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# Operation Manual for Multi Phase Extraction & Separation at the Beede Oil Site

presented to

GZA GeoEnvironmental Inc

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## 1.0 INTRODUCTION

This manual contains specification and detailed description of all components within the Multi Phase Extraction Unit supplied for the Beede Oil site. Also contained within this manual is a brief description of the operation and maintenance of the system. **It is very important to note that these descriptive sections are an attempt to give an overview of the unit operation. For exact process operation procedures, the reader should refer directly to the Mechanical and Electrical Specification Appendices.**

## 2.0 WARRANTY STATEMENT

The Multi Phase Unit provided for the Beede Oil Site is offered with a one year limited warranty on all parts within. All warranty claims are subject to the discretion of SCG Industries Limited and will be dealt with on an individual component basis. Any abuse or misuse of the equipment will void all pre-stated warranty. Warranty is extended to include all labour performed by SCG if SCG personnel are contracted to provide maintenance through an arranged maintenance contract.

Although these units may be modified to suit the changing needs of the site or future sites, it is strongly recommended that the changes be approved in writing by SCG Industries Limited, at least for modifications performed during the one year warranty period.

## 3.0 EQUIPMENT AND COMPONENTS

The following section details the specific operation of major components within the Multi Phase Unit. **For exact process operation procedures, the reader should refer directly to the Mechanical and Electrical Specification Appendices.**

### *3.1 Header Pipe*

The extraction piping system consists of the (typical) components listed below.

3.1.1. Well Assembly: PVC (sch. 40) well(4") with a 1" low density polyethylene (LDPE) tubing inserted through a EDPM (Ethylene propylene diene Monomer) Gasket. The LDPE tube is perforated at the end with a specified series of 3/16" holes to facilitate optimal suction. Wells are equipped with valves for flow control.

3.1.2. Above Ground Piping: The Above ground piping system is constructed of heat welded Polypropylene (PPL) pipe and fittings ( from 55 mm to 200 mm diameter), with control valves as specified. The PPL piping terminates with a flange at the treatment system buildings.

3.1.3. Building Piping: The header pipe assembly inside the building is constructed of sch 40 PVC and appropriate gaskets and fittings, with a clear pipe observation window in line. The assembly also includes a fresh air dilution valve and a drain valve.

### *3.2 High Vacuum Liquid Separator*

The SCG manufactured High Vacuum Liquid Separator (HVLS) is located upstream of the vacuum pump. The HVLS design serves to separate the extracted aqueous and non-aqueous liquids (i.e., droplets) from the vapour phase stream. The HVLS uses a two-tank design and a combination of floats and timer activated pneumatic actuators to conduct the simultaneous removal of liquid from the bottom tank of the HVLS while allowing concurrent vacuum extraction and accumulation of liquid droplets in the upper tank. The HVLS is equipped with two control floats (F1& F2) and two pneumatically operated wafer valves (Sol 1, & Sol 2) and one electrically operated solenoid (Sol 3).

The upper most float (F1), located in the upper tank, is an overflow control and deactivates the system if the HVLS becomes over-filled with liquid. This prevents any potential breakthrough of liquid droplets into the vacuum pump.

The lower float (F2), located in the bottom tank, serves to cycle the HVLS and evacuate all accumulated liquid from the bottom tank. There is a three step cycle that the HVLS performs to evacuate all the accumulated liquid from the bottom tank.

- ***Step 1*** The isolation valve (Sol 1) located between the two tanks, and the 3-way valve (Sol 2), located on the end of the tank, close simultaneously to isolate the upper and lower tanks. The lower tank is immediately vented to achieve atmospheric pressure. This allows the continuous accumulation of liquid in the upper tank at the operating vacuum. The duration of this step is approximately 10 seconds.

- ***Step 2*** While the upper and lower tanks remain isolated, the bottom tank is pressurized with compressed air supplied by the compressor. This step transfers liquids from the HVLS downstream to the Isolation tank. This is achieved upon the pressurization valve (Sol 3) being opened for approximately 15 seconds.

- ***Step 3*** The 3-way valve re-opens allowing the build-up of pressurized air in the lower tank to pass around the upper tank. This allows the two tanks to achieve the same operating vacuum. Upon equalization of the negative pressure in the two tanks, the isolation valve re-opens allowing all accumulated liquid in the upper tank to drain to the lower tank thus terminating the cycle.

The HVLS is activated through an entire cycle upon the following conditions being achieved:

i) Panel switch "on".
ii) Outputs activated
iii) High level floats in the Reclaimer tank, Isolation Tank and Oil/Water Separator are not activated. All high level floats have a ten second time delay before activating.
iv) Proper supply of compressed air to each actuator from the compressor.
v) Activation of F2 in lower tank of HVLS.
vi) Depressing the "HVLS Jog " button located on the control panel.

### *3.3 Liquid Ring Vacuum Pump*

The driving system of the Multi Phase Remediation Unit is a *50 hp SiHi Liquid Ring Vacuum Pump*. The liquid ring pump is an Oil-Sealed system, cooled via a fan-cooled radiator. The Vacuum Pump is equipped with a Reclaimer Tank and demister to prevent the breakthrough of oil droplets in the effluent vapour stream.

The 50 hp SiHi Liquid Ring operates effectively at 770 ACFM at 16 in Hg and should not exceed an operating vacuum of 26 in Hg. The specifications and the performance curve for the pump are located in the technical specifications of this manual.

The liquid ring vacuum pump is equipped with two temperature switches (T1, T2). T1 serves to deactivate the system upon the sealant oil achieving a temperature of above 165 °F. T2 serves to deactivate the pump upon the off-gas temperature being in access of required limits (factory set at 100 °F) this may be adjusted to suit off gas treatment equipment (do not exceed 165 °F without consulting SCG Industries limited).

The Reclaimer Tank on the Vacuum Pump is equipped with two floats (i.e. low/low, high/high) to ensure an adequate volume of oil is contained in the reclaimer tank to provide a continuous flow of oil to properly seal the pump. If the oil level in the pump falls below the low level float, the pump will de-activate. If the oil level exceeds the high /high float the pump will deactivate.
The vacuum pump operates upon having achieved the following conditions:

i) Panel switch "on".
ii) Pilot switch at pump "on".
iii) J-leads/overloads to Vacuum Pump are not "tripped".
iv) High level floats in the HVLS, Isolation Tank, Oil/Water Separator and Reclaimer tank are not activated. All high level floats have a ten second time delay before activating.
v) Temperature Switches (T1,T2) on the Liquid Ring Pump are not continuously activated.
vi) If all the above conditions are satisfied, the system reset button on the panel must be pushed to initially start the pumps. The reset must also be depressed when re-activating the vacuum pump after a failed conditions or deliberate a system shut-down at the panel. If only the pilot switch is used to deactivate the Liquid Ring Pump, the unit can be re-started by activating the pilot switch only.

** "JOG" is used to activate Liquid Ring directly without activating the control circuit.

***Important Note for Start-up of the Liquid Ring Pump***
The pumping chamber of the liquid ring pump must be drained to the centre line of the pump housing before each pump start-up. A manual ball valve is fitted on the side of the pump chamber to perform the draining. This draining is mandatory for each start-up as the pump can be damaged if allowed to rotate with a full housing. Therefore, start-up requires that a technician to be present during each start-up to drain the pump and to de-press the reset button. In other words, **remote start-up of the system is not recommended.**

### *3.4 Isolation Tank*
The process liquid is transferred from the HVLS to the Isolation Tank for the purpose of stabilizing flow to allow for sediment precipitation as well as emulsion breaking. The tank is equipped with a High/High protection float to protect against System overflow.

### *3.5 Oil/Water Separator*
The process liquid is allowed to pass from the Isolation tank into the SCG manufactured M-16 Oil/Water Separator via gravity flow. All phase separated product is collected in the oil chamber of the Oil Water Separator and transferred to an exterior aboveground Oil Holding Tank (see below). The Oil/Water Separator is equipped with a High/High float , which acts as an overflow control and deactivates the system if the Oil/Water Separator becomes over-filled with liquid. This prevents any potential loss of product from the tank.

The separator is equipped with a pumping chamber which is fitted with a High activation float. Upon activation of this float, the diaphragm pump transfers all accumulated process water in the

pumping chamber downstream(timer controlled).

The High float located in the Oil/Water Separator is activated upon the following conditions being achieved:

i) Panel switch "on".

### *3.6 Water Transfer Pump*

A diaphragm pump is located between the Oil/Water Separator and the Discharge. The pump removes accumulated process liquid from the secondary chamber of the Oil/Water Separator upon activation of the float. The pump is activated by the float and a timer set-up. The timer is set to let the transfer pump run for 45 seconds during each cycle. The discharge pipe is equipped with a GPI 1" digital water flow meter.

### *3.7 Oil Transfer Pump*

A diaphragm pump is located between the Oil Chamber of the Oil/Water Separator and the Discharge. The pump removes accumulated oil from the oil chamber of the Oil/Water Separator upon activation of the float. The pump is activated by the float and a timer set-up. The timer is set to let the transfer pump run for 15 seconds during each cycle.The discharge pipe is equipped with a GPI 1" digital oil flow meter calibrated to the viscosity of the existing product.

### *3.8 Compressor*

A 5 hp Ingersoll-Rand Compressor supplies the Vacuum Enhanced Dual-Phase Extraction & Treatment Unit with a supply of compressed air used to operate the HVLS and each pneumatically actuated valve (i.e. Liquid Ring Pump and HVLS). The compressor is fitted with a intrinsically safe pressure switch (P1) which regulates the internal pressure of the compressor to maintain a minimum of approximately 90 psi.

The Compressor is activated upon the following conditions being achieved:

i) Panel switch "on".
ii) Pilot (wall) switch "on".
iii) The J-leads and thermal overloads not "tripped".
iv) P1 being activated.

### *3.9 Heat and Ventilation*

The enclosure is equipped with a 5000 Watt Ruff Neck Heater which is self-regulated by a side-mounted thermostat. The enclosure is also equipped with a 30" motorized actuated damper which is controlled by an internally mounted thermostat. The actuated damper opens when the enclosure temperature exceeds the temperature setting of the internally mounted thermostat. The heater is set to heat the enclosure until the temperature set on the thermostat has been achieved. The heater thermostat must be set to a temperature lower (minimum of 10 degrees) than that of the Damper actuator thermostat setting to avoid unnecessary cycling damper and loss of heat. To ensure that a proper temperature has been set observe one full cycle and note the temperature of the enclosure.

The Convection Heater operates upon having achieved the following conditions:

i) Panel switch "on".

## *4.0 START-UP PROCEDURE*

The initial start-up of the Multi Phase Extraction Unit requires a multi-step protocol. First, the user should become familiar with the programmable logic controller (PLC) indicator lights and panel hand switches and associated panel lights, as well as the specification of each component supplied in this operation manual. The indicator lights on the face of the PLC are used to display the operating state of all internal components.

Upon becoming familiar with the indicator devices on the control panel, a knowledge of the general flow and process components is necessary to properly operate and calibrate the Unit .

The following is a step by step guide to a typical start-up of the system. This procedure assumes that the valve positions are in the last operating possition.

### *4.1 Panel*

Begin the start-up procedure by ensuring that all panel hand switches and associated lights on the control panel are in the "off" position. Ensure that the interior pilot switches, located on the interior wall, are in the "off" position.

Return to the control panel and switch the main power disconnect to the "on" position. Turn PLC to "on" position This should immediately activate the PLC and the panel heater if the outdoor ambient temperature is less than that set on the thermostat.

Turn the interior pilot switch for the light to the "on" position and observe the illumination of the interior light. This ensures that 110 volt power is supplied to the System.

### *4.2 Liquid Ring Vacuum Pump*

To operate the Liquid Ring Vacuum Pump, begin by turning the exterior system panel switch to the "on" position.
Turn Outputs switch to on position.
Turn the exterior L.R. pilot switch to the "on" position.
Ensure oil fills the housing of the Liquid Ring to the centre line, and is not over full.
Ensure that the dilution valve at the HVLS influent is in the open position.

The pump should now be ready to run upon the reset button being depressed and the pilot switch being activated.

If the power supply has been manipulated since the last period of operation, proper rotation of the pump should be confirmed during the system start-up. Rotation arrows on the pump shaft indicate proper flow orientation.

### *4.3 Water Transfer Pump*

To operate the Transfer Pump, begin by turning the exterior panel hand switch to the "on" position. Also ensure that the regulator supplying compressed air to the diaphragm pump is supplying sufficient pressure. The transfer pump should now be ready to run upon the activation of float F5.

### *4.4 Oil Transfer Pump*

To operate the Transfer Pump, begin by turning the exterior panel hand switch to the "on" position. Also ensure that the regulator supplying compressed air to the diaphragm pump is supplying sufficient pressure. The transfer pump should now be ready to run upon the activation of float F6.

### *4.5 Compressor*

To operate the Compressor, begin by turning the exterior panel system switch to the "on" position. Turn the interior pilot switch to the "on" position. The compressor should now be ready to run if the tank pressure is below the set-point of the internal pressure switch.

## *5.0 GENERAL MAINTENANCE PROCEDURE*

This section focuses on the major components of the Vacuum Enhanced Dual-Phase Extraction & Treatment Unit and the associated maintenance to be expected. As maintenance is conducted, other areas of concern may arise based on the site conditions including, but not limited to, hardness and sediment levels within the process water. In general, the main focus of regular maintenance is associated with the working components (i.e., motors, pumps, belts, solenoids, filters, strainers, etc). For more detailed information, refer to the specification sheets located in the Mechanical Specification Appendix of this manual.

### *5.1 PVC Header Pipe*

Periodic cleaning of the observation pipe will be required to ensure visual inspection. The header pipe assembly (building interior) should be inspected for degradation monthly, and disassembled at 6 months intervals to inspect for interior degradation of the materials.

### *5.2 High Vacuum Liquid Separator*

The HVLS requires little maintenance but may periodically require the removal of sediment which may accumulate at the bottom of the tank.

Sediment accumulation is usually indicated by check valve failure, resulting in a back flow through the discharge check valve and is indicated by syphoning of the Isolation tank back to the HVLS.

- The unit can be drained by manually depressing the HVLS "Jog" button located on the exterior electrical Panel. This button must be depressed every 30 seconds until only air exists the HVLS to the Isolation tank. At this point the line can be disconnected and cleaned.

Float switches will require periodic cleaning due to scaling if significant suspended solids exist. Irregular cycling of the HVLS will indicate float malfunctions.

Air lines supplying compressed air to all pneumatic valves should be inspected and cleaned of all moisture on a monthly basis.

### *5.3 Liquid Ring Vacuum Pump*

The Liquid Ring Pump requires the following regular preventative maintenance:

- Inspect the flex connector for wear and increased temperature on a monthly basis (this is observed at the end of the systems operation, and can be determine by touch).
- Remove and inspect the demister element for internal scaling on a monthly basis.
- Inspect bearing for increased temperature upon each visit (this is observed at the end of the systems operation, and can be determine by touch). If discolour of paint occurs bearing inspection will be required.
- Provide grease to bearings on a monthly basis, with the installation of grease vent to ensure over greasing does not occur.
- Inspect pneumatic solenoid, the temperature probe and vacuum gauge to ensure proper operation on a quarterly basis.
- Check amperage being drawn by the motor on a quarterly basis.

### *5.4 Isolation Tank*

The tank may require periodic sediment removal. Float operation should be inspected monthly. Sediment removal can be conducted through the drain valve located at the bottom of the tank. This is most effectively performed with the use of a vacuum truck. And is only required when significant accumulations of sediment occur.

### *5.5 Oil/Water Separator*

The Oil/Water Separator requires little maintenance. Proper operation of the high/high level float should be verified on monthly basis. The tank will collect sediment and sludge on a regular basis and requires cleaning through the clean-out port. Upon draining, inspect the coalescing pack to ensure no fouling has occurred. The draining of the Oil Water separator is conducted by connecting the 1.5" discharge valve, located at the bottom of the first chamber, to a waste container of vacuum truck. Upon draining the vessel's Coalescent pack should be inspected and cleaned with pressurized water to ensure proper flow through.

### *5.6 Transfer Pump*

The Transfer Pump is a low maintenance item. If observed flow rates decrease during regular operation of the pump, verify the pressure at the regulator located adjacent to the three way valve on the bottom tank of the HVLS. to ensure the proper pressure is being supplied. Inspect the pump for leaks or excess vibration. For more information on air consumption, refer to the Mechanical Specifications Appendix of this manual. If the totalizer is observed to be sticking or losing accuracy the meter should be removed and cleaned of any debris.

### *5.7 Compressor*

The compressor should be drained of all accumulated moisture on a bi-weekly (i.e., twice per

week) basis. The belts on the compressor should be inspected on a monthly basis. The oil should be checked monthly and the filters should be changed every 6 months of operation. Also, a check of the amperage being drawn by the compressor motor should be performed on a quarterly basis.

## 6.0 Spare Parts List

With the supply of the units one full set of fuses, for one complete change have been provided.

A complete spare parts list is not required but is available at an additional cost. This list would include the following components.

HVLS
- Actuator for HVLS
- Float assemblies
- Check valve
- Regulator

Compressor
- Air filter
- Regulator

Isolation Tank
- Float

Oil Water Separator
- Coalescing material
- Floats

Transfer Pumps
- Diaphragms
- Gauges
- Kitec "O" Rings

Liquid Ring
- Demister element
- Floats
- Temp switch
- Oil T-32

# APPENDIX I
## Input / Output List

**Job Name:** **Beede Oil**

**Job number:** **356**

Schneider

Controller Type: Micro
Model: 31100
Manufacturer:

Input voltage: 24 vdc
Output relays: 120 vac

## Input designations

| No. | Input Description | Reference | Notes |
|---|---|---|---|
| 01 | HVLS HH | F 1 | NI |
| 02 | HVLS H/JOG | F 2 | NI |
| 03 | ISOLATION H/H | F 3 | NI |
| 04 | OWS H/H | F 4 | NI |
| 05 | OWS H | F 5 | NI |
| 06 | OWS OIL SUMP H | F 6 | NI |
| 07 | OWS OIL SUMP H/H | F 7 | NI |
| 08 | RECLAIMER H/H | F 8 | NI |
| 09 | RECLAIMER L | F 9 | NI |
| 10 | LRP OIL TEMP | T 1 | NI |
| 11 | LRP OFF GAS TEMP | T 2 | NI |
| 12 | LRP VAC SWITCH | Vac Sw | NI |
| 13 | DAMPER THERMOSTAT | TH1 | NI |
| 14 | COMPRESSOR PRESSURE SWITCH | Ps Sw 1 | NI |
| 15 | RESET | B1 | PANEL |
| 16 | EXTERIOR TANK (oil and water) H/H | F10 | NI |

## Output Designations:

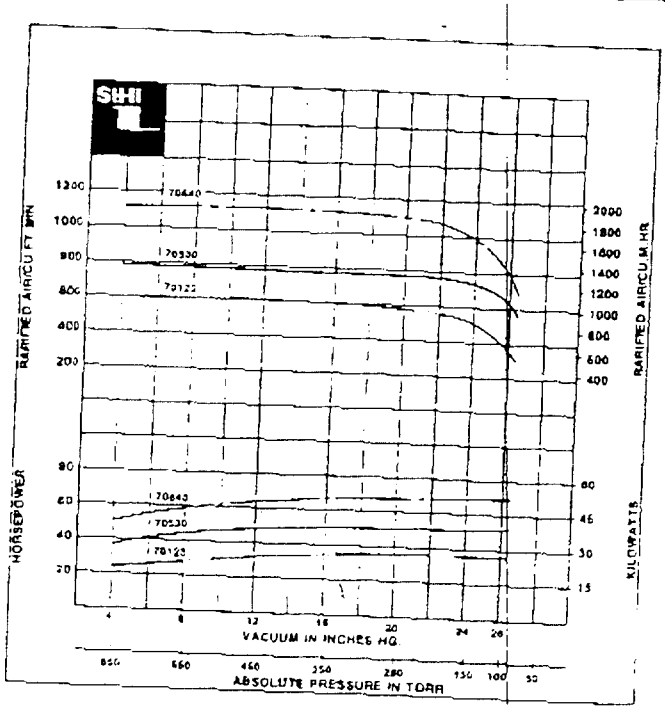
| No. | Output Description | Reference | Notes |
|---|---|---|---|
| 0001 | 50 HP LIQUID RING PUMP | M-1 | |
| 0002 | 5 HP COMPRESSOR | M-2 | |
| 0003 | HVLS ISOLATION VALVE | SOL-1 | |
| 0004 | HVLS 3-WAY VALVE | SOL-2 | |
| 0005 | HVLS PRESSURIZATION | SOL-3 | |
| 0006 | DAMPER ACTUATOR | SOL-4 | |
| 0007 | WATER TRANSFER PUMP | SOL-5 | |
| 0008 | OIL TRANSFER PUMP | SOL-6 | |
| 0009 | | | |
| 0010 | | | |
| 0011 | | | |
| 0012 | AUTO DIALER | DEVICE 1 | |
| | | | |
| | | | |
| | | | |

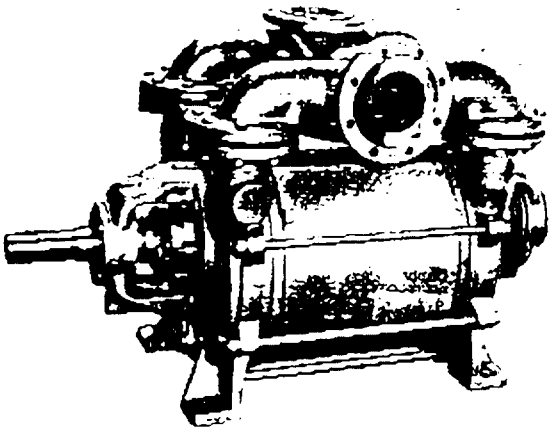
## ANALOG INPUTS/OUTPUTS

| No. | Description | Reference | 4-20 Ma. Input/output |
|---|---|---|---|
| 01 | | | |
| 02 | | | |
| 03 | | | |
| 04 | | | |
| 05 | | | |
| 06 | | | |

## APPENDIX II
## Mechanical / Electrical Specifications

Liquid Ring Vacuum Pump and accessories
High Vacuum Liquid Separator and accessories
Isolation Tank
Compressor
Oil Water Separator
Transfer Pump
Flow meter
Heater

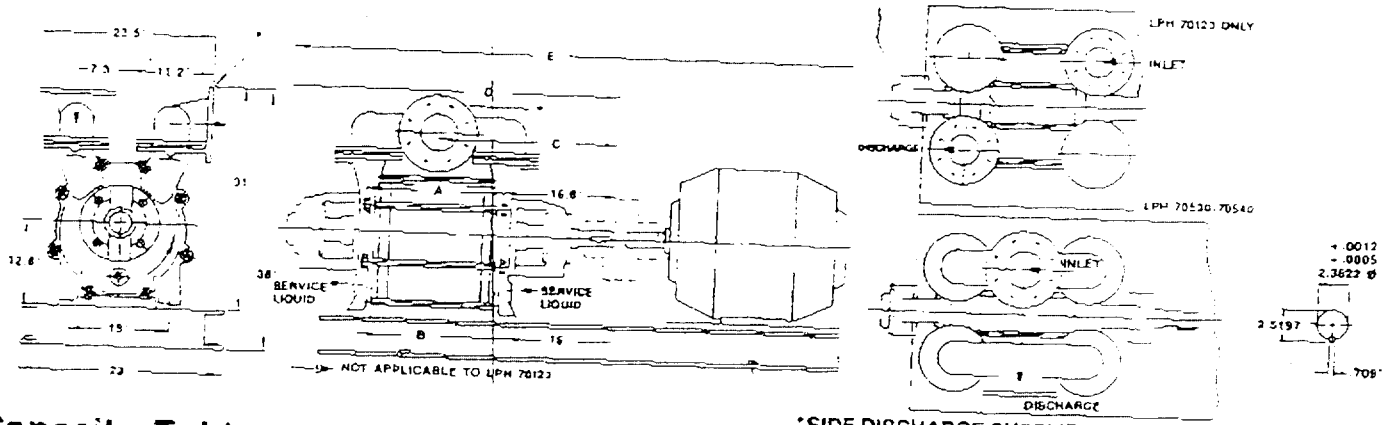


## Dimensions (inches)

| Pump Model | A | B | C | D | E |
|---|---|---|---|---|---|
| 70123 | 16.5 | 19.7 | — | 44.0 | 75 |
| 70530 | 19.3 | 22.4 | 28.3 | 46.7 | 80 |
| 70540 | 23.2 | 26.4 | 28.2 | 50.6 | 87 |

For connection sizes/ratings and motor sizes refer to engineering data table on reverse




*SIDE DISCHARGE SUPPLIED ON ALL IRON PUMPS ONLY

For baseplate mounting please obtain factory certified dimensions

## Capacity Table

| Speed (RPM) | 4" Hg 888 Torr | | 8" Hg 857 Torr | | 12" Hg 455 Torr | | 16" Hg 354 Torr | | 20" Hg. 252 Torr | | 24" Hg. 150 Torr | | 26" Hg. 100 Torr | | 26.4" Hg. 88 Torr | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | cfm | HP | cfm | HP | cfm | HP | cfm | HP | cfm | HP | cfm | HP | cfm | HP | cfm | HP |
| **Pump Model — LPH 70123** | | | | | | | | | | | | | | | | |
| 1150 | 600 | 23.5 | 600 | 29.0 | 600 | 33.5 | 600 | 37.0 | 580 | 38.1 | 485 | 38.2 | 380 | 38.5 | 305 | 38.5 |
| 975 | 502 | 18.0 | 502 | 22.2 | 502 | 25.8 | 502 | 28.1 | 483 | 29.0 | 410 | 29.5 | 330 | 29.3 | 295 | 29.5 |
| 880 | 455 | 14.5 | 455 | 19.2 | 455 | 23.0 | 455 | 25.6 | 440 | 26.0 | 375 | 26.1 | 285 | 26.1 | 259 | 26.1 |
| **Pump Model — LPH 70530** | | | | | | | | | | | | | | | | |
| 1150 | 825 | 36.0 | 820 | 40.0 | 812 | 43.6 | 795 | 47.0 | 760 | 49.0 | 685 | 50.5 | 545 | 51.0 | 430 | 50.5 |
| 975 | 685 | 24.5 | 685 | 28.8 | 685 | 32.2 | 675 | 35.5 | 655 | 37.5 | 590 | 38.5 | 485 | 38.2 | 410 | 38.3 |
| 880 | 590 | 20.5 | 590 | 24.5 | 590 | 28.0 | 590 | 31.0 | 575 | 33.5 | 535 | 34.0 | 450 | 34.0 | 365 | 34.0 |
| **Pump Model — LPH 70540** | | | | | | | | | | | | | | | | |
| 1150 | 1120 | 49 | 1120 | 55 | 1120 | 60 | 1120 | 64 | 1095 | 67 | 1000 | 68 | 825 | 68 | 700 | 68 |
| 975 | 913 | 31 | 913 | 37 | 913 | 42 | 913 | 46 | 910 | 49 | 845 | 50 | 700 | 50 | 600 | 50 |
| 880 | 850 | 27 | 850 | 33 | 850 | 38 | 850 | 42 | 830 | 45 | 770 | 46 | 630 | 46 | 500 | 46 |

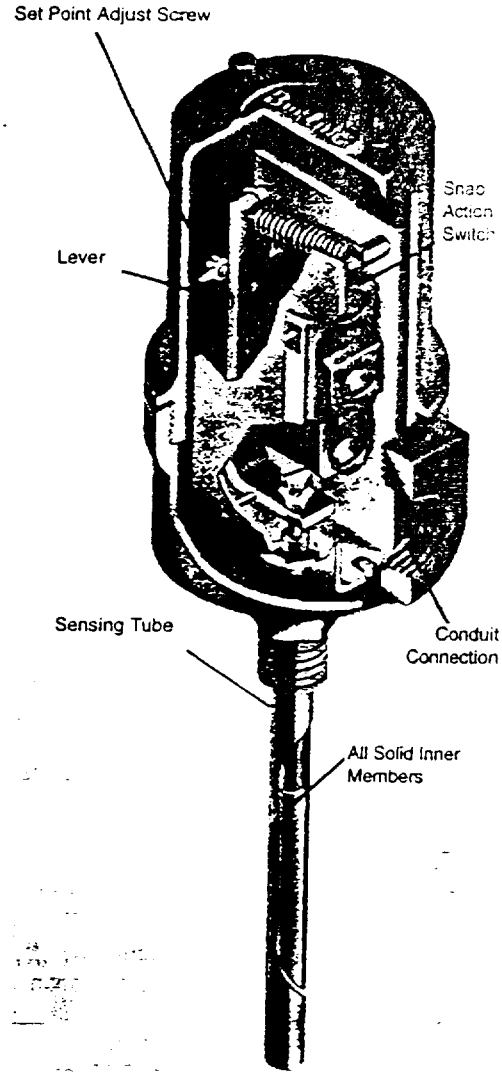
This data represents average values for pumps in standard materials. Capacity in cubic feet per minute at 68°F (20°C) using 60°F (16°C) water as service liquid. Vacuum in inches HG. Barometric pressure at sea level 29.92". Hg. abs. (760 Torr). All performance data per HEI standards; subject to SIHI standard tolerances.

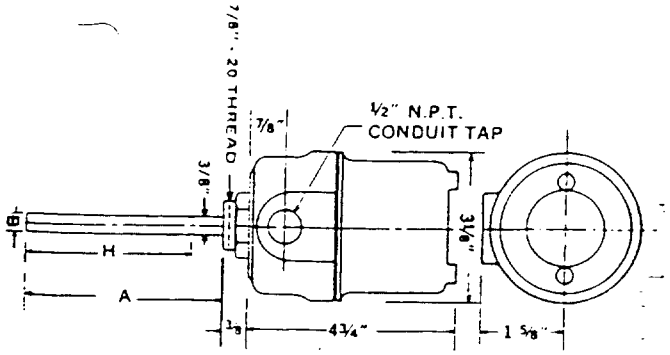
## FEATURES:

- Standard series
- [illegible]le switch
- NEMA 4 enclosure (*B-1C* only)
- Explosion-proof housing (*B-1X* only)
- Internal temperature adjusting screw
- For temperatures up to 1200°F (650°C)
- C.S.A. and F.M. approved

## HOW TO ORDER:

1) ***Model B-1C*** (with housing) or ***B-10*** (without housing), or ***B-1X*** (with explosion proof housing)
2) ***Select Code*** from chart below.
3) ***Range in °F is standard.*** Specify if °C is required. Specify if alternate range for codes 62 - 68 is required.
4) ***Add CSA or FM,*** if required (***B-1C*** and ***B-1X*** only)
   a. CSA Certifications: specify CSA
   b. FM Approval: specify FM, show sealed factory temperature setting, and show manual reset switch (type ***"J"***). See item 5.
5) ***Specify letter for type of SPDT snap action switch*** required.
   a. ***"N"*** is standard automatic reset with U.L. rating of 15A, 125-250-460 VAC, 1/8 HP, 125 VAC; 1/4 HP, 250 VAC.
   b. ***"J"*** is manual reset. See other side for U.L. rating.
   c. For higher ratings or wider differentials, consult Baker.
6) ***Specify Tube Number*** for code selected. See chart below.
7) ***Specify Mounting Fitting*** part number for other side.



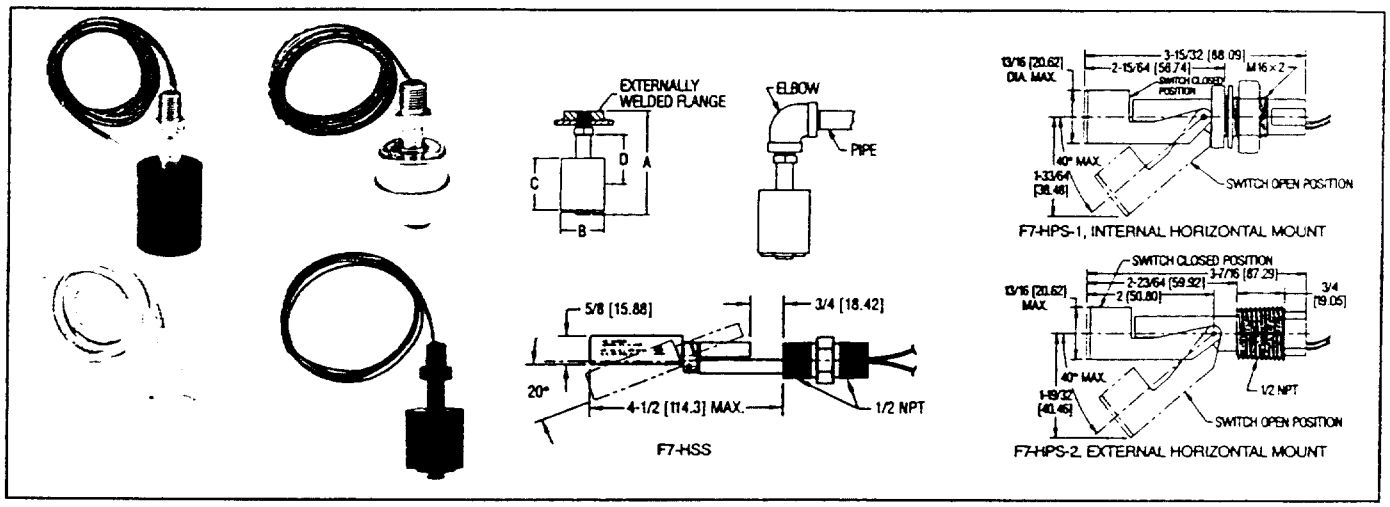



| Code No. | Adjustable Temp. Range Fahrenheit | Adjustable Temp. Range Celsius | Max. Temp. | Tube Specifications: Active Part Length "H" | Active Part Dia. "B" | Active Part Mat. | Inactive Part Mat. | Overall Length "A" | Part No. | Total Oper. Diff. | Temp. per Turn of Adj. Screw | Position of Bushing (C) or Union (D) on Tube | Standard Thermowell Draw. | Standard Thermowell Length "U" |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 | -100 to 100°F | -75 to 35°C | 600°F | 9 1/8" | 3/8" | S.S. | S.S. | 10" | 163-30 | 2°F | 40°F | C=9 1/8", D=8 1/4" | A-666-3 | 9 1/4" |
| 53 | 0 to 200°F | -10 to 100°C | " | " | " | " | " | " | 163-30 | 2°F | 40°F | " " | " | " |
| [illegible] | 100 to 300°F | 40 to 150°C | " | " | " | " | " | " | 163-30 | 2°F | 40°F | " " | " | " |
| [illegible] | 200 to 400°F | 90 to 200°C | " | " | " | " | " | " | 163-30 | 3°F | 50°F | " " | " | " |
| 56 | 300 to 500°F | 150 to 260°C | " | " | " | " | " | " | 163-30 | 3°F | 50°F | " " | " | " |
| 62 | 100 to 600°F | 40 to 310°C | 600°F | 4 1/8" | 3/8" | S.S. | S.S. | 5" | 163-20 | 5°F | 95°F | C=4 1/8" | A-666-3 | 4 1/4" |
| | 100 to 600 °F | 40 to 310°C | 600°F | 5" | 1/4" | S.S. | Ni. alloy | 5 15/16" | 131-10 | 3°F | 90°F | C=5 1/16" | None | - |
| | 100 to 600°F | 40 to 310°C | 600°F | 5" | 1/4" | S.S. | Ni. alloy | 7 1/8" | 131-40 | 3°F | 90°F | C=6 1/4", D=5" | A-698-1 | 5 1/4" |
| [illegible] | 100 to 600°F | 40 to 310°C | 600°F | 5" | 1/4" | S.S. | Ni. alloy | 8" | 131-30 | 3°F | 90°F | C=6 1/4", D=6 1/4" | A-689-1 | 5 1/4" |
| 67 | [illegible]0 to 650°F | 200 to 340°C | 1200°F | 8" | 3/8" | S.S. | S.S. | 12" | 132-10 | 4°F | 48°F | C=9 1/2", D=9 1/2" | A-807 | 8 3/4" |
| | [illegible]0 to 800°F | 200 to 425°C | 1200°F | 5" | 3/8" | S.S. | S.S. | 10" | 132-20 | 6°F | 75°F | C=6 1/2", D=6 1/2" | A-807 | 5 3/4" |
| | 600 to 1000°F | 310 to 525°C | 1200°F | 5" | 3/8" | S.S. | S.S. | 10" | 132-20 | 6°F | 75°F | C=6 1/2", D=6 1/2" | A-807 | 5 3/4" |
| [illegible] | 600 to 1200°F | 320 to 650°C | 1200°F | 3" | 3/8" | S.S. | S.S. | 8" | 132-60 | 10°F | 120°F | C=4 1/8", D=4 1/8" | A-1198 | 3 5/8" |

Series F7

# Level Switches

## Low cost, reliable and compact. Hermetically sealed contacts.




**Series F7 compact level switches** combine low cost and reliability with fast, simple installation. Seven models assure you can choose just the right combination of features, capabilities and media compatibility for almost any application. Model F7 HSS is approved for use in hazardous locations.

Hermetically sealed reed switches are actuated by magnets permanently bonded inside the float and can be easily adapted to open or close a circuit on rising or falling levels. Vertical mount models are shipped with normally open switch contacts which close as the float rises toward the mounting threads. Reverse switch action by removing the float, rotating it end-for-end and replacing it on the stem. Vertical models mount internally, oriented within 30° of vertical, or select optional fittings for external mounting. Contacts in horizontal models F7-HPS-1 (internal mount) and F7-HPS-2 (external mount), are normally open when the float is down and normally closed when the float is up. Horizontal model F7-HSS is in the normally open position when the indicating arrow points up, and normally closed when the arrow points down. Install model F7-HSS internally or externally. Switch ratings are suitable for many solid state control systems and monitors or alarms. Simple relay interfaces can be used for higher current applications.

## APPLICATIONS

Chemical processing systems, sumps, coolant tanks, oil reservoirs, fuel or water tanks, sterilizing equipment.

- The F7-SB is an ideal general purpose switch.
- The F7-SS2 is designed for high temperature, high pressure or corrosives.
- The F7-PP is suggested for highly acidic conditions.
- The F7-BT is an economical choice for lubricating and hydraulic oils, gasoline, diesel fuel and many solvents.
- The F7-HPS-1, -2 are suitable for gasoline, kerosene or solvents.
- The F7-HSS is designed for high temperatures or corrosives.

## Suggested Specifications:

Level switch shall be operated by a (specify material) float actuating a SPST hermetically sealed reed switch potted in a (specify material) stem, with normally open contacts, reversible to normally closed. Switch shall be W.E. Anderson Model No. F7___.

## PHYSICAL DATA

**Electrical Rating (Maximum):**

| | |
|---|---|
| F7-SB, -SS2 | AC: 25VA,1.0A, 200V DC: 10W,1.0A, 200V. |
| F7-PP, -BT, -HSS | AC: 30W,0.14A,220V DC: 0.28A,24V; 0.07A,120V. |
| F7-HPS-1, -2 | AC/DC: 15VA, 220V,1.0A max. |

(F7-HSS is rated explosion-proof for Class I, Groups A,B,C,D; Class II, Groups E,F,G; Class III).

**Mounting Connection:** ½" NPTM (all vertical mount), ½" NPTM F7-HPS-2, F7-HSS), M16x2 (F7-HPS-1).

**Wire Leads:** 22 AWG x18" (46 cm), vertical mount models; 22 AWG x 39" (1 m), models F7-HPS-1, -2, 22 AWG x 24" (61 cm) model F7-HSS.

**Magnet:** Alnico (F7-SB, -PP, -BT, -HPS), ceramic (F7-SS2, -HSS).

**Weight:** F7-SB, 2 oz. (58 g); F7-SS2, 1.2 oz. (34 g); F7-PP, 0.8 oz. (23 g); F7-BT, 0.7 oz. (20 g); F7-HPS-1, 1.5 oz. (43 g); F7-HPS-2, 2 oz. (57 g); F7-HSS, 3 oz. (94 g)

## DIMENSIONS, INCHES (MM)

| Model Number | (A) Stem Length | (B) Float Diameter | (C) Float Height | (D) Actuation from Hex[1] |
|---|---|---|---|---|
| F7-SB | 2.75(70) | 1.13(29) | 1.38(35) | 1.2(31) |
| F7-SS2 | 2.06(52) | 1.0(25) | 1.0(25) | 0.73(19) |
| F7-PP | 2.18(55) | 1.18(30) | 1.0(25) | 0.69(18) |
| F7-BT | 2.18(55) | 1.18(30) | 1.0(25) | 0.69(18) |

① Distance between hex and liquid (S.G. = 1.0) level at actuation point will vary with specific gravity changes.

## STOCKED MODELS

| Model Number | Material Float/Stem | Max Temp. | Max Press. | Min. S.G. | Approx. Deadband |
|---|---|---|---|---|---|
| **Vertical Mount** | | | | | |
| F7-SB | Buna-N & Epoxy/ 316SS | 220°F 105°C | 150 PSIG 10 Bar | 0.60 | ¼" 2mm |
| F7-SS2 | 316SS (CYC)/ 316SS | 300°F 149°C | 450 PSIG 31 bar | 0.75 | ¼" 2mm |
| F7-PP | Polypropylene & Epoxy/Polypropylene | 220°F 105°C | 100 PSIG 6.89 Bar | 0.60 | ⅛" 4mm |
| F7-BT | Buna-N & Epoxy/ PBT* | 220°F 105°C | 150 PSIG 10 Bar | 0.45 | ⅛" 4mm |
| **Horizontal Mount** | | | | | |
| F7-HPS -1,-2 | Polysulfone/ Polysulfone | 185°F 85°C | 150 PSIG 10 Bar | 0.85 | ¼" 5mm |
| F7-HSS | 316SS/316SS | 392°F 200°C | 300 PSIG 20.7 Bar | 0.60 | ⅛" 4mm |

*PBT - Polybutylene Terephthalate

**Optional Fittings** — For external mounting of vertical models

A-347 .....½" x 1¼" NPT carbon steel adapter
A-347-SS .....½" x 1¼" NPT 316 stainless steel adapter
A-348 .....½" x 1½" NPT carbon steel adapter
A-348-SS .....½" x 1½" NPT 316 stainless steel adapter

Level

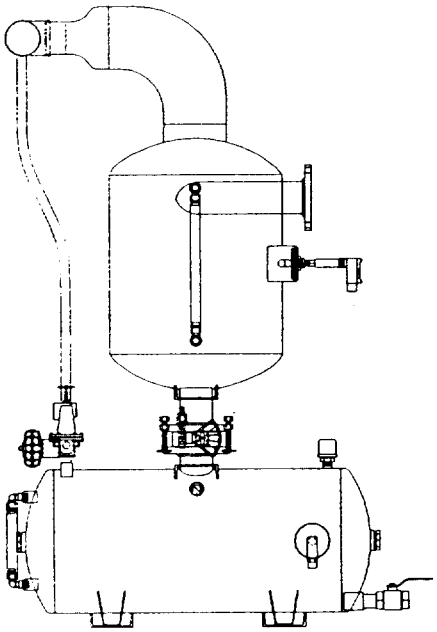
SCG Industries Limited
250 King William Road
Prince Lake Industrial Park
St. John, NB, Canada, E2M 5Y5
Tel: (506) 674-1081
Fax: (506) 674-1082
Web Site: www.remedi8.com

1-888-REMEDi8

## HVLS - High Vacuum Liquid Separator

The SCG patented HVLS is a unique design used for the continuous separation of liquid and vapour phases during high vacuum extraction (i.e., bioslurping). The HVLS provides upstream separation of all process liquids before the process vapour enters the vacuum driving system (i.e., liquid ring pump).

Once separated, process water is allowed to pass downstream for subsequent treatment while constant liquid separation from the vapour stream is achieved. The two-tank design provides phase separation with reduced emulsification that sets apart SCG's approach to vacuum extraction from its competitors. The HVLS construction includes two vacuum tanks, pneumatic valves, hazardous location floats, sight glasses and carbon steel inlet and outlet lines.

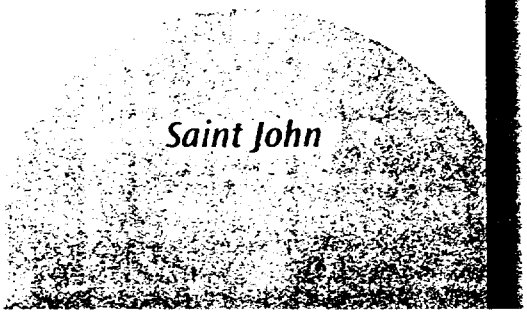


*Above:*
*Profile view of*
*SCG's HVLS,*
*Model:*
*HVLS-2-B-1-A-1*

## User-Defined Specifications:

- ACFM
- Hydraulic Flowrate

**Warranty:** SCG Industries Limited offers a standard manufacturer's warranty against material defects and manufacturer's workmanship.




*Montréal* *Calgary*

SCG

# Specifications

1. EV1 - 4 Way NEMA 4 solenoid valve with proprietary mount. (M20 - M103)

   Specifications:

   Nominal Voltage: 110 VAC +/- 10%
   Port Dimensions: Ports 1,3,5 1/8" NPT
   Power: 60 Hz AC at 3.3 Watts
   Pressure Range: Min - 29 psi. / Max - 145 psi.
   KV Factor: 4

2. EV2 - 4 Way NEMA 4 solenoid valve with namur mount (M148 - M2958)

   Specifications:

   Nominal Voltage: 110 VAC +/- 10%
   Port Dimensions: Ports 1,3,5 1/4" NPT
   Power: 60 Hz AC at 3.3 Watts
   Pressure Range: Min - 29 psi. / Max - 145 psi.
   KV Factor: 9

In addition to these two basic models UniTorq also offers a NEMA 4,7,9 upgrade for explosion proof applications. The UniTorq explosion proof solenoid can easily be mounted to the standard UniTorq valve block with the addition of a spacer block and a valve adapter kit.

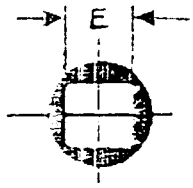
3. EV1 & EV2 - 4Way - NEMA 4,7,9 solenoid valve with proprietary or Namur Mounting

   Specification:

   Nominal Voltage: 110 VAC +/- 10%
   Port Dimensions: 1,3,5 1/4" NPT (Namur); 1/8" NPT (Proprietary)
   Power: 60 Hz AC at 5.9 Watts
   Pressure Range: Min - 29 psi. / Max - 145 psi.
   KV Factor: 4,9

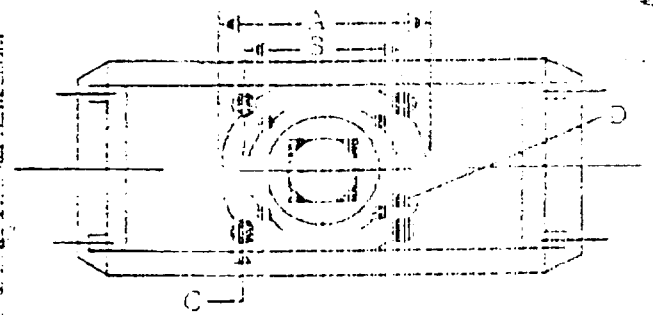
HIIN, [illegible]
674-1082

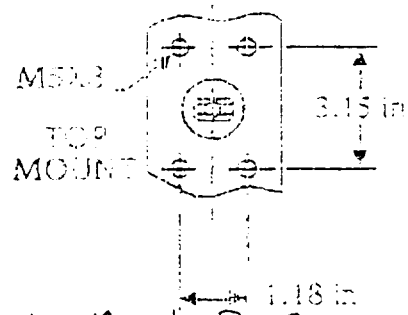
OUTPUT SHAFT




UNITORQ

BOTTOM VIEW



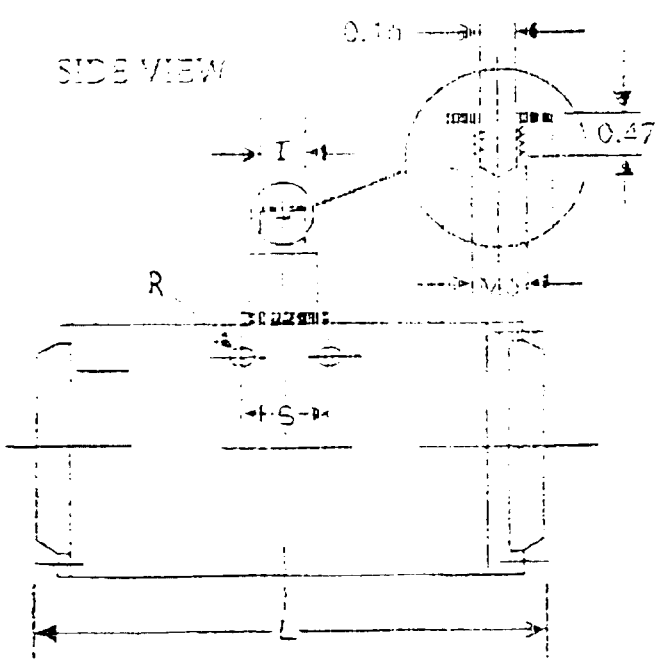



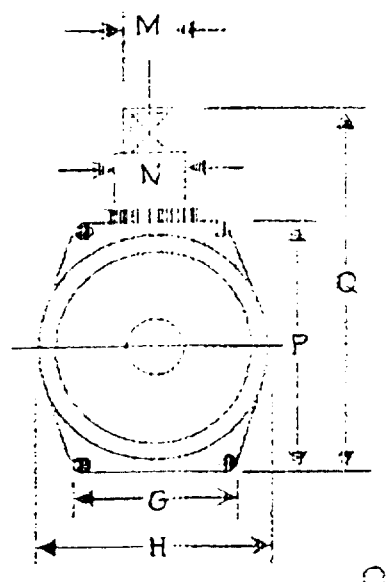

| | A | B | C | D | E | F | G | H | I | L | M | N | P | Q | R | S | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M 20 | 1.97 | 1.42 | 1/4 - 20 | #10 - 32 | .551 | .55 | 1.97 | 2.32 | .39 | 5.00 | .472 | .472 | 2.91 | 3.70 | 1/8 | .87 | 3.15 x 1.18 |
| M 30 | 2.76 | 1.97 | 5/16 - 18 | 1/4 - 20 | .551 | .71 | 2.36 | 2.76 | .39 | 5.24 | .472 | .472 | 3.46 | 4.25 | 1/8 | .87 | 3.15 x 1.18 |
| M 52 | 2.76 | 1.97 | 5/16 - 18 | 1/4 - 20 | .669 | .75 | 2.56 | 3.27 | .39 | 6.10 | .551 | .707 | 3.94 | 4.73 | 1/8 | .87 | 3.15 x 1.18 |
| M 73 | 2.76 | 1.97 | 5/16 - 18 | 1/4 - 20 | .669 | .75 | 2.56 | 3.58 | .39 | 6.97 | .551 | .707 | 4.25 | 5.04 | 1/8 | .87 | 3.15 x 1.18 |
| M 103 | 2.76 | 1.97 | 5/16 - 18 | 1/4 - 20 | .669 | .75 | 2.76 | 3.94 | .55 | 7.99 | [illegible] | .984 | 4.61 | 5.40 | 1/8 | .87 | 3.15 x 1.18 |
| M 148 | 4.02 | 2.76 | 3/8 - 16 | 5/16 - 18 | .866 | .96 | 3.54 | 4.72 | .55 | 8.50 | .768 | .984 | 5.51 | 6.30 | 1/4 | .94 | 3.15 x 1.18 |
| M 222 | 4.02 | 2.76 | 3/8 - 16 | 5/16 - 18 | .866 | .96 | 3.54 | 4.72 | .79 | 11.[illegible] | 1.1[illegible] | 1.575 | 5.51 | 6.30 | 1/4 | .94 | 3.15 x 1.18 |
| M 295 | 4.02 | 2.76 | 3/8 - 16 | 5/16 - 18 | .866 | .96 | 4.06 | 5.39 | .79 | 11.42 | 1.102 | 1.575 | 6.30 | 7.10 | 1/4 | .94 | 3.15 x 1.18 |
| M 586 | 4.92 | 4.02 | 1/2 - 13 | 3/8 - 16 | 1.063 | 1.14 | 4.33 | 6.77 | 1.10 | 14.49 | 1.417 | 1.575 | 7.80 | 8.98 | 1/4 | .94 | 5.12 x 1.18 |
| M 1213 | 5.51 | — | 5/8 - 11 | — | 1.417 | 1.57 | 5.31 | 8.82 | 1.26 | 17.72 | 1.850 | 2.362 | 10.00 | 11.18 | 1/4 | .94 | 5.12 x 1.18 |
| M 2366 | 6.50 | — | 3/4 - 10 | — | 1.811 | 1.97 | 6.26 | 10.71 | 1.26 | 23.07 | 1.850 | 2.362 | 11.89 | 13.07 | 1/4 | .94 | 5.12 x 1.18 |
| M 2958 | 6.50 | — | 3/4 - 10 | — | 1.811 | 1.97 | 6.26 | 10.71 | 1.26 | 26.22 | 1.850 | 2.362 | 11.89 | 13.07 | 1/4 | .94 | 5.12 x 1.18 |

3" Wafer

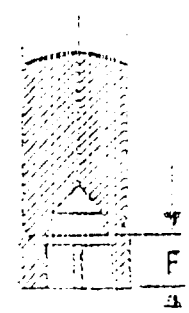
* U.N.C. bolt sizes. ** Top mounting dimensions for accessories to Namur standard. Bottom mounting is to DIN-ISO standards. Solenoid mounting to Namur specifications is available on all units and is standard on units 148 and higher.

SIDE VIEW




END VIEW




OUTPUT SHAFT X-SECTION

DIMENSIONS

# Features New Chemline Isolator Ball Valves.

## Compare these safety features with competition!

*This is a temporary data information page.*

**Pressure Rated to 225 psi.**
- Provides a higher factor of safety.

**Double Stem O-rings**
- If excessive force is applied the deeper upper O-ring groove will shear first and lower O-ring remains intact and valve continues to hold pressure.
  A very important safety feature!

**Modular ISO Top Flange Design**
- This permits secure and easy actuator mounting with the moulded valve body incorporating an ISO Actuator mounting flange.

**Panel Mount Bottom Pad**
- The bottom of the body of the valve incorporates a mounting pad. This permits valves with heavy actuators to be securely mounted.

**Teflon seats have elastomer cushions.**
- Helps seats to seal with minimum pressure, thus lower stem torques.
- Compensates for seat wear.

**Full Port - Lower pressure loss**

**Fully Blocking**
- The Safe-Bloc design enables the down line pipe to be removed.
- True union connectors allow for simple and quick disconnecting.

**Built in Spanner Wrench.**
- Top of the handle is designed to be used as a spanner wrench for tightening and loosening the Teflon seat carrier.

**High Chemical Resistance Material**
- PVC and CPVC compounds have an A chemical resistance rating as per ASTM D-1784. They have outperformed other PVC and CPVC compounds on aggressive chemicals.

## Maximum Working Pressure Ratings:

**Sizes ½" to 2"**
**PVC**
225 psi at 20°C
150 psi at 50°C
**CPVC**
225 psi at 20°C
150 psi at 50°C
**PP**
150 psi at 30°C
**PVDF**
225 psi at 20°C
150 psi at 60°C

**Sizes 2-1/2", 3" & 4"**
**PVC**
150 psi at 50°C

**CPVC**
150 psi at 50°C

**PP**
150 psi at 20°C
**PVDF**
150 psi at 60°C

# PP Pneumatic Actuators

CHEMLINE Plastics Limited

## Series – for Ball and Butterfly Valves

| | |
|---|---|
| ELS: | PPD (Double Acting)<br>PPS (Spring Return) |
| / & END S: | 50% Glass Reinforced Polyamide* |
| T & WARE: | 303 Stainless Steel |
| ON RACKS: | Polyamide* Plastic |

- *All-Plastic Construction*
- *For Plastic or Metal Valves*
- *Economical*

emline has found a perfect match in the Series Pneumatic Rotary actuators with r ball and butterfly valves. These compact k and pinion design units are constructed nostly plastic with stainless steel shaft and dware. Chemline offers control essories of similar plastic construction. Actuated valve packages are assembled, ch tested, and adjusted before shipment. ese packages are 100% warranted, mpact and lightweight – perfect for all uc piping systems.

## eatures

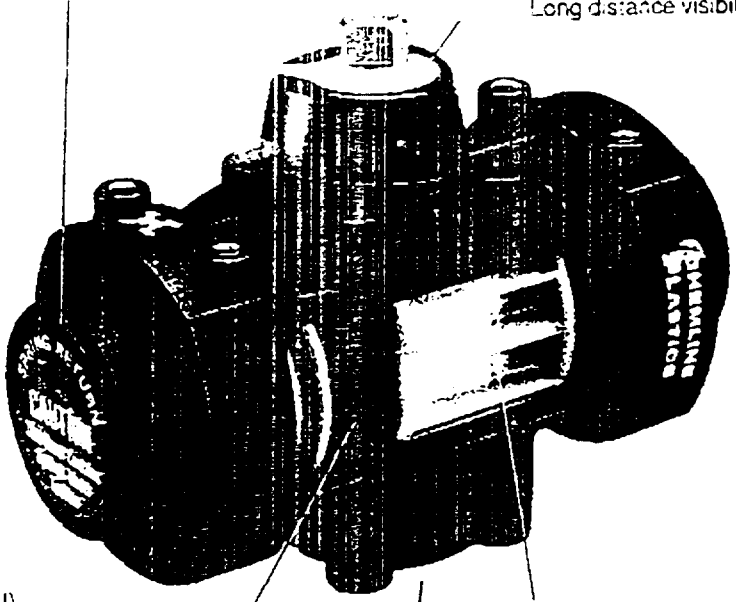
**Lightweight**
eal for plastic valves.
ower stresses on plastic piping.
il major parts are Polyamide* plastic.
haft and metal parts are 303 SS.

**Compact, Simple Design**
Double rack, double pinion design supplies onstant torque output.
ll porting is integral.

**Long Cycling Life**
Double O-ring shaft seals at top and bottom f shaft.
Massive teeth engagement between dual acks and pinions.

**Direct mounted All-Plastic Solenoid** (optional)
Plastic polyamide pilot solenoid valves mount flush (no nipples used.)
Solenoid coil is epoxy imbedded and all arts are plastic or stainless.
Screw type override is standard.

**Concentric Spring Sets**
Spring return models are adjustable to various supply pressures by removing or adding springs.



**Position Indicator**
Long distance visibility

**One-piece Polyamide* Piston/ Rack/Piston Guides.**

**Pinion** is SS shaft with gear teeth cut across full length

**ISO Mounting** - International Standard mounting bolt circle dimensions for convenient mounting. Drive is recessed square.

INGERSOLL-RAND®
SMALL COMPRESSOR

# 2475

Ref: 9820.00
Sheet: 105
Date: 1 June 1999
Cancels: 1 Jan. 1999

Davidson, NC 28036

## Model 2475 Engineering Data

Bore .....4" & 2.5"
Stroke .....2.75"
Inlet Size .....1" NPT
Discharge Size ...0.5" NPT

Min RPM .....575
Max RPM .....1600
Sheave OD ..13.75"
Sheave PD ....13.5"

Air cooled aftercooler CTD 25° F
(Package performance)
Number of belts 1
Belt Section A

### Performance

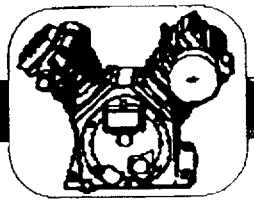
| Bare | Motor HP | PSI | RPM | ACFM | BHP |
|---|---|---|---|---|---|
| 2475 | 5 | 75# | 1040 | 17.3 | 4.5 |
| 2475 | 5 | 125# | 1040 | 17.1 | 4.8 |
| 2475 | 5 | 175# | 1040 | 16.8 | 5.5 |
| 2475 | 7.5 | 75# | 1500 | 24.3 | 7.3 |
| 2475 | 7.5 | 125# | 1500 | 24.2 | 7.8 |
| 2475 | 7.5 | 175# | 1500 | 24.0 | 8.2 |
| 2475 (Gas)* | 11 | 175# | 1200 | 19.0 | 6.8 |
| 2475 (Gas)** | 11 | 175# | 1600 | 25.0 | 8.1 |
| 2475 (Gas)*** | 12.5 | 175# | 1500 | 24.0 | 8.2 |

*Honda **Kawasaki ***Kohler
(5hp Duplex units multiply capacity by 2)

| | Nominal Amp Rating | | | | |
|---|---|---|---|---|---|
| | 200-3-60 | 230-1-60 | 230-3-60 | 460-3-60 | 575-3-60 |
| 5 HP | 17.5 | 28 | 15.2 | 7.6 | 6.1 |
| 7.5HP | 25.3 | 40 | 22 | 11 | 9 |

Nominal Amps are based on NEC full load amperage rating for this size motor. Actual nameplate amps may vary according to motor design and/or motor manufacturer.

## Model 2475
### Detailed Specifications
## BARE



**FRAME**—The 100% cast iron frame is designed to support the overhung crankshaft. Cylinders bolt directly to the cast iron frame. Frame is completely sealed yet allows for maximum accessibility.
**CRANKSHAFT**—A unique overhung design supported by two heavy duty ball bearings with replaceable crankpin bushing. Entire shaft is balanced with an integral counterweight to insure smooth operation.
**CONNECTING RODS**—Solid one-piece design. These simple, easy to maintain rods can be used only with an overhung crankshaft. Crankpin bushing inside the rod is precision ground requiring no alignment.
**CYLINDERS**—These are 100% cast iron, separately cast and individually bolted to the frame in a V-type configuration. The cylinders are precision honed for low oil carryover. Radial fins on the cylinders help remove heat and ensure 360 degree cooling of the cylinders.
**PISTONS**—Precision balanced low pressure aluminum and high pressure cast iron pistons provide smooth operation.
**RINGS**—There are three piston rings for sealing compression and oil control. The taper faced compression ring and beveled oil scraper ring provide quick seating. One, three-piece oil control ring maintains proper lubrication on cylinder wall. Precision honing used in conjunction with the ring stack up means low oil carryover.
**FLYWHEEL**—The cast iron fan type flywheel forces a "cyclone" air blast to provide cooling for the deep finned cylinders and finned copper tube intercooler. The flywheel is balanced to keep vibration to a minimum.
**INTERCOOLER**—Two stage compressors use an intercooler. The intercooler between stages is of finned copper tube construction to provide maximum cooling area. It is located directly in the flywheel air blast to remove the heat of compression between stages keeping running temperatures and power needs to a minimum, ensuring high air delivery for horsepower expended. The intercooler is provided with a relief valve to prevent over-pressurization.
**LUBRICATION**—Splash lubrication of running parts is simple and reliable. Lubrication dippers are integral with connecting rods and cannot come loose.
**INLET FILTER**—The filter has a durable canister with a dry type 10 micron inlet filter/silencer as standard.
**VALVES**—Reliable, time proven finger valves are quick acting and made from premium grade stainless steel. Valve components are easily removable for maintenance.

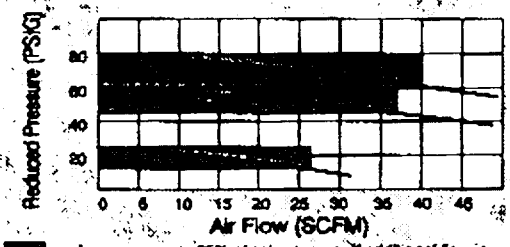
© Ingersoll-Rand Company 1999
Printed In U.S.A.

Revisions—Revised Amp Rating.

# FRL FLEXIBLOK® SERIES

Optional CircleVision™ Bowl

## 10 Series Particulate / Regulator



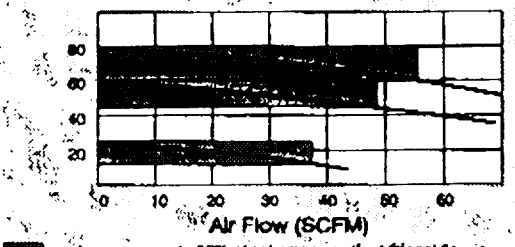

■ = Area represents 25% of set pressure. If additional flow is required, a larger size is recommended.

| MODEL NUMBER | PIPE SIZE | Bowl Size | Micron Rating | SCFM AT REDUCED PRESSURE OF | | |
|---|---|---|---|---|---|---|
| | | | | 25 PSIG | 60 PSIG | 80 PSIG |
| P10A-01 | 1/8 | 1.5 oz. | 20 | 27 | 36 | 38 |
| P10B-01 | 1/8 | 1.5 oz. | 05 | 24 | 30 | 33 |
| P10A-02 | 1/4 | 1.5 oz. | 20 | 31 | 39 | 42 |
| P10B-02 | 1/4 | 1.5 oz. | 05 | 27 | 37 | 40 |

Flows are 100 PSIG inlet and a 25% PSID.

Standard Polycarbonate Bowl

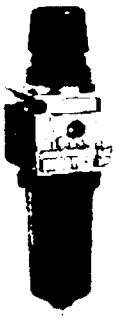
## 21 Series Particulate / Regulator




■ = Area represents 25% of set pressure. If additional flow is required, a larger size is recommended.

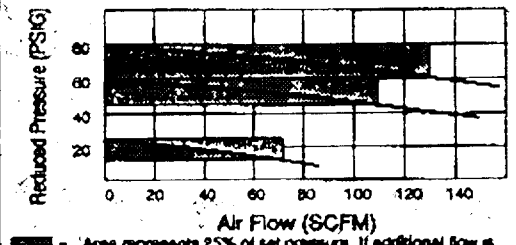
| MODEL NUMBER | PIPE SIZE | Bowl Size | Micron Rating | SCFM AT REDUCED PRESSURE OF | | |
|---|---|---|---|---|---|---|
| | | | | 25 PSIG | 60 PSIG | 80 PSIG |
| P21A-02 | 1/4 | 3.8 oz. | 40 | 31 | 59 | 61 |
| P21B-02 | 1/4 | 3.8 oz. | 05 | 22 3 | 38 | 45 |
| P21A-03 | 3/8 | 3.8 oz. | 40 | 54 | 60 | 62 |
| P21B-03 | 3/8 | 3.8 oz. | 05 | 39 | 49 | 55 |
| P21A-04 | 1/2 | 3.8 oz. | 40 | 54 | 60 | 62 |
| P21B-04 | 1/2 | 3.8 oz. | 05 | 39 | 49 | 55 |

Flows are 100 PSIG inlet and a 25% PSID.



Optional Metal Bowl

## 30 Series Particulate / Regulator



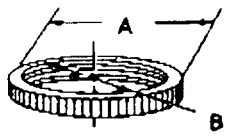

■ = Area represents 25% of set pressure. If additional flow is required, a larger size is recommended.

| MODEL NUMBER | PIPE SIZE | Bowl Size | Micron Rating | SCFM AT REDUCED PRESSURE OF | | |
|---|---|---|---|---|---|---|
| | | | | 25 PSIG | 60 PSIG | 80 PSIG |
| P30A-04 | 1/2 | 8.5 oz. | 40 | 101 | 128 | 141 |
| P30B-04 | 1/2 | 8.5 oz. | 05 | 73 | 115 | 129 |
| P30A-06 | 3/4 | 8.5 oz. | 40 | 101 | 128 | 141 |
| P30B-06 | 3/4 | 8.5 oz. | 05 | 73 | 115 | 129 |

Flows are 100 PSIG inlet and a 25% PSID.

## PANEL MOUNT NUT

| Series | Model | Hole Dia. | A | B |
|---|---|---|---|---|
| 10/21 | PN10 | 1.25 (32) | 1.38 (35) | 1-3/16 18 UNEF-2B |
| 30 | PN31P | 1.77 (45) | 2.05 (52) | 1-3/4 18 UNS-2B |

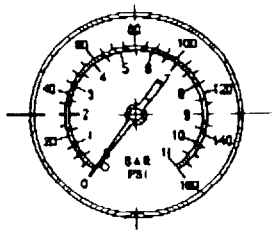



NOTE: For Regulator Brackets, See accessories section

## GAUGES

| Series | Model Numbers | | PSIG Range |
|---|---|---|---|
| | 1/8 NPT | G 1/8 | |
| 10/21 | GA060 | RA060 | 0-60 |
| 10/21 | GA160 | RA160 | 0-160 |

| Series | Model Numbers | | PSIG Range |
|---|---|---|---|
| | 1/4 NPT | G 1/4 | |
| 30 | GB060 | RB060 | 0-60 |
| 30 | GB160 | RB160 | 0-160 |
| 30 | GB300 | RB300 | 0-300 |




GA and RA models gauges have a 1.5" (38) face diameter. GB and RB model gauges have a 2.0" (50.8) face diameter.

## SPECIFICATIONS

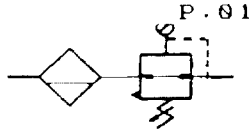
| | Temp. Range | | Maximum Pressure | | Weight | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 10 Series | | 21 Series | | 30 Series | |
| | °F | °C | PSIG | BAR | lbs | Kg | lbs | Kg | lbs | Kg |
| Polycarbonate Bowl | 40 to 120 | 4.4 to 48.9 | 150 | 10.3 | .78 | .35 | 1.39 | .63 | 2.21 | 1.0 |
| CircleVision Bowl | 40 to 150 | 4.4 to 65.6 | 250 | 17.2 | 1.03 | .47 | 1.85 | .84 | 2.86 | 1.3 |
| Metal Bowl | 40 to 180 | 4.4 to 82.2 | 300 | 20.8 | .98 | .45 | 1.72 | .78 | 2.66 | 1.2 |
| Body Material | — | | — | | Zinc | | Zinc | | Aluminum | |

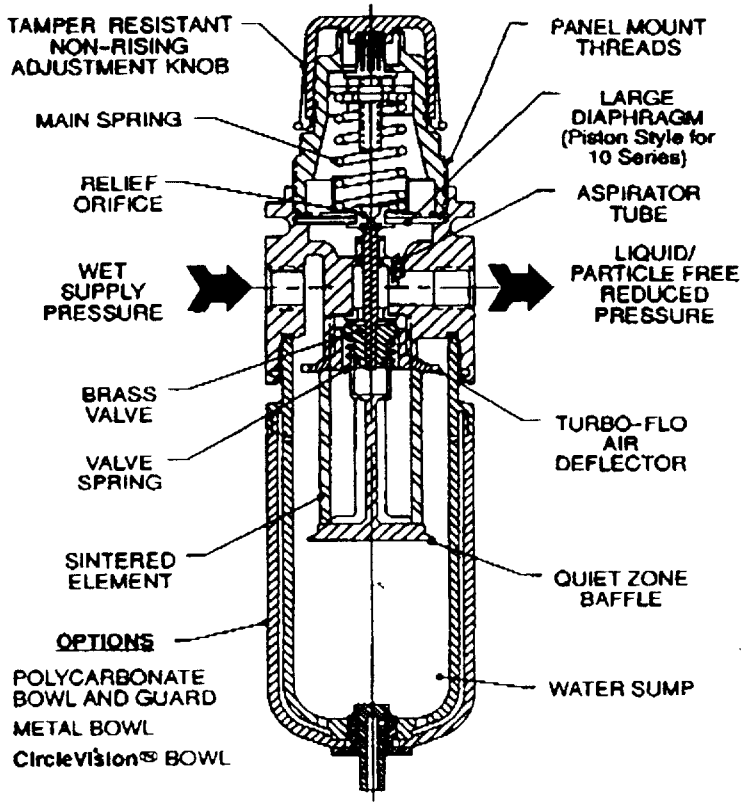
## AUTO DRAIN OPTIONS

| SUFFIX | FOR UNITS | KIT NO. |
|---|---|---|
| A | 21 and 30 Series | AKF00 |
| J | 10 Series | JK10 |

# PARTICULATE FILTER / REGULATORS

A.N.S.I. SYMBOL






## ▶ APPLICATION

The integral particulate filter/regulator (piggyback) is a two station component designed to filter and regulate compressed air when cost and space are of primary concern. As dirty, wet air enters, it immediately flows through the air deflector causing the air to move in a swirling motion. After condensed water is centrifugally removed, air passes through the filter and into the regulator. The high pressure air is systematically reduced via the adjustment spring and valve and exits the housing as a clean and dry air that is ready to work at the specified pressure.

NOTE: See separate Filter and Regulator sections for additional information.

## ▶ FEATURES

- Three convenient sizes
- 5 Micron element standard.
- Can be mounted as modular or individual unit
- Available with CircleVision™ sight bowl.
- Non-rising knob.
- Standard output pressure 0-125 PSIG

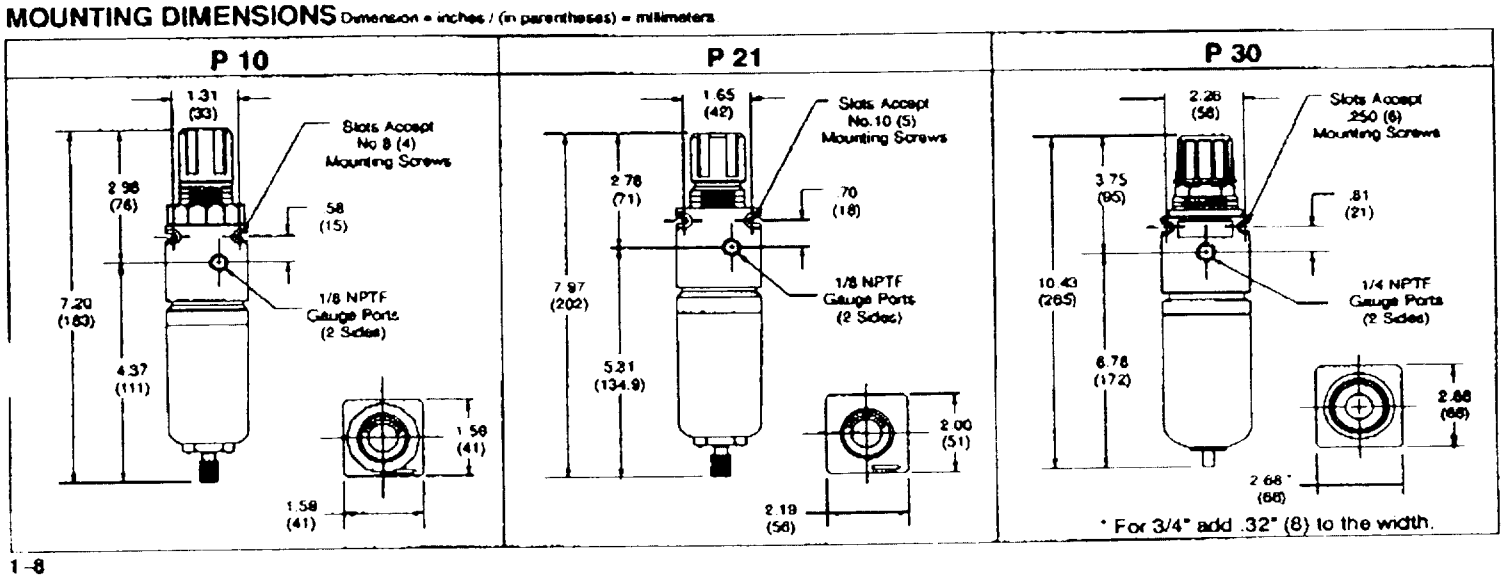
Att: Ken
Specs for P30B-06A.

## ▶ HOW TO ORDER

EXAMPLE:

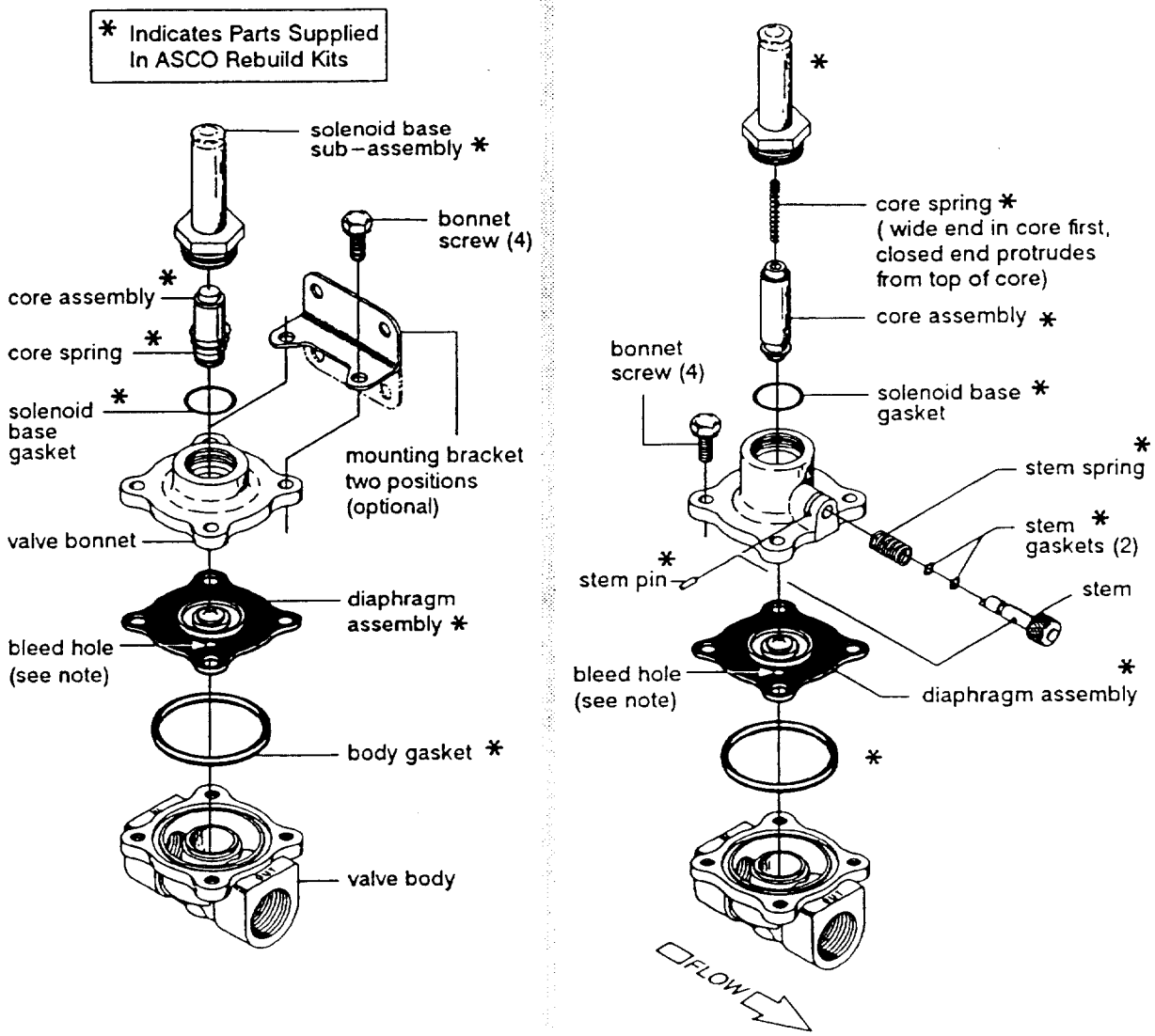
| P | 1 0 | B | – | 0 2 | C G J P |
|---|---|---|---|---|---|
| MODEL | SERIES | ELEMENT | THREADS | PORT SIZE | OPTIONS |
| P = Particulate/ Regulator | 10 = 1.5 oz. Bowl<br>21 = 3.8 oz. Bowl<br>30 = 8.5 oz. Bowl | A = 40 Micron Particulate<br>B = 5 Micron Particulate (Standard) | – = NPTF<br>G = G Tap | Series Available<br>01 = 1/8 ..... 10<br>02 = 1/4 ..... 10, 21<br>03 = 3/8 ..... 10*, 21<br>04 = 1/2 ..... 21, 30<br>06 = 3/4 ..... 30<br>* With End Plates | A = Auto Drain (21/30)<br>C = CircleVision® Sight Bowl<br>E = End Plates (Attached)<br>G = Gauge<br>H = 0-250 PSIG Output (30)<br>I = 0-25 PSIG Output<br>J = Piston Drain (10)<br>L = 0-60 PSIG Output<br>M = Metal Bowl<br>N = Non-relieving<br>P = Panel Mount Nut |

## ▶ MOUNTING DIMENSIONS Dimension = inches / (in parentheses) = millimeters



## Torque Chart

| Part Name | Torque Value Inch–Pounds | Torque Value Newton–Meters |
|---|---|---|
| Solenoid base sub–assembly | 175 ± 25 | 19,8 ± 2,8 |
| Bonnet screws | 95 ± 10 | 10,7 ± 1,1 |




Note:
Locate bleed hole in diaphragm assembly approximately 45° from valve outlet.

Figure 3. Series 8210 -- DC construction without solenoid.

*Oil/Water Separator*

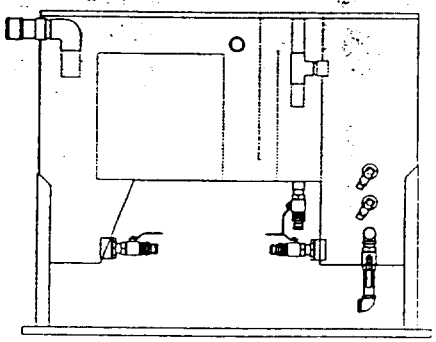
**SCG Industries Limited**
*250 King William Road*
*Spruce Lake Industrial Park*
*Saint John, NB, Canada, E2M 5Y5*
*Tel: (506) 674-1081*
*Fax: (506) 674-1082*
*Web Site: www.remedi8.com*

***1-888-REMEDi8***

## OWSEP- Oil/Water Separator

The SCG manufactured OWSEP is used as a secondary water treatment vessel which is employed to coalesce and remove free phase oils and petroleum hydrocarbons from contaminated water streams. As the OWSEP operates most effectively with a laminar influent flow of up to 50 gpm it is typically located downstream of an ISOL.

The OWSEP is an epoxy-lined carbon steel tank equipped with weirs to regulate liquid flow to prevent breakthrough of separated product, an adjustable skimmer, oleophilic coalescing pack, sludge clean-outs, vapour-tight lid and vent assembly, and a hazardous location float for overflow protection.



*Above:*
*A profile view of*
*SCG's OWSEP.*
*Model:*
*OWSEP-3-B-2-B-4*

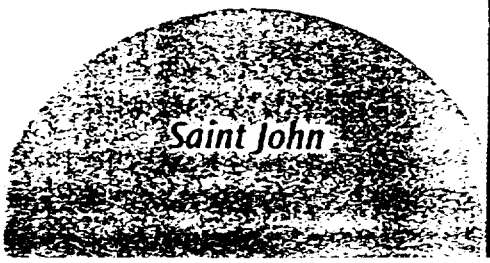
### User-Defined Specifications:

- Hydraulic Flowrate
- Contaminant Type
- Removal Efficiency
  - Influent Concentration

### Listed Options:

- Cleanout chambers
  - Influent Concentration
  - Effluent Concentration
- Additional Floats

**Warranty:** SCG Industries Limited offers a standard manufacturer's warranty against material defects and manufacturer's workmanship.

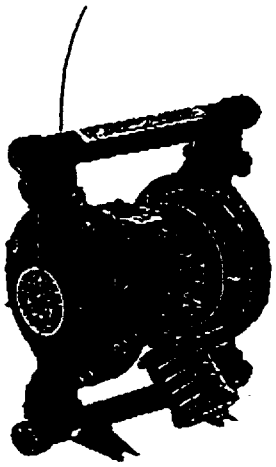



*Montréal* *Calgary*

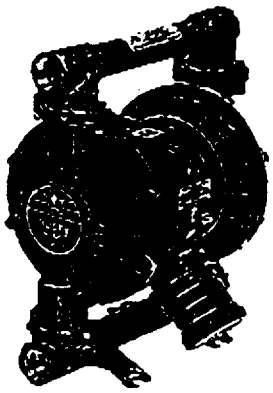
SCG

# Husky™ 1040

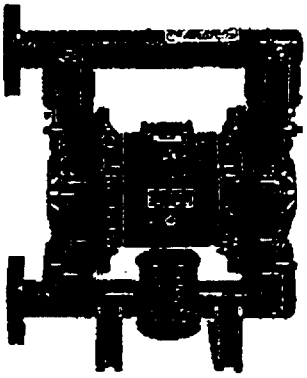
## Air-Operated Double Diaphragm Pump



Aluminum



Stainless Steel



Acetal

Polypropylene

Kynar

Your Husky 1040 is a pump ready for action. With high flow rates, it can take on a large range of fluids to meet your wide variety of needs. You get a lot of pumping in a small package.

Smooth, clean fluid passages permit the use of heavier fluids at faster flow rates. The Husky 1040 has a new valve system that is 100% serviceable without disassembly of the wetted parts.

You have a choice of 5 models: the **aluminum** all-around general purpose pump; **316 stainless steel** to better handle the more abrasive or corrosive fluids; **acetal** for paints/solvents; **polypropylene** for general chemicals; and **Kynar** for very aggressive chemicals or elevated temperatures. Each model has a selection of conversion kits, making it easy to adapt your pump to your specific fluid needs. UL listed models are also available.

CE

- ***High flow – 42 gpm (159 lpm) in a compact, portable size***
- ***Fluid pressure to 120 psi (8.3 bar)***
- ***E-coated center section for corrosive environments***
- ***Equipped with a new, tried & true valve system***
- ***Stainless steel exterior hardware***

Form No. 305-588

GRACO

***A hard working pump for a wide variety of fluids***

# Technical Specifications

Maximum Fluid Pressure ..... 120 psi (8.3 bar)
Maximum Free Flow Delivery ..... 42 gpm (159 lpm)
Maximum Pump Speed ..... 276 cpm
Gallons (liters) per Cycle ..... 0.15 (0.57)
Maximum Size Pumpable Solids ..... ⅛ in. (3.2 mm)
Maximum Suction Lift – Wet or Dry ..... 18 ft. (5.48 m)
Air Pressure Operating Range ..... 20-120 psi (1.4-8.3 bar)
Maximum Operating Temperature ..... 150°F (65.5°C)
*200°F (93.3°F) for models with Teflon diaphragms and metal or Kynar housings*
Typical Noise Level (at 70 psi, 50 cpm) ..... 78 dBA
Air Inlet ..... ½ npt(f)
Fluid Inlet
- Metals ..... 1 npt(f)
- Plastics ..... 1 in. raised face flange

Fluid Outlet
- Metals ..... 1 npt(f)
- Plastics ..... 1 in. raised face flange

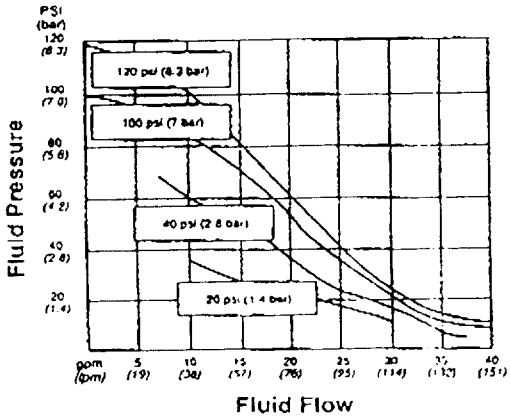
Weight
- Aluminum ..... 18 lbs. (8.2 kg)
- Stainless Steel ..... 33 lbs. (15 kg)
- Polypropylene ..... 19 lbs. (8.6 kg)
- Acetal ..... 22 lbs. (10 kg)
- Kynar ..... 25 lbs. (11.3 kg)

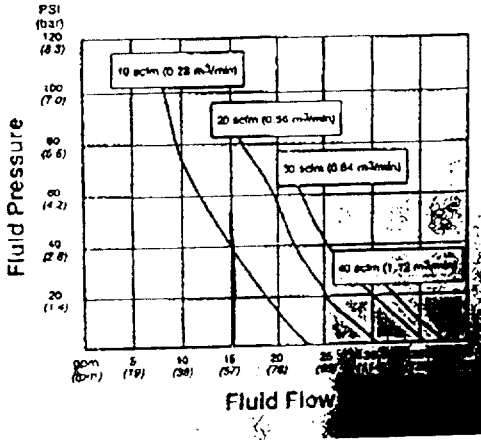
Size
- Metal Models ..... 12 in. W x 14 in. H x 9¼ in. D (304.8 mm W x 355.6 mm H x 235 mm D)
- Plastic Models ..... 13.5 in. W x 16.88 in. H x 9¼ in. D (342.9 mm W x 428.8 mm H x 235 mm D)

Mounting Hole Layout ..... 5 in. x 5½ in. (127 mm x 139.7 mm)
Wall Bracket Mounting Hole Pattern ..... 6.24 in. W x 5.38 in. H (158.5 mm W x 136.7 mm H)

Instruction Manual
- Aluminum and Stainless Steel ..... 308-479
- Acetal, Polypropylene & Kynar ..... 308-443

## Husky 1040 Performance Chart *(Inlet Submerged in Water)*



## HUSKY PUMPS (Continued)

| Part No. | Description | Flow at 60 cpm gpm | Flow at 60 cpm lpm | Max. Output Pressure psi | Max. Output Pressure bar | Wetted Parts Housing | Wetted Parts Seats | Wetted Parts Balls | Wetted Parts Diaphragms | Instruction Manual |
|---|---|---|---|---|---|---|---|---|---|---|
| D61-211 | Husky 715 | 16 | 60 | 100 | 7 | Acetal | Acetal | Teflon | Teflon | 308-444 |
| D61-277 | Husky 715 | 16 | 60 | 100 | 7 | Acetal | Acetal | Buna-N | Buna-N | 308-444 |
| D62-911 | Husky 715 | 16 | 60 | 100 | 7 | Polypropylene | Polypropylene | Teflon | Teflon | 308-444 |
| D62-977 | Husky 715 | 16 | 60 | 100 | 7 | Polypropylene | Polypropylene | Buna-N | Buna-N | 308-444 |
| D62-211 | Husky 715 | 16 | 60 | 100 | 7 | Aluminum | Acetal | Teflon | Teflon | 308-037 |
| D62-277 | Husky 715 | 16 | 60 | 100 | 7 | Aluminum | Acetal | Buna-N | Buna-N | 308-037 |
| D64-311 | Husky 715 | 16 | 60 | 100 | 7 | SST | SST | Teflon | Teflon | 308-037 |
| D64-377 | Husky 715 | 16 | 60 | 100 | 7 | SST | SST | Buna-N | Buna-N | 307-037 |
| D73-911 | Husky 1040 | 42 | 159 | 120 | 8.3 | Aluminum | Polypropylene | Teflon | Teflon | 308-479 |
| D73-525 | Husky 1040 | 42 | 159 | 120 | 8.3 | Aluminum | Hytrel | Acetal | Hytrel | 308-479 |
| D73-666 | Husky 1040 | 42 | 159 | 120 | 8.3 | Aluminum | Santoprene | Santoprene | Santoprene | 308-479 |
| D73-311 | Husky 1040 | 42 | 159 | 120 | 8.3 | Aluminum | 316 SST | Teflon | Teflon | 308-479 |
| D74-525 | Husky 1040 | 42 | 159 | 120 | 8.3 | SST | Hytrel | Acetal | Hytrel | 308-479 |
| D74-666 | Husky 1040 | 42 | 159 | 120 | 8.3 | SST | Santoprene | Santoprene | Santoprene | 308-479 |
| D74-311 | Husky 1040 | 42 | 159 | 120 | 8.3 | SST | 316 SST | Teflon | Teflon | 308-479 |
| D71-221 | Husky 1040 | 42 | 159 | 120 | 8.3 | Acetal | Acetal | Acetal | Teflon | 308-443 |
| D71-311 | Husky 1040 | 42 | 159 | 120 | 8.3 | Acetal | 316 SST | Teflon | Teflon | 308-443 |
| D71-411 | Husky 1040 | 42 | 159 | 120 | 8.3 | Acetal | Hardened SST | Teflon | Teflon | 308-443 |
| D71-431 | Husky 1040 | 42 | 159 | 120 | 8.3 | Acetal | Hardened SST | SST | Teflon | 308-443 |
| D72-311 | Husky 1040 | 42 | 159 | 120 | 8.3 | Polypropylene | 316 SST | Teflon | Teflon | 308-443 |
| D72-911 | Husky 1040 | 42 | 159 | 120 | 8.3 | Polypropylene | Polypropylene | Teflon | Teflon | 308-443 |
| D72-525 | Husky 1040 | 42 | 159 | 120 | 8.3 | Polypropylene | Hytrel | Acetal | Hytrel | 308-443 |
| D72-666 | Husky 1040 | 42 | 159 | 120 | 8.3 | Polypropylene | Santoprene | Santoprene | Santoprene | 308-443 |
| D75-311 | Husky 1040 | 42 | 159 | 120 | 8.3 | Kynar | 316 SST | Teflon | Teflon | 308-443 |
| D75-666 | Husky 1040 | 42 | 159 | 120 | 8.3 | Kynar | Santoprene | Santoprene | Santoprene | 308-443 |
| D75-A11 | Husky 1040 | 42 | 159 | 120 | 8.3 | Kynar | Kynar | Teflon | Teflon | 308-443 |
| D75-A88 | Husky 1040 | 42 | 159 | 120 | 8.3 | Kynar | Kynar | Viton | Viton | 308-443 |
| DB3-911 | Husky 1590 | 90 | 34 | 120 | 8.3 | Aluminum | Polypropylene | Teflon | Teflon | 308-441 |
| DB3-525 | Husky 1590 | 90 | 34 | 120 | 8.3 | Aluminum | Hytrel | Acetal | Hytrel | 308-441 |
| DB3-666 | Husky 1590 | 90 | 34 | 120 | 8.3 | Aluminum | Santoprene | Santoprene | Santoprene | 308-441 |
| DB3-311 | Husky 1590 | 90 | 34 | 120 | 8.3 | Aluminum | 316 SST | Santoprene | Teflon | 308-441 |
| DB4-311 | Husky 1590 | 90 | 34 | 120 | 8.3 | SST | 316 SST | Teflon | Teflon | 308-441 |
| DB4-525 | Husky 1590 | 90 | 34 | 120 | 8.3 | SST | Hytrel | Acetal | Hytrel | 308-441 |
| DB4-666 | Husky 1590 | 90 | 34 | 120 | 8.3 | SST | Santoprene | Santoprene | Santoprene | 308-441 |
| DB2-311 | Husky 1590 | 90 | 34 | 120 | 8.3 | Polypropylene | 316 SST | Teflon | Teflon | 308-549 |
| DB2-666 | Husky 1590 | 90 | 34 | 120 | 8.3 | Polypropylene | Santoprene | Santoprene | Santoprene | 308-549 |
| DB2-911 | Husky 1590 | 90 | 34 | 120 | 8.3 | Polypropylene | Polypropylene | Teflon | Teflon | 308-549 |
| DB2-555 | Husky 1590 | 90 | 34 | 120 | 8.3 | Polypropylene | Hytrel | Hytrel | Hytrel | 308-549 |
| DB5-311 | Husky 1590 | 90 | 34 | 120 | 8.3 | Kynar | 316 SST | Teflon | Teflon | 308-549 |
| DB5-666 | Husky 1590 | 90 | 34 | 120 | 8.3 | Kynar | Santoprene | Santoprene | Santoprene | 308-549 |
| DB5-A11 | Husky 1590 | 90 | 34 | 120 | 8.3 | Kynar | Kynar | Teflon | Teflon | 308-549 |
| DB5-A88 | Husky 1590 | 90 | 34 | 120 | 8.3 | Kynar | Kynar | Viton | Viton | 308-549 |
| DF3-911 | Husky 2150 | 150 | 568 | 120 | 8.4 | Aluminum | Polypropylene | Teflon | Teflon | 308-368 |
| DF3-525 | Husky 2150 | 150 | 568 | 120 | 8.4 | Aluminum | Hytrel | Acetal | Hytrel | 308-368 |
| DF3-666 | Husky 2150 | 150 | 568 | 120 | 8.4 | Aluminum | Santoprene | Santoprene | Santoprene | 308-368 |
| DF3-311 | Husky 2150 | 150 | 568 | 120 | 8.4 | Aluminum | SST | Teflon | Teflon | 308-368 |
| DF4-311 | Husky 2150 | 150 | 568 | 120 | 8.4 | SST | SST | Teflon | Teflon | 308-368 |
| DF4-525 | Husky 2150 | 150 | 568 | 120 | 8.4 | SST | Hytrel | Acetal | Hytrel | 308-368 |
| DF4-666 | Husky 2150 | 150 | 568 | 120 | 8.4 | SST | Santoprene | Santoprene | Santoprene | 308-368 |
| DF2-311 | Husky 2150 | 150 | 568 | 120 | 8.4 | Polypropylene | 316 SST | Teflon | Teflon | 308-550 |
| DF2-666 | Husky 2150 | 150 | 568 | 120 | 8.4 | Polypropylene | Santoprene | Santoprene | Santoprene | 308-550 |
| DF2-911 | Husky 2150 | 150 | 568 | 120 | 8.4 | Polypropylene | Polypropylene | Teflon | Teflon | 308-550 |
| DF2-555 | Husky 2150 | 150 | 568 | 120 | 8.4 | Polypropylene | Hytrel | Hytrel | Hytrel | 308-550 |
| DF5-311 | Husky 2150 | 150 | 568 | 120 | 8.4 | Kynar | 316 | Teflon | Teflon | 308-550 |
| DF5-666 | Husky 2150 | 150 | 568 | 120 | 8.4 | Kynar | Santoprene | Santoprene | Santoprene | 308-550 |
| DF5-A11 | Husky 2150 | 150 | 568 | 120 | 8.4 | Kynar | Kynar | Teflon | Teflon | 308-550 |
| DF5-A88 | Husky 2150 | 150 | 568 | 120 | 8.4 | Kynar | Kynar | Viton | Viton | 308-550 |

Note: *In addition to the pump selections shown above, you may order custom configured pumps available in hundreds of material combinations. Contact your local Graco representative for further information.*

* *Stainless Steel* ** *Hard Chrome plating over Stainless Steel*

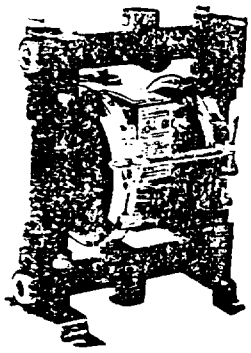
▲ *Waterborne Paint Compatible*

*SST=Stainless Steel CS=Carbon Steel*

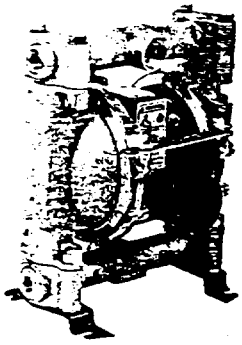
GRACO

*First choice when quality counts.™*

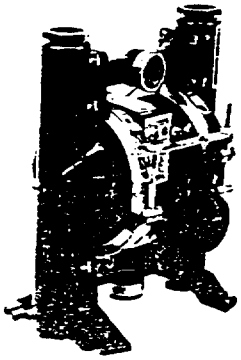
# Husky™ 715 Air-Operated Diaphragm Pumps



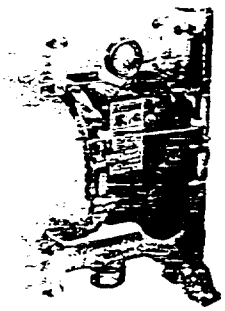
*Aluminum*



*Stainless Steel*



*Acetal*



*Polypropylene*

- **No seals to leak or fail mean less downtime**
- **Clean, hands-off fluid handling**
- **Quiet running, less than 85 dB(A) with easy to use remote muffler capability for even lower noise levels**
- **High flow – 16 gpm (60 l/min.) in a small portable package**

**Reliable transfer pump handles a variety of fluids**

## Multiple Uses and Hard Working

The Husky 715 is a versatile pump, well suited for a variety of utility duties requiring operation up to 16 gpm (60 l/min.) with light to medium viscosity fluids. This is an excellent pump for a variety of applications, including machine lube servicing, cleaning fluids and detergents, plating and dip tanks, water treatment, chemicals and other difficult fluids. Uses include drum evacuation, chemical injection, ceramic glaze supply, low viscosity printing inks and similar fluids. Because of its small size, the Husky 715 is compact, lightweight and easy to carry.

The Husky 715 is available in four models: Acetal for solvents and flammables, Polypropylene for acids and bases, Aluminum for oil and water and most solvents, and Stainless Steel for those wanting an all metal pump with excellent corrosion and abrasion resistance. UL models are available for oil transfer, or waste oil evacuation.

## New Air Valve Design

The Husky 715 now features Graco's new patented air valve design with the following advantages.

- Simple design with only 15 parts, accessed by removing six screws
- Lubricated air is not required
- Air valve operates with 20 psi (1.4 bar) air or less
- Common to Graco's Husky 307 pump

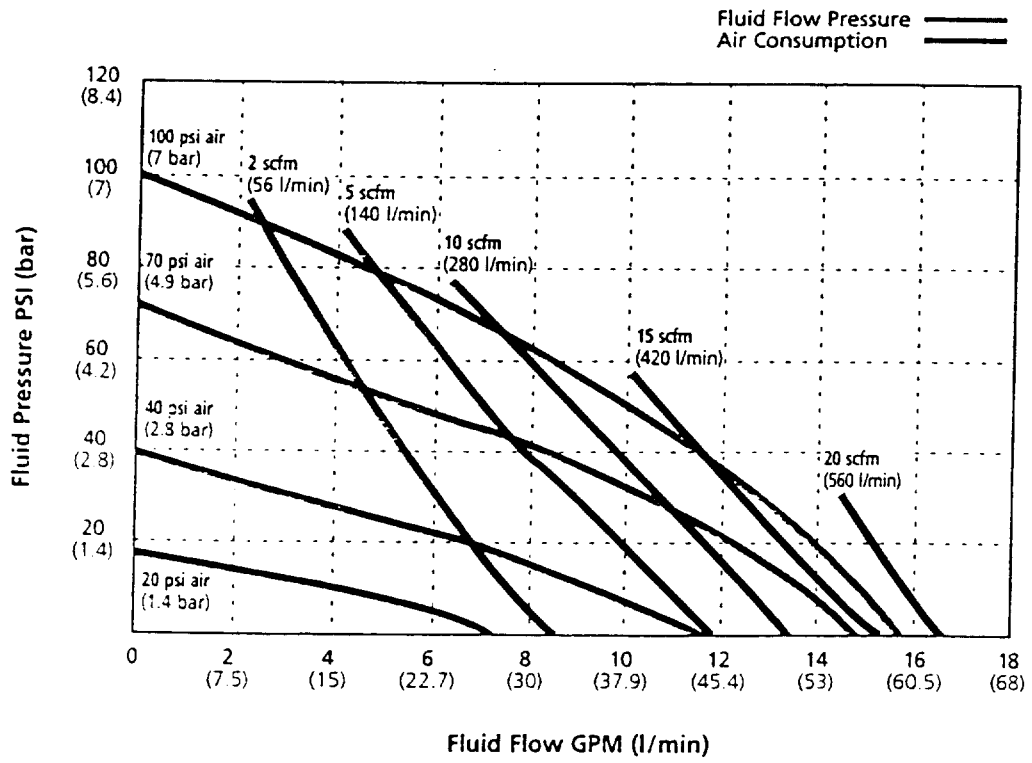
## Technical Specifications

Maximum fluid pressure ..... 100 psi (7 bar)
Maximum free flow delivery ..... 16 gpm (60 l/min.)
Displacement ..... .08 gallon (0.3 liter)
Maximum pump speed ..... 200 cycles/min.
Maximum size pumpable solids ..... 3/32 in. (2.4 mm)
Maximum suction lift – wet ..... 21 ft. (6.4 m)
Maximum suction lift – dry ..... 16 ft. (4.9 m)
Air pressure operating range ..... 25-100 psi (1.7-7 bar)
Operating temperature range ..... 40°-150°F (5°-65°C)
Maximum noise level ..... 85 dB(A)
Air inlet ..... 1/4 npt(f)
Fluid inlet/outlet ..... 3/4 npt(f)
Maximum air consumption ..... 19 scfm

**Maximum recommended viscosity** ..... 5000 cps
**Dimensions (W x H x D)** ..8-3/4 in. x 10-3/4 in. x 7-1/2 in. (222 mm x 273 mm x 191 mm)
**Weight**
**Acetal and Polypropylene** ..... 7 lbs. (3.2 kg)
**Aluminum** ..... 9.6 lbs. (4.4 kg)
**Stainless Steel** ..... 19.25 lbs. (8.7 kg)
**Mounting Hole Layout** ..... 4.3 in. x 6.62 in. (109 mm x 168 mm)
**Instruction manuals**
**Acetal and Polypropylene** ..... 307-855
**Aluminum and Stainless Steel** ..... 308-037

CE

## Husky 715 Performance Chart (Inlet Submerged in Water)

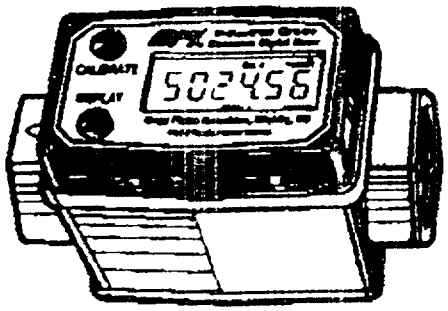


Fact Sheet

Industrial Grade Metering Products

# Stainless Steel Turbine

# Model S100



Model S100 Turbine shown with standard Computer Electronics wich are sold seperately

- Field Replaceable Internal Parts
- Excellent Chemical Compatibility
- High Accuracy
- High Turndown Ratio
- Pressure Rating of 1,500 PSIG (103 bar)
- Extended Flow Range of 2.5 to 50 GPM (9.5 to 190 LPM)
- Linear Range of 5 to 50 GPM (18.9 to 190 LPM)
- Signal Output Capabilities
- Repeatability of ±0.1%
- Accessories easily upgrade meters

FM APPROVED

All GPI turbines are Factory Mutual Approved and carry a Class 1, Division 1 Approval for hazardous environments

## Technical Specifications

| | |
|---|---|
| **Flow Ranges** | |
| Linear: | 5 to 50 GPM (18.9 to 190 LPM) |
| Extended: | 2.5 to 50 GPM (9.5 to 190 LPM) |
| Maximum Flow: | 75 GPM (284 LPM) |
| Fluid Velocity in Extended Range: | 0.93-18.6 ft./sec. (0.28-5.7 m/sec.) |
| **Performance*** | |
| Linear Range: | 10:1 @ ±1.5% of reading |
| Extended Range: | 20:1 @ ±5.0% of reading |
| Repeatability: | ±0.1% |
| Maximum Pressure Drop in 10:1 Range: | 5 PSIG (0.34 bar) |
| Pressure Rating: | 1,500 PSIG (103 bar) |
| Frequency Range: | 45-475 Hz @ 5-50 GPM |
| **Connections** | |
| Inlet and Outlet: | 1 inch female NPT or ISO |
| Wrench Flat Size: | 1-5/8 in. (41mm) |
| **Temperatures**** | |
| Operational: | -40° to +250°F (-40° to +121°C) |
| Storage: | -40° to +250°F (-40° to +121°C) |
| **Wetted Components** | |
| Housing: | 316 Stainless Steel |
| Journal Bearings: | Ceramic (96% Alumina) |
| Shaft: | Tungsten Carbide |
| Rotor and Supports: | PVDF |
| Retaining Rings: | 316 Stainless Steel |
| **Weight** | |
| Turbine only: | 2.4 lbs.(1.1kg) |
| Turbine with computer: | 2.6 lbs.(1.2kg) |
| **Shipping Weight** | |
| Turbine only: | 2.6 lbs.(1.2kg) |
| Turbine with computer: | 2.8 lbs.(1.3kg) |

* Results determined with 1 centistoke stoddard solvent test fluid at 70°F (21°C).

** Turbine only without computer.

GPI is a registered trademark of Great Plains Industries, Inc. U.S. Patents 4,856,384; 4,700,579, and 5,046,370. Australian Patent 572,494. Canadian Patent 1,223,464. European Patent EU0147004. German Patent P3478494.2-08. Italian Patent 68074-BE/89

GPI
5252 East 36th Street North
Wichita, KS USA 67220-3205
TEL: 316-686-7361
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GREAT PLAINS INDUSTRIES, INC.

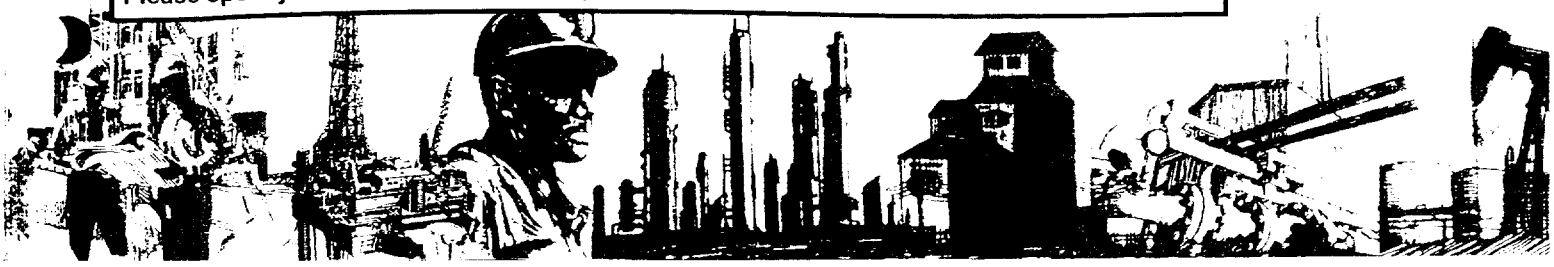
4/97 ML-1233-4

Roughneck.

# Performance Data For 60 Hertz

**CSA certified or UL listed**

| NOMINAL WATTAGE (KW) | MODEL | VOLTAGE | PHASE | TOTAL CURRENT (A) CSA MODELS (600V MODELS) | TOTAL CURRENT (A) UL MODELS (600V MODELS) | TOTAL CURRENT (A) UL MODELS (600V MODELS) | TEMPERATURE RISE °F | TEMPERATURE RISE °C | BTU/HR |
|---|---|---|---|---|---|---|---|---|---|
| 5 | XL412-208160-3 | 208 | 1 | 25.5 | 15.3 | 15.3 | 19.0 | 10.5 | 17,250 |
| | XL412-240160-3 | 240 | 1 | 22.5 | 13.5 | 13.5 | | | |
| | XL412-208360-3 | 208 | 3 | 14.8 | 8.9 | 8.9 | | | |
| | XL412-240360-3 | 240 | 3 | 13.2 | 7.9 | 7.9 | | | |
| | XL412-480160-3*○ | 480 | 1 | 6.5 | N/A | N/A | | | |
| | XL412-480360-3 | 480 | 3 | 6.5 | 3.9 | 3.9 | | | |
| | XL412-600360-3* | 600 | 3 | 5.2 | N/A | N/A | | | |
| 7.5 | XL412-208160-5 | 208 | 1 | 24.9 | 24.9 | 24.9 | 31.6 | 17.6 | 25,850 |
| | XL412-240160-5 | 240 | 1 | 21.8 | 21.9 | 21.9 | | | |
| | XL412-208360-5 | 208 | 3 | 14.9 | 14.4 | 14.4 | | | |
| | XL412-240360-5 | 240 | 3 | 12.9 | 12.7 | 12.7 | | | |
| | XL412-480160-5*○ | 480 | 1 | 10.4 | N/A | N/A | | | |
| | XL412-480360-5 | 480 | 3 | 6.9 | 6.4 | 6.4 | | | |
| | XL412-600360-5* | 600 | 3 | 5.5 | N/A | N/A | | | |
| 15 | XL412-208160-7.5 | 208 | 1 | 36.9 | 36.9 | 36.9 | 27.9 | 15.5 | 51,600 |
| | XL412-240160-7.5 | 240 | 1 | 32.3 | 32.3 | 32.3 | | | |
| | XL412-208360-7.5 | 208 | 3 | 21.4 | 21.4 | 21.4 | | | |
| | XL412-240360-7.5 | 240 | 3 | 18.6 | 18.7 | 18.7 | | | |
| | XL412-480160-7.5*○ | 480 | 1 | 9.6 | N/A | N/A | | | |
| | XL412-480360-7.5 | 480 | 3 | 9.6 | 9.4 | 9.4 | | | |
| | XL412-600360-7.5* | 600 | 3 | 7.2 | N/A | N/A | | | |
| 10 | XL412-208160-10*• | 208 | 1 | 48.1 | N/A | N/A | 37.2 | 20.6 | 34,100 |
| | XL412-240160-10 | 240 | 1 | 42.1 | 42.7 | 42.7 | | | |
| | XL412-208360-10 | 208 | 3 | 27.8 | 28.3 | 28.3 | | | |
| | XL412-240360-10 | 240 | 3 | 24.1 | 24.7 | 24.7 | | | |
| | XL412-480160-10*○ | 480 | 1 | 20.8 | N/A | N/A | | | |
| | XL412-480360-10 | 480 | 3 | 12.0 | 12.4 | 12.4 | | | |
| | XL412-600360-10* | 600 | 3 | 9.6 | N/A | N/A | | | |
| 15 | XL416-240160-15*• | 240 | 1 | 62.5 | N/A | N/A | 27.1 | 15.0 | 51,200 |
| | XL416-208360-15 | 208 | 3 | 41.6 | 41.4 | 41.4 | | | |
| | XL416-240360-15 | 240 | 3 | 36.1 | 36.0 | 36.0 | | | |
| | XL416-480160-15*○ | 480 | 1 | 31.3 | N/A | N/A | | | |
| | XL416-480360-15 | 480 | 3 | 18.0 | 18.0 | 18.0 | | | |
| | XL416-600360-15* | 600 | 3 | 14.4 | N/A | N/A | | | |
| 20 | XL416-208360-20*• | 208 | 3 | 55.5 | N/A | N/A | 36.1 | 20.1 | 68,250 |
| | XL416-240360-20*• | 240 | 3 | 48.1 | N/A | N/A | | | |
| | XL416-480160-20*○ | 480 | 1 | 41.7 | N/A | N/A | | | |
| | XL416-480360-20 | 480 | 3 | 24 | 24.0 | 24.0 | | | |
| | XL416-600360-20* | 600 | 3 | 19.2 | N/A | N/A | | | |
| 25 | XL420-240360-25*• | 240 | 3 | 60.1 | N/A | N/A | 21.9 | 12.2 | 85,300 |
| | XL420-480360-25 | 480 | 3 | 30 | 30.1 | 30.1 | | | |
| | XL420-600360-25* | 600 | 3 | 24.1 | N/A | N/A | | | |
| 30 | XL420-480360-30 | 480 | 3 | 36.1 | 36.1 | 36.1 | 26.3 | 14.6 | 102,350 |
| | XL420-600360-30* | 600 | 3 | 28.9 | N/A | N/A | | | |
| 35 | XL420-480360-35 | 480 | 3 | 42.1 | 42.1 | 42.1 | 28.0 | 15.6 | 119,450 |
| | XL420-600360-35* | 600 | 3 | 33.7 | N/A | N/A | | | |

Note: * CSA certified ONLY.
• Exceeds the 48 amp. circuit limit of NEC 424-22.
Not available with Group C rating.
To order a heater with an optional built-in thermostat, add a "T" suffix to model number.
To order a heater with a Group (C, D, F, & G) rating, add a "C" suffix to model number.
To order a heater with a Group (D, E, F, & G) rating, no suffix is required.
Please specify CSA or UL when ordering.

See Page 6 for Model Coding and Installation Conditions.