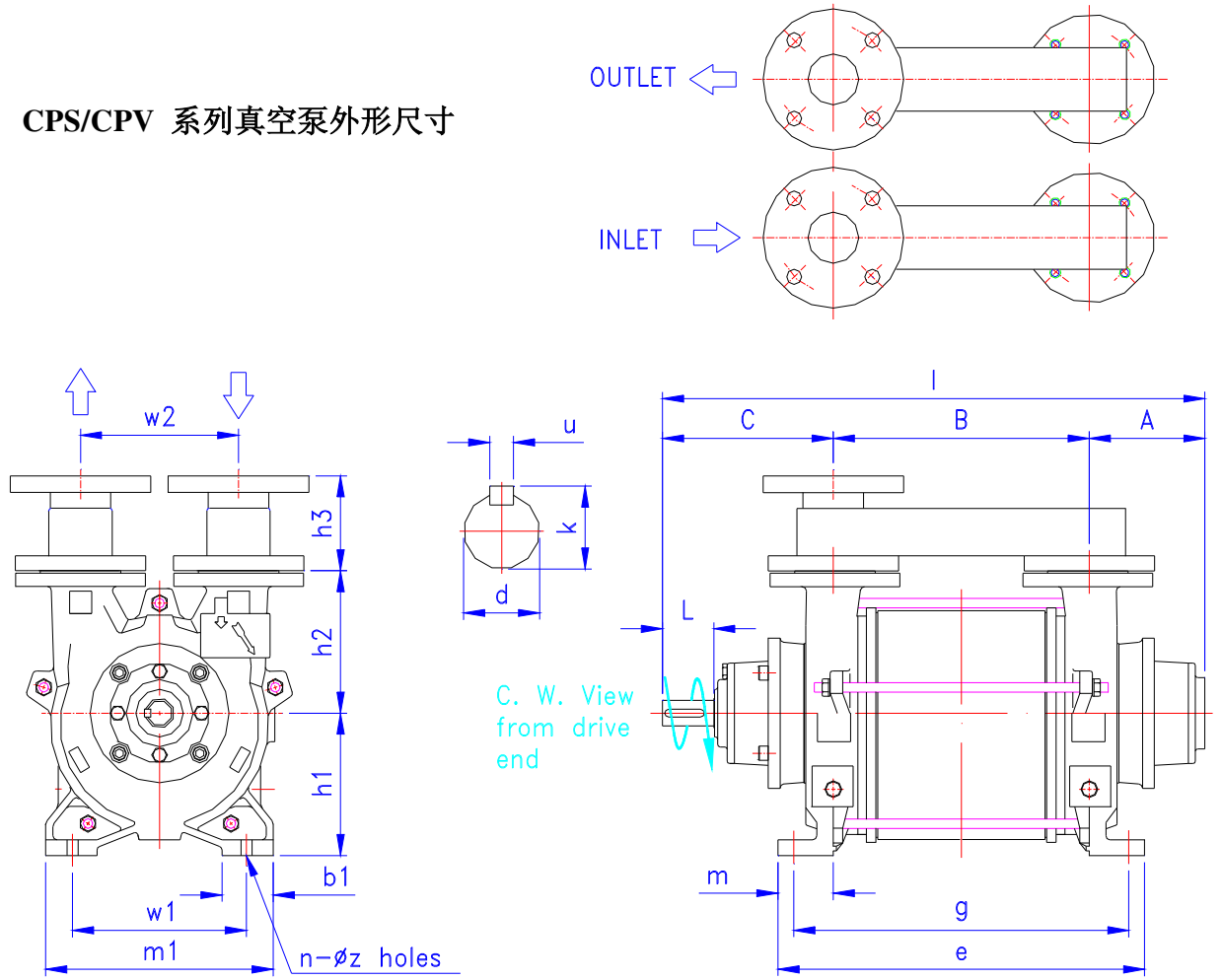
| 泵型號 | Inch Hg(G) | | 8 | | 12 | | 16 | | 20 | | 24 | | 25 | | 26 | | 密封水 流量 M ³ /H | |
|-----------------|-------------|------|------|-------------------|-------|-------------------|-------|-------------------|-------|-------------------|--------|-------------------|--------|-------------------|-------|-------------------|--------------------------------|------|
| | mm Hg(Abs.) | | 557 | | 455 | | 354 | | 252 | | 150 | | 125 | | 100 | | | |
| | mbar(Abs.) | | 742 | | 607 | | 471 | | 336 | | 200 | | 167 | | 133 | | | |
| | 法蘭 尺寸 | RPM | KW | M ³ /H | KW | M ³ /H | KW | M ³ /H | KW | M ³ /H | KW | M ³ /H | KW | M ³ /H | KW | M ³ /H | | KW |
| CPV 32 20 | 1 1/4" | 2900 | 0.75 | 19 | 0.47 | 20 | 0.53 | 19 | 0.61 | 17.7 | 0.68 | 12.2 | 0.73 | 9.4 | 0.74 | 6 | 0.75 | 0.27 |
| CPV 32 50 | 1 1/4" | 2900 | 1.5 | 46 | 0.81 | 47 | 0.89 | 45 | 1.04 | 38 | 1.11 | 24 | 1.22 | 17 | 1.26 | 8.5 | 1.26 | 0.27 |
| CPV 40 100 | 1 1/2" | 1450 | 3 | 99 | 2.07 | 99 | 2.37 | 98 | 2.66 | 97 | 2.89 | 81 | 2.89 | 72 | 2.94 | 58 | 2.94 | 0.6 |
| CPV 40 150 | 1 1/2" | 1450 | 3.7 | 145 | 2.29 | 144 | 2.66 | 143 | 3.11 | 133 | 3.55 | 94 | 3.48 | 77 | 3.40 | 51 | 3.26 | 0.7 |
| CPV 50 220 | 2" | 1450 | 5.5 | 199 | 4.07 | 201 | 4.44 | 203 | 4.81 | 204 | 5.11 | 199 | 5.11 | 197 | 4.96 | 195 | 4.81 | 1.1 |
| CPV 65 300 | 2 1/2" | 1450 | 7.5 | 279 | 5.33 | 281 | 5.70 | 283 | 6.22 | 283 | 6.44 | 280 | 6.22 | 277 | 5.92 | 272 | 5.55 | 1.6 |
| CPV 65 450 | 2 1/2" | 1450 | 11 | 408 | 8.14 | 413 | 8.88 | 418 | 9.62 | 425 | 9.99 | 415 | 9.62 | 412 | 9.03 | 405 | 8.29 | 2.0 |
| CPV 100 550 | 4" | 1450 | 15 | 530 | 9.84 | 546 | 11.1 | 551 | 12.06 | 531 | 13.10 | 471 | 13.91 | 446 | 13.99 | 400 | 13.99 | 1.8 |
| CPV 100 700 | 4" | 1450 | 18.5 | 721 | 15.10 | 731 | 16.28 | 731 | 17.02 | 701 | 17.09 | 600 | 17.09 | 551 | 17.09 | 466 | 17.09 | 2 |
| CPV 125 1250 | 5" | 880 | 30 | 961 | 23.68 | 981 | 25.9 | 1000 | 26.64 | 966 | 28.12 | 765 | 28.12 | 680 | 28.12 | --- | --- | 3.6 |
| | | 975 | 37 | 1250 | 27.75 | 1250 | 28.79 | 1250 | 29.75 | 1200 | 30.71 | 1100 | 31.75 | 935 | 31.82 | --- | --- | 3.9 |
| | | 1150 | 45 | 1394 | 39.96 | 1380 | 40.7 | 1377 | 41.44 | 1343 | 42.92 | 1148 | 42.92 | 1020 | 42.92 | --- | --- | 4.3 |
| CPV 125 1550 | 5" | 880 | 37 | 1245 | 31.08 | 1261 | 34.04 | 1301 | 35.52 | 1292 | 37 | 918 | 37 | 799 | 37 | --- | --- | 3.6 |
| | | 975 | 45 | 1556 | 37 | 1556 | 38.48 | 1556 | 39.22 | 1547 | 39.96 | 1309 | 40.7 | 1173 | 40.7 | --- | --- | 4.1 |
| | | 1150 | 55 | 1802 | 53.28 | 1802 | 54.02 | 1802 | 54.76 | 1785 | 55 | 1394 | 55 | 1275 | 55 | --- | --- | 4.8 |
| CPV 200 1950 | 8" | 585 | 45 | 1253 | 34.04 | 1253 | 37.74 | 1250 | 40.7 | 1139 | 43.66 | 816 | 45.14 | --- | --- | --- | --- | 7.3 |
| | | 735 | 55 | 1955 | 42.18 | 1955 | 46.62 | 1947 | 50.32 | 1887 | 54.02 | 1666 | 55 | --- | --- | --- | --- | 7.7 |
| | | 880 | 90 | 2397 | 64.38 | 2397 | 71.04 | 2380 | 76.22 | 2278 | 82.88 | 1921 | 85.84 | --- | --- | --- | --- | 9.1 |
| CPV 200 2500 | 8" | 585 | 55 | 1603 | 42.18 | 1603 | 47.36 | 1603 | 51.8 | 1471 | 54.02 | 1088 | 55 | --- | --- | --- | --- | 8.2 |
| | | 735 | 75 | 2499 | 52.54 | 2499 | 59.2 | 2482 | 64.38 | 2445 | 67.34 | 2168 | 70.3 | --- | --- | --- | --- | 8.9 |
| | | 880 | 110 | 2975 | 79.92 | 2958 | 90.28 | 2924 | 96.94 | 2805 | 101.38 | 2278 | 105.82 | --- | --- | --- | --- | 10 |
| CPV 200 3100 | 8" | 585 | 75 | 1964 | 56.24 | 1964 | 59.94 | 1964 | 63.64 | 1709 | 65.12 | 1241 | 70.3 | --- | --- | --- | --- | 9.5 |
| | | 735 | 90 | 3103 | 70.3 | 3103 | 74 | 3052 | 78.44 | 2882 | 81.4 | 2499 | 86.58 | --- | --- | --- | --- | 10.2 |
| | | 880 | 160 | 3655 | 103.6 | 3655 | 111 | 3604 | 118.4 | 3366 | 123.58 | 2618 | 130.98 | --- | --- | --- | --- | 11.4 |

※CPV 系列内置止回阀，真空度可达绝压 50mmHg(66mbar)

CPD 系列真空泵

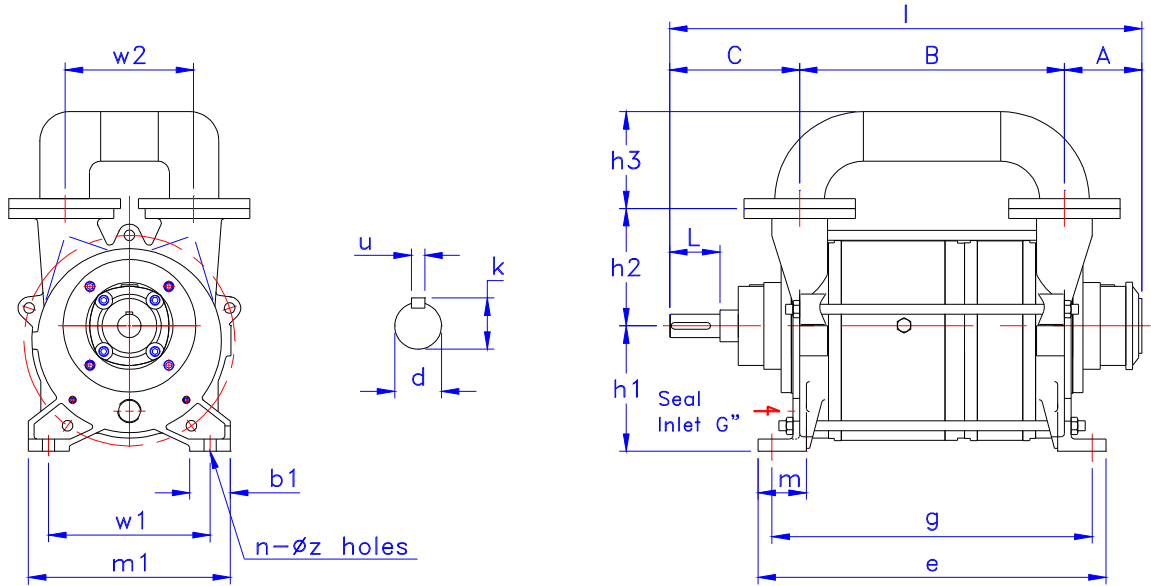
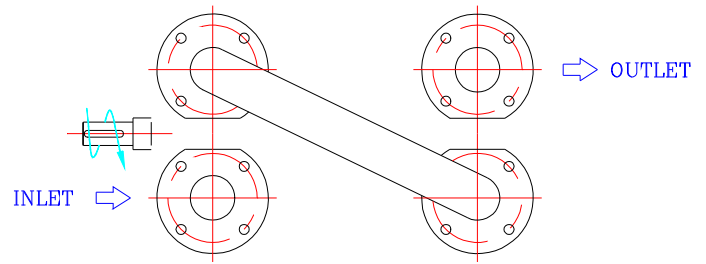
| 泵型號 | Inch Hg(G) | | 20 | | 22.5 | | 25 | | 27.5 | | 28 | | 28.7 | | 28.94 | | Average Liquid Flow M ³ /H | |
|--------------|-------------|------|-----|-------------------|-------|-------------------|--------|-------------------|--------|-------------------|--------|-------------------|--------|-------------------|--------|-------------------|---------------------------------------|-----|
| | mm Hg(Abs.) | | 252 | | 188 | | 125 | | 61.5 | | 49 | | 31 | | 25 | | | |
| | mbar(Abs.) | | 336 | | 251 | | 167 | | 82 | | 65 | | 41 | | 33 | | | |
| | 法蘭尺寸 | RPM | KW | M ³ /H | KW | M ³ /H | KW | M ³ /H | KW | M ³ /H | KW | M ³ /H | KW | M ³ /H | KW | M ³ /H | | |
| CPD 32-20 | 1/4" | 2900 | 1.1 | 21 | 0.80 | 21.3 | 0.81 | 20.4 | 0.81 | 16.5 | 0.81 | 15 | 0.81 | 11.2 | 0.81 | --- | --- | 0.2 |
| CPD 32-45 | 1/4" | 2900 | 1.5 | 43.4 | 1.23 | 43.5 | 1.25 | 40.5 | 1.26 | 31.5 | 1.28 | 29 | 1.29 | 18.7 | 1.30 | --- | --- | 0.3 |
| CPD 32-60 | 1/4" | 2900 | 2.2 | 48.5 | 1.79 | 52.7 | 1.81 | 53.5 | 1.78 | 45 | 1.66 | 38.2 | 1.64 | 23.8 | 1.63 | 14.5 | 1.63 | 0.5 |
| CPD 40-110 | 1/2" | 1450 | 3 | 99.5 | 2.83 | 104 | 2.86 | 104.5 | 2.86 | 95 | 2.81 | 90 | 2.78 | 64.5 | 2.65 | 50 | 2.59 | 0.5 |
| CPD 40-140 | 1/2" | 1450 | 3.7 | 131 | 3.59 | 137.8 | 3.52 | 144 | 3.33 | 138.5 | 2.96 | 130 | 2.89 | 99.5 | 2.81 | 81.5 | 2.81 | 0.5 |
| CPD 40-190 | 1/2" | 1450 | 5.5 | 178.5 | 4.81 | 182.5 | 4.66 | 189 | 4.44 | 189.5 | 4.00 | 177 | 3.85 | 136 | 3.77 | 102 | 3.7 | 0.6 |
| CPD 50-280 | 2" | 1450 | 7.5 | 263 | 7.5 | 275 | 7.5 | 281 | 7.33 | 253.5 | 6.73 | 238 | 6.66 | 187 | 6.66 | 160 | 6.66 | 1.2 |
| CPD 50-340 | 2" | 1450 | 11 | 326 | 9.40 | 340 | 9.25 | 345 | 8.73 | 323 | 8.14 | 306 | 8.07 | 233 | 8.07 | 187 | 8.14 | 1.5 |
| CPD 50-420 | 2" | 1450 | 15 | 383 | 11.03 | 408 | 11.1 | 415 | 10.73 | 383 | 9.32 | 357 | 8.95 | 264 | 8.81 | 213 | 8.88 | 2 |
| CPD 80-600 | 3" | 1450 | 22 | 532 | 17.69 | 542 | 17.61 | 568 | 17.39 | 568 | 15.98 | 544 | 15.61 | 452 | 14.87 | 420 | 14.65 | 2.1 |
| CPD 80-750 | 3" | 1450 | 30 | 658 | 23.16 | 678 | 22.50 | 734 | 21.53 | 738 | 19.91 | 707 | 19.39 | 590 | 18.28 | 530 | 17.91 | 2.4 |
| CPD 100-870 | 4" | 880 | 30 | 714 | 22.94 | 757 | 22.94 | 782 | 22.2 | 731 | 20.72 | 712 | 20.72 | 553 | 20.72 | 485 | 20.72 | 3.3 |
| | | 975 | 30 | 799 | 25.16 | 850 | 24.42 | 876 | 23.68 | 816 | 22.2 | 801 | 21.46 | 641 | 21.46 | 551 | 21.46 | 3.3 |
| | | 1030 | 30 | 876 | 30 | 918 | 29.6 | 920 | 27.38 | 842 | 25.9 | 816 | 25.16 | 416 | 25.16 | 571 | 25.16 | 3.3 |
| | | 1150 | 37 | 930 | 37 | 971 | 37 | 981 | 36.26 | 901 | 32.56 | 850 | 32.56 | 651 | 32.56 | 578 | 32.56 | 3.7 |
| CPD 100-1260 | 4" | 880 | 30 | 1063 | 27.38 | 1114 | 28.12 | 1139 | 27.38 | 1020 | 25.9 | 944 | 26.64 | 680 | 25.9 | 646 | 25.9 | 3.2 |
| | | 975 | 37 | 1165 | 34.78 | 1233 | 34.04 | 1258 | 33.3 | 1148 | 30.34 | 1088 | 30.34 | 774 | 29.6 | 663 | 29.6 | 3.5 |
| | | 1030 | 45 | 1190 | 39.96 | 1284 | 39.22 | 1309 | 38.48 | 1182 | 36.26 | 1122 | 34.78 | 791 | 34.78 | 672 | 34.78 | 3.5 |
| | | 1150 | 55 | 1267 | 46.62 | 1352 | 46.62 | 1411 | 45.14 | 1241 | 42.92 | 1182 | 42.92 | 799 | 42.92 | 680 | 42.92 | 3.9 |
| CPD 100-1600 | 4" | 880 | 37 | 1190 | 37.74 | 1241 | 39.22 | 1462 | 38.48 | 1377 | 34.78 | 1301 | 34.04 | 893 | 31.82 | 782 | 31.82 | 3.2 |
| | | 975 | 45 | 1318 | 39.96 | 1403 | 40.7 | 1598 | 39.96 | 1539 | 36.26 | 1479 | 35.52 | 1046 | 33.3 | 867 | 33.3 | 3.6 |
| | | 1030 | 45 | 1445 | 42.92 | 1505 | 42.92 | 1624 | 42.18 | 1547 | 40.7 | 1505 | 40.7 | 1063 | 39.96 | 884 | 39.96 | 3.6 |
| | | 1150 | 75 | 1539 | 55.5 | 1598 | 56.24 | 1692 | 56.24 | 1598 | 54.76 | 1556 | 54.02 | 1105 | 53.28 | 893 | 53.28 | 4.0 |
| CPD 150-2000 | 6" | 735 | 55 | 1904 | 49.58 | 1921 | 49.58 | 2066 | 53.28 | 2023 | 51.06 | 1901 | 48.84 | 1401 | 44.4 | 1114 | 44.4 | 5.5 |
| | | 880 | 90 | 2057 | 84.36 | 2142 | 84.36 | 2253 | 88.8 | 2057 | 87.32 | 2006 | 85.84 | 1479 | 80.66 | 1190 | 80.66 | 6.6 |
| CPD 150-2600 | 6" | 735 | 75 | 2380 | 66.6 | 2482 | 66.6 | 2652 | 68.08 | 2499 | 62.9 | 2253 | 59.2 | 1819 | 56.24 | 1462 | 56.24 | 5.9 |
| | | 880 | 110 | 2720 | 103.6 | 2788 | 105.08 | 2975 | 106.56 | 2720 | 102.12 | 2550 | 98.42 | 1989 | 92.5 | 1615 | 92.5 | 6.8 |
| CPD 150-3100 | 6" | 735 | 90 | 2856 | 76.96 | 2924 | 76.96 | 3128 | 75.48 | 3001 | 72.52 | 2805 | 68.82 | 2176 | 65.12 | 1785 | 65.12 | 6.4 |
| | | 880 | 160 | 3315 | 125.8 | 3400 | 125.8 | 3689 | 124.32 | 3400 | 118.4 | 3230 | 112.48 | 2448 | 104.34 | 2023 | 104.34 | 8 |

CPS/CPV 系列真空泵外形尺寸



| 泵型號 | 進/出 □ (IN) | A | B | C | G | I | L | m | g | e | h1 | h2 | h3 | d | k | u | w1 | w2 | b1 | m1 | n - φ z | 重量 (Kg) | |
|----------|------------------|-----|-----|-----|--------|------|-----|-----|-----|------|-----|-----|-----|----|------|----|-----|-----|-----|-----|-------------|------------|------|
| 32-20 | 1 1/4" | 80 | 90 | 118 | 3/8" | 288 | 35 | 45 | 144 | 170 | 100 | 100 | 65 | 19 | 21.5 | 6 | 125 | 100 | 45 | 160 | 4 - φ 12 | 17 | |
| 32-50 | | | 125 | | | 323 | | | 179 | 205 | | | | | | | | | | | | 19 | 17 |
| 40-100 | 1 1/2" | 135 | 120 | 184 | 3/4" | 439 | 55 | 50 | 180 | 210 | 160 | 160 | | 28 | 31 | 8 | 200 | 180 | 50 | 250 | 4 - φ 15 | 70 | |
| 40-150 | | | 195 | | | 514 | | | 255 | 295 | | | | | | | | | | | | 15 | 70 |
| 50-220 | 2" | | | | | | | | | | | | | | | | | | | | 3 - φ 16 | | |
| 65-300 | 2 1/2" | 144 | 254 | 216 | 1/2" | 614 | 65 | 70 | 354 | 394 | 180 | 180 | 120 | 32 | 35 | 10 | 220 | 200 | 70 | 280 | 4 - φ 16 | 133 | |
| 65-450 | | | 324 | | | 684 | | | 424 | 464 | | | | | | | | | | | | 15 | 133 |
| 100-550 | 4" | 168 | 326 | 233 | 1 1/4" | 727 | 90 | 85 | 447 | 496 | 225 | 210 | 160 | 42 | 45 | 12 | 290 | 230 | 85 | 355 | 4 - φ 18 | 200 | |
| 100-700 | | | 391 | | | 792 | | | 512 | 561 | | | | | | | | | | | | 15 | 200 |
| 125-1250 | 5" | 142 | 445 | 260 | 1 1/4" | 847 | 90 | 100 | 601 | 645 | 315 | 270 | 202 | 60 | 64 | 18 | 330 | 270 | 100 | 410 | 4 - φ 20 | 436 | |
| 125-1550 | | | 545 | | | 947 | | | 701 | 745 | | | | | | | | | | | | 15 | 436 |
| 200-1950 | 8" | 358 | 530 | 522 | 2 1/2" | 1410 | 160 | 150 | 710 | 830 | 430 | 370 | 215 | 80 | 85 | 22 | 520 | 500 | 150 | 650 | 4 - φ 24 | 1125 | |
| 200-2500 | | | 630 | | | 1510 | | | 810 | 930 | | | | | | | | | | | | 15 | 1125 |
| 200-3100 | | | 730 | | | 1610 | | | 910 | 1030 | | | | | | | | | | | | 15 | 1125 |

CPD 系列真空泵外形尺寸图



| 泵型號 | 進 / 出口 (IN) | A | B | C | G | I | L | m | g | e | H1 | h2 | h3 | d | k | u | w1 | w2 | b1 | m1 | n - ϕ z | 重量 (Kg) |
|----------|-------------|-----|------|-----|--------|------|------|-----|------|------|-----|-----|-----|----|------|----|-----|-----|-----|-----|---------------|---------|
| 32-20 | 1 1/4" | 80 | 139 | 118 | 1/2" | 337 | 35 | 45 | 193 | 219 | 100 | 100 | 44 | 19 | 21.5 | 6 | 125 | 100 | 45 | 160 | 4 - ϕ 12 | 20 |
| 32-45 | | | 189 | | | 387 | | | 243 | 269 | | | | | | | | | | | | 23 |
| 32-60 | | | 214 | | | 412 | | | 278 | 304 | | | | | | | | | | | | 27 |
| 40-110 | 1 1/2" | 135 | 239 | 184 | 1/2" | 558 | 52.5 | 50 | 299 | 339 | 160 | 160 | 80 | 28 | 31 | 8 | 200 | 180 | 50 | 250 | 4 - ϕ 15 | 70 |
| 40-140 | | | 269 | | | 588 | | | 329 | 369 | | | | | | | | | | | | 79 |
| 40-190 | | | 339 | | | 658 | | | 399 | 439 | | | | | | | | | | | | 87 |
| 50-280 | 2" | 144 | 319 | 216 | 1" | 679 | 65 | 70 | 419 | 459 | 200 | 180 | 120 | 32 | 35 | 10 | 240 | 230 | 70 | 300 | 4 - ϕ 16 | 130 |
| 50-340 | | | 379 | | | 739 | | | 479 | 519 | | | | | | | | | | | | 140 |
| 50-420 | | | 419 | | | 779 | | | 519 | 559 | | | | | | | | | | | | 145 |
| 80-600 | 3" | 139 | 475 | 233 | 1" | 847 | 90 | 85 | 575 | 624 | 225 | 210 | 174 | 42 | 45 | 12 | 290 | 230 | 85 | 355 | 4 - ϕ 18 | 220 |
| 80-750 | | | 560 | | | 932 | | | 660 | 709 | | | | | | | | | | | | 240 |
| 100-870 | 4" | 137 | 546 | 235 | 1 1/2" | 918 | 90 | 100 | 672 | 716 | 315 | 270 | 225 | 60 | 64 | 18 | 330 | 270 | 100 | 410 | 4 - ϕ 20 | 411 |
| 100-1260 | | | 696 | | | 1068 | | | 822 | 866 | | | | | | | | | | | | 484 |
| 100-1600 | | | 796 | | | 1168 | | | 922 | 966 | | | | | | | | | | | | 518 |
| 150-2000 | 6" | 333 | 830 | 497 | 2" | 1660 | 160 | 150 | 960 | 1080 | 430 | 370 | 331 | 80 | 85 | 22 | 520 | 500 | 150 | 650 | 4 - ϕ 24 | 1,328 |
| 150-2600 | | | 980 | | | 1810 | | | 1110 | 1230 | | | | | | | | | | | | 1,478 |
| 150-3100 | | | 1080 | | | 1910 | | | 1210 | 1330 | | | | | | | | | | | | 1,628 |

3. 保存：

保持泵在一温度低、密闭、干燥的环境。每6个月或气候较潮湿时要更经常加入约 1/2 L 防锈油到泵内，并转动叶轮数次。

运转后长时间闲置时，将泵内完全清理干净，必要时使用合适的除锈剂将表面沉淀物刮除。

请依上述指示提供泵适当的维护。

3. Storage :

Keep the pump in a cool closed dry environment. Renew the preservation condition every 6 months or more frequently if the climate is particularly damp by pouring 1/2 liter of rustproof oil in the pump and rotating the impeller a few times.

After a long idle period, empty the pump completely and remove, if necessary any scale deposit by using a suitable de-scaling mixture.

Provide then for preservation of the pump as indicated above.

4. 安装：

4.1 泵需水平摆置在一平坦表面，并使用螺栓穿过固定孔固定。

4.2 出入口配管不可有应力造成。

连接泵时配管需确实洗干净，垫片不可突出管内。

4. Installation :

4.1 The pump has to be set horizontally on a level surface and fix using bolts through the relevant holes.

4.2 The inlet and the outlet piping must cause no stress.

Clean piping properly before connecting the pump. Gaskets are not to protrude into the piping.

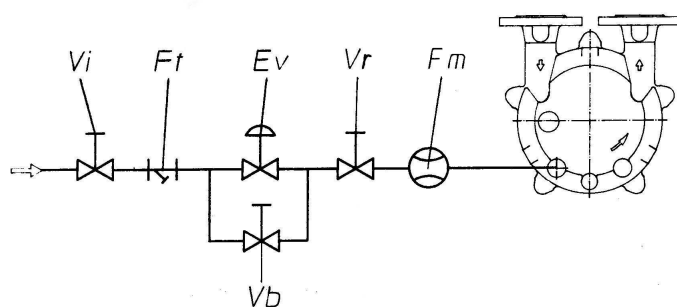


Fig. 2

5. 运转操作

5.1 初步检验

泵第一次启动前，以下之操作与检查需确实作到：

- 打开入水开关(若有).
- 检查出入口配管确实密闭。
- 检查马达旋转方向。检查时，先启动马达后立刻停止，然后检查马达风扇转向，如果旋转方向不正确，关闭电源并将马达任两条电源线对调即可。

5.2 启动

5.2.1 第一次启动

- 启动泵;
- 打开封液水开关 Vb:
 1. 自动供给:
电磁阀 Ev 藉由马达作动,马达 on 时打开;
 2. 手动供给:
马达 on 时立刻手动打开阀 Vb.
- 藉由阀 Vr (见 Fig. 2)调整入水量. 由流量计 Fm 检查流量或由出口水气分离桶之排水口检查。
- 依马达铭板上之额定电流检查马达之电量消耗。
- 检查马达及泵无不正常之震动。

5. Operation

5.1 Preliminary controls

Before starting up the pump for the first time, the following operations and checks should be carried out :

- Open the shut-off valve (if installed) on the inlet piping.
- Check that inlet and outlet piping be airtight.
- Check the direction of rotation of the motor. To do this, start up the pump for a short time and check that the fan rotates, If the direction of rotation is not correct **turn off power** and invert connections of two of the motor feed conductors.

5.2 Start up

5.2.1 First start-up

- Start up the pump;
- Supply service liquid to the pump by opening valve Vb:
 1. Automatic supply:
Solenoid valve Ev, actuated by the electric motor, opens when motor is on;
 2. Manual supply:
Open manually valve Vb soon after the motor has been switched on.
- Adjust the flow of service liquid by means of the valve Vr (see Fig. 2) checking the flow value by means of the flowmeter Fm or, if missing, by measuring the flow of the liquid from the separator to drain.
- Check motor power consumption rate against the rate indicated on the plate.
- Check that there are no abnormal vibrations of the motor and/or of the

- 检查机械轴封有无泄漏。

警告：严禁泵无水运转。

5.2.2 下次启动

- 启动;
- 依第 4&5 页提供泵的密封水量

5.3 运转检查

每日数次检查下列各项：

- 进出口真空或压力;
- 密封水封液流量;
- 马达电流消耗量;
- 出口密封水温
- 轴承温度

5.4 停止

- 停止电源供应
- 停止密封水供应

6. 维修保养。

6.1 预防性保养

针对非故障性保养：

- 机械轴封不可无水运转。
- 若密封水使用含有特别高盐份含量时，使用柔软剂或定期循环来除去附于表面之污垢，可使用 10%草酸 ($H_2C_2O_4$)溶剂运转约 30 分钟来除垢。

★ 警告:皮肤接触或吸入有危险性。★ Warning: It is harmful if in contact with the skin or ingested.

pump.

- Check that there are no leakages from the mechanical seal.

WARNING: Do not operate the pump without service liquid.

5.2.2 Next start-up

- Start up the pump;
- Supply service liquid to the pump as explained at page 4&5

5.3 Operating checks

Every day and several times a day check the following item:

- Inlet or outlet pressures;
- Flow of service liquid;
- Motor power consumption rate;
- Discharge temperature of service liquid;
- Temperature of bearings.

5.4 Stop

- Stop electric supply.
- Stop service liquid feed.

6. Maintenance.

6.1 Preventive maintenance

For a trouble free operation:

- The mechanical seal must not operate when service liquid is missing.
- If the service liquid used has a particularly high salt content , provide for softening or removing the scale deposit with periodic recirculation of a descalent. Descalant used may be a 10% oxalic acid solution, let it act for about 30 minutes.

6.2 泵内部清理

当污垢沉积阻塞泵或造成马达电源升高时泵必需作内部清理。

依下列步骤：

- 使用适合的溶剂，若有需要可使用刮刀来确实清除内部零件。

6.2.3 Cleaning of the pump internally

The pump must be cleaned internally when scale deposits block the pump or increase the power absorbed by the motor.

In order to carry out this operation:

- Clean the internal components accurately with suitable solvents or, if required, with scrapers.

7. Trouble shooting.

| | Break down condition | Cause | Solution |
|-----|---|---|---|
| 7.1 | The motor does not start up and there is no noise. | At least 2 of the electric connections have been cut off. | Check fuses, terminal boards and connection cables and, if required, replace them. |
| 7.2 | The motor does not start up but a humming noise is heard. | At least 1 of the electric connection have been cut off | Check fuses, terminal boards and connection cables and, if required, replace them. |
| | | The pump is locked | 1. Clean the internal chamber of the pump. 2. Check the clearance of the impeller and, if required, adjust it. |
| | | Faulty impeller. | Replace impeller (see par. 8.1) |
| | | Faulty bearing | Replace bearing (see par. 8.1) |
| 7.3 | Automatic ct off occurs just after start up. | Short circuit in the motor windings. | Check motor. |
| | | Motor overload. | Reduce flow of service liquid. |
| | | Too high counter pressure at outlet | Check if anything is clogging the outlet piping. |
| | | Too high quantity of liquid entrained from the gas. | Reduce the quantity of entrained liquid. |
| | | The pump is locked | See point 7.2 |
| 7.4 | Absorbed power is too high. | Scale deposits | Descale and/or clean pump. |
| | | Wrong direction of rotation. | Exchanging two of the electric connections. |

| | | | |
|-----|--|---|---|
| 7.5 | The pump does not produce vacuum | Service liquid is missing | Check the infeed circuit for the service liquid. |
| | | Considerable air re-entry in the plant. | Check seals in the plant. |
| | | Wrong direction of rotation. | Exchanging two of the electric connections. |
| 7.6 | The pump produce insufficient vacuum | The pump capacity is too small. | Use a larger pump. |
| | | The flow of the service liquid is too low. | Increase flow of the service liquid. |
| | | The temperature of the service liquid is high (>15°C for the water) | Cool the service liquid and increase the flow. |
| | | Leakage in the mechanical seal. | Replace seal rings or the complete mechanical seal. |
| | | Internal erosion of the pump. | Replace damaged components of the pump. |
| | | | |
| 7.7 | The pump makes a strange or loud noise | Cavitation | Use the anticavitation valve. |
| | | Excessive flow of the service liquid. | Check the service liquid flow and reduce it. |
| 7.8 | Leakage of the pump | Faulty gaskets | Replace gaskets. |

7. 故障排除。

| | 故障状况 | 原因 | 解决方法 |
|-----|---------------|--------------|---------------------------------|
| 7.1 | 马达未启动且无任何声音。 | 至少 2 条电源线断裂。 | 检查 Fuse,接线端子台及接线若有需要请更新。 |
| 7.2 | 马达未启动但有听到嗡嗡声。 | 至少 1 条电源线断裂。 | 检查 Fuse,接线端子台及接线若有需要请更新。 |
| | | 泵叶轮被卡住 | 1. 清理泵内部。 2. 检查叶轮间隙，若有需要则调整。 |
| | | 叶轮有问题。 | 更换叶轮 |
| | | 轴承有问题。 | 更换轴承 |
| 7.3 | 启动后立刻自动跳脱 | 马达线圈短路 | 检查马达 |
| | | 马达超载 | 减少密封水的供水量。 |
| | | 出口背压过高 | 检查出口配管有无堵塞 |

| | | | |
|-----|------------|-----------------|-------------|
| | | 太多水量随气体进入。 | 降低吸入水量。 |
| | | 泵叶轮卡住 | 见 7.2 |
| 7.4 | 电流过高 | 污垢沉积。 | 清除泵污垢。 |
| | | 转向错误。 | 2 条电源线互换。 |
| 7.5 | 泵无法形成真空/压力 | 无密封液水。 | 检查封液入水管路。 |
| | | 过量气体自接缝泄入。 | 检查接缝处之密封性。 |
| | | 转向错误。 | 2 条电源线互换 |
| 7.6 | 泵真空/压力不足 | 泵容量太小。 | 使用较大之泵。 |
| | | 封液水量太少 | 增加封液水量 |
| | | 封液水温度太高 (>15°C) | 降低封液温度并增加水量 |
| | | 机械轴封泄漏 | 更换轴封 |
| | | 泵内部有腐蚀 | 更换泵有腐蚀之零件 |
| 7.7 | 泵有异音或噪音变大 | 孔蚀产生 | 安装防孔蚀阀 |
| | | 封液水过量 | 检查封液水量并调低 |
| 7.8 | 泵泄漏 | 垫片破损 | 更新垫片 |

8. 分解和组立。

分解，任何修理工作及泵组立必需由有技术性之员工实施，并使用合适之辅助设备。

注意：因分解及组立时所造成之损害不在保固内。

8. Disassembly and reassembly

Disassembly, any repair work and reassembly of the pump must be carried out only by skilled personnel and with the aid of suitable equipment.

NOTE: the warranty does not cover damage caused by operations carried out incorrectly during disassembly and/or reassembly of the pump.

9. 安全规章。

为了降低可能造成的身体危险，所有可能与泵有接触之员工均必须了解此基本规章。

9. Safety regulations

All the personnel that may come into contact with the pump must observe elementary safety regulations in order to minimize the possibility of physical dangers.

9.1 泵运转时

不可接触泵结线。

不可接触泵外表之输送热气及危险液体。

不可拆解附属之配管。

不可略过必要之安全系统。

操作者避免长期曝露在高噪音状态。

9.2 在任何保养前

依 5.4. 节指示停止泵。

使泵处于大气状态。

将马达上之结线拆除。

由塞头 75C 清空泵外壳内残留之水。

拆除主管及附属接管。

清除任何沉积物，即使用适合的清除剂。

9.3 保养时

确认所有操作已依 9.2 完成。

操作危险液体时泵内部零件需使用合适液体清洗。

使用适当设备及步骤来：

- 分解及移动主管路；
- 吊起泵及其主要零件；
- 分解泵零件。

9.1 Pump in operation

Do not approach the pump connections.

Do not touch the external surfaces of the pumps conveying gas and/or hot and/or dangerous liquid.

Do not disconnect auxiliary piping.

Do not by-pass the required safety systems.

Avoid long exposure of operator to loud noise.

9.2 Before any staff service

Stop the pump as indicated in Paragraph 5.4.

Bring the pump to atmospheric pressure.

Disconnect all power sources and electric cables from the motor.

Empty the pump casing of the residual liquid through plug 75C

Disconnect main and auxiliary piping.

Eliminate any scale deposit by means of suitable descalent

9.3 During staff service

Check that all operations indicated in Par.9.2 have been completed.

Wash with compatible liquid the internal parts of pumps operating with dangerous liquid.

Use adequate equipment and procedures to:

- Disconnect and handle main piping;
- Hoist the pump and its main parts;
- Disassemble components of the pump.