Preface

This manual has been written and illustrated to present the basic installation, operation, and servicing instructions of the ORION LM-100 Liquid Laundry Supply Dispenser. Guidelines will be suggested in reference to the preferred method of installation, however, the variety of equipment and the surrounding environment will dictate the actual installation of the LM-100.
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Theory of Operation

Overview
The ORION LM-100 liquid laundry product dispensing system uses the latest technology to provide low cost and reliable operation with full features. The ORION system is designed for laundry machines typically found in an On Premise Laundry (OPL) type account. Multiple modes of operation allow for maximum flexibility in washer application.

Features
The ORION system features include:

- **High Capacity Pumps** - ORION pumps have an output of up to 18 ounces per minute for fast product transfer.
- **Six Product Capability Standard** - The ORION system is capable of dispensing up to 6 products with a flush manifold. When using a TOTAL ECLIPSE Controller and the optional 8-pump PI PCB, the system can dispense up to 8 products.
- **Flush Capacity** - When used with a STANDARD ECLIPSE Controller or a TOTAL ECLIPSE Controller, a programmable output is available for controlling a flush manifold water valve. Flush time is easily programmed in seconds. A flow switch input is provided as a safety interlock to stop pumps in the event of no (or low) water flow.
- **Quick Pump Tube Change** - The pump faceplates are secured with four finger-tightened, captive thumbscrews to facilitate easy maintenance.
- **Safe Wiring** - The ORION dispensing system requires high voltage connections only at the Machine Interface (MI) to washer signal connections. All other wiring is plug-in with ethernet type communication cables. Dispenser power is sourced from a 115VAC wall outlet or via conduit for 208-230VAC.
Mechanical Installation

Principle of Operation

The **Machine Interface** connects to the **Controller** and communicates a supply signal, derived from the laundry machine programmer, at predetermined times in the wash formula. Once a signal is received, the ORION dispenser injects specific products directly from their containers to the laundry machine. See **Figure 1 “ORION LM-100 Liquid Laundry Dispensing System Diagram”** below to view these components.

Typically, there should be at least three supply signals from the laundry machine for complete automatic control of each product.

The **Machine Interface**, installed outside the laundry machine control wiring area, receives the laundry machine supply signals. It automatically adjusts for supply signal voltages ranging from 24-240VAC or 22-24VDC.

The **Pumpstand** is wired into the appropriate voltage power supply. It also supplies low voltage power to the Controller and provides an interface for the optional Flush Manifold.

The **Controller** indicates which formula is currently selected. The laundry operator can change formulas to match the load, review the load counter for each of the formulas, and—if required—prime each of the pumps from the Controller. Compatible controllers include the STANDARD ECLIPSE and the TOTAL ECLIPSE. An optional 8-pump PI PCB is available for use with a TOTAL ECLIPSE Controller to yield 8 pump capability. For additional Controller features, please refer to the specific Reference Manual provided with that Controller.

The **Optional Flush Manifold**—not shown—provides an alternative means of chemical transfer to the laundry machine. In flush configuration, the Orion system is a complete, integrated water flush chemical dispensing system.

![Figure 1 ORION LM-100 Liquid Laundry Dispensing System Diagram](image-url)
Installation and Setup

Preplanning the Installation

The following factors should be considered when choosing an installation location:

- Locate Pumpstand within 50’ (15.3 meters) of the laundry machine, close to product containers and at a convenient height for pump tube servicing, typically 4–5 ft. (1.2–1.5 meters).
- The Pumpstand must be mounted to a solid surface. Use appropriate hardware for each material, e.g. metal anchors in cement or cinder-block.
- For flush installations, allow room underneath Pumpstand for a flush manifold, water valve, and related plumbing.
- Verify that there is access to the appropriate power source for the unit. For pumpstands with 115VAC motors, locate the power cable close to a suitable 115VAC electrical outlet. Higher voltage connections must be done in accordance with applicable electrical codes.
- The outlet supply tubing run should not exceed 50’ (15.3 meters). The total input and output tubing runs should be kept to less than 60’ (18.3 meters) or pump tubing durability will be affected.

Controller Installation

The Controller should be installed in a suitable location on (or close to) the washer. The location should allow easy access for machine operators to input formulas and to read the display. When utilizing the Auto Formula Select feature (AFS) the Controller can be mounted with or near the pumpstand.

The Controller may be mounted on a horizontal surface, such as the top of the washer, or on a vertical surface, such as the front of the washer.

Machine Interface Installation

Mounting the Machine Interface (MI)

Mount MI outside the laundry machine control wiring area.

1. Remove lock nut on MI 1/2 inch nipple to secure MI to washer.
2. Route MI signal wires through 1/2 inch knock-out on washer (within the wiring area.)
3. Reinstall lock nut.
4. Route J2 cable to controller.
5. Plug J2 cable into Machine Interface.
6. Bundle excess J2 cable outside the washer.
7. Connect the other end of the J2 cable into the J2 connector on the Controller.

CAUTION:
These installation, operation and servicing instructions are for use by qualified personnel only. This pumpstand is intended to be installed by experienced installers, in accordance with all applicable electrical and plumbing codes.

All machine and dispenser power must be disconnected during installation and/or any time the dispenser cabinet is opened.

NOTE:
Specific Controller installation instructions are provided in the Controller Reference manual that is shipped with each Controller.

WARNING:
Disconnect power to the wash machine before proceeding.

Keep Machine Interface and communication cable away from high voltage wires and relays. NEVER parallel the cable with high voltage lines.

NOTE:
Electrical wiring connections for supply triggers should be done inside the junction box. See “Supply Trigger Wiring” (below) for connection information.
Installation and Setup

Machine Interface Installation (continued)

**Signal Voltage**
The Machine Interface will work with any signal voltage between 24 – 240VAC or 22 – 24VDC. With DC signals, polarity must be observed. Common is negative. The signals should be positive voltages. An optional 12VDC Machine Interface, p/n 03-07902-012, is available and is sold separately.

**Supply Trigger Wiring**

1. Identify the washer supply signals. Check with technical service or with the washer manufacturer if you are not sure of the connections.

2. Use appropriate terminal connectors to connect the signal wires to the Machine Interface wires. Use the color codes for equivalent pump numbers as found in Table 1 “Signal Wire Connections” on page 7:

<table>
<thead>
<tr>
<th>Supply Signal</th>
<th>Signal Common</th>
<th>Pump Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal 1</td>
<td>Black wire</td>
<td>White/Black</td>
</tr>
<tr>
<td>Signal 2</td>
<td>Brown wire</td>
<td>White/Brown</td>
</tr>
<tr>
<td>Signal 3</td>
<td>Red wire</td>
<td>White/Red</td>
</tr>
<tr>
<td>Signal 4</td>
<td>Orange wire</td>
<td>White/orange</td>
</tr>
<tr>
<td>Signal 5</td>
<td>Yellow wire</td>
<td>White/Yellow</td>
</tr>
<tr>
<td>Signal 6</td>
<td>Blue wire</td>
<td>White/Blue</td>
</tr>
</tbody>
</table>

**Trigger Signal Wiring Notes:**
- If washer has a single common, wire nut together all Machine Interface common wires that will be used. Tape off or wire nut unused wires.
- If one or more pump/pump group signals are not used, they do not need to be connected.
- If you are triggering more than one pump from a single washer signal, connect all of the Machine Interface pump signal wires for those pumps to that washer signal.
- Each of the 6 LEDs on the MI will light when the corresponding valid signal is received.

**Pumpstand Mechanical Installation**

**Figure 3 Pumpstand Mounting Options**

For units with 3 or more pumps and keyhole slot mounting:

1. Mark mounting surface screw locations, using the keyholes in the back of the unit as a template. See Figure 3.

2. Drill marked locations and install wall anchors that are suitable to the installation surface.

3. Start screws into the wall anchors and hang the pumpstand.

4. Tighten screws.

**CAUTION:**
Always verify all voltage sources with a meter.
**Installation and Setup**

**Pumpstand Electrical Installation**

If pumpstands motor voltage is 115VAC, power is sourced from a 115VAC wall outlet. Higher voltage connections must be done in accordance with applicable electrical codes.

1. Connect the J1 Cable to the J1 connector on the Controller.
2. If pumpstand motor voltage is 115VAC, connect power cable to the nearest suitable 115VAC wall outlet. In cases where the dispenser must be hard wired from the washer or other power source, consult the wiring label inside the dispenser Pumpstand cabinet.

**NOTE:** ORION pumpstands have a resettable circuit breaker on the underside of the unit, next to the power cable.

**Flush Manifold Connection (optional)**

The flush manifold wiring connector is located on the underside of the pumpstand (Orion 2 pumpstand is shown at right). Specific flush manifold installation instructions are provided in the Flush Manifold Reference Manual that is shipped with each flush manifold.

Depress the locking tab on the Pumpstand flush jumper harness (connected to flush connector on non-flush units) and remove the jumper harness. Connect flush manifold connecting cable to the Pumpstand flush connector.

**Supply and Discharge Tubing**

**NOTE:** The tubing between the pumps and the washing machine should be routed in a descending path from the pumps to the machine.

Supply tubing is not included with the dispensing system. Use the largest ID (inner diameter) size possible to maximize pump flow rates and minimize pump tube wear.

Do not exceed 50 feet total (pump inlet and exit lengths) combined supply tubing length, or a 10 foot maximum vertical rise.

The ideal situation to minimize any product drip at the washer is to have the supply tube sloped upwards to the washer entry point. If this ideal situation cannot be realized, then form a service loop in the supply tube as close as possible to the washer entry point. This will minimize drip at the injection point at the washer.

**NOTE:** Installations without a service loop in the tubing risk excessive detergent overshoot.
Supply and Discharge Tubing (continued)
The supply tubes can be brought into the washer via the washer's built in powder supply compartment, or through a side entry port, if available. The latter option may be preferred because it usually adds product to the water, not on top of the load. If you add through top mounted compartments, use the Controller's delay feature to allow the washer to fill before adding product.

Use tie wraps or hose clamps to ensure that the tubes are secured at the washer entry point.

![Image of supply and discharge tubing installation]

**Figure 5 Supply and Discharge Tubing Installation**

1. Connect supply tubes to pump tubes by sliding the supply tube up inside the pump tube. For 3/8" tube you may need to lubricate the supply tube.
2. Secure tube connections with tie wraps. (See Figure 5.)
3. Place the liquid chemical containers in a suitable area and run 1/4" (6 mm) polyethylene tubing from each container to the pump intake—left—side of each pump tube.
4. Insert the supply tubing 1/2" into the pump tube and secure with a tie wrap.
5. Insert the other end of the tubing into the tube guide cap and tube guide at the product drum pickup point. While the use of tube guides and caps is optional, this helps to keep tubing in the product and avoid curling (see Figure 5).

**NOTE:** When using optional, modified-output pump tubes, use 3/8" (9mm) supply tubing.
Installation and Setup

Setup and Operation

Refer to the Controller reference manual for Controller operating and programming instructions. After programming the controller, test system operation:

- Prime each pump and observe the pump tube for any bulging or pulsing on the outlet side (indicating that excessive back pressure is present).
- Calibrate pumps and program formulas.
- Select a formula, start washer, and observe a test load to ensure all products dispense only when they should.

**CAUTION:** Always wear eye protection when working with strong or hazardous chemicals.

Controller Programming Variations

Controllers that can be used with the ORION system include the STANDARD ECLIPSE and the TOTAL ECLIPSE. While these controllers have some similarities, the information below notes some important variations. Please read this section prior to programming your controller.

Calibrate Pumps

**NOTE:** Refer to your Controller’s Reference Manual to determine the proper calibration method (timed or volume) for your Controller.

You must calibrate all pumps, via the Controller, using either the volume or timed methods of calibration. If you do not calibrate a pump properly, your pumped amounts could be wrong or the pump may not run. Calibrate pumps using either of the methods below:

1. Pumping the exact 8 oz. or 250 ml amount called for in the Calibrate menu instructions (STANDARD ECLIPSE Controller).
2. Measuring the precise volume pumped for a 20 second period. When using the timed method, the measuring container must be capable of holding the amount of product that the specified pump is capable of delivering in 20 seconds. (Both methods available on the TOTAL ECLIPSE Controller)
Troubleshooting

Troubleshooting Basics

ORION pumpstands have a resettable circuit breaker on the underside, next to the power cable. In the event of a dead unit, always check the circuit breaker first (push to reset).

When troubleshooting for no product dispensed on signal, always confirm pump calibration and formula amounts are correctly programmed in the Controller.

We advise that you keep an inventory of the following new or “known good” spare parts to use for substitution purposes when troubleshooting. (Alternatively, you may “borrow” components from an adjacent dispensing system.)

- Controller
- Pump Interface PCB
- Wiring Harness Plate Assy.
- J1 Cable
- Machine Interface (with J2 Cable)

Always ensure that all telco connectors (J1 and J2 Cables) are clean and corrosion free. Also examine cables for cuts or kinks which can indicate broken wires. When in doubt, replace defective cables.

**NOTE:** The most important first step in troubleshooting the dispensing system is to confirm the failure or symptom that was reported.

**Circuit Breaker Reset**

If the Breaker (left bottom rear of Pump Module) needs resetting, verify that all motors are okay and no pumps are jammed or the unit will shut down again.

**Trigger Signal Test**

If you cannot obtain indication of signals on the Machine Interface or Control Module, use a meter to verify voltages between signal wires and common connections.

**Repair Procedures**

If you need to return items for repair, please obtain a returned product authorization number from Hydro Systems Customer Service and a note describing the symptoms encountered.
# Troubleshooting Table

**Use the following table as a guide to solve system problems.**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Solution</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Check if circuit breaker on Pumpstand is tripped.</td>
<td>2. Reset circuit breaker (on underside of pumpstand).</td>
</tr>
<tr>
<td></td>
<td>3. Check Controller to Pumpstand wiring.</td>
<td>3. Reconnect or replace J1 cable.</td>
</tr>
<tr>
<td></td>
<td>4. Possible defective Pumpstand PI PCB.</td>
<td>4. Replace Pumpstand PI PCB.</td>
</tr>
<tr>
<td></td>
<td>5. Possible defective Controller.</td>
<td>5. Replace Controller.</td>
</tr>
<tr>
<td>No pumps run on prime or on signal.</td>
<td>1. Check flush connector for contact closure.</td>
<td>1. Reconnect wiring harness.</td>
</tr>
<tr>
<td></td>
<td>2. Check for disconnected or damaged J1 cable connections.</td>
<td>2. Reconnect or replace cable.</td>
</tr>
<tr>
<td></td>
<td>3. Check for defective PI PCB or Controller.</td>
<td>3. Substitute components, one at a time.</td>
</tr>
<tr>
<td>Some (not all) pumps do not run on prime or on signal.</td>
<td>1. Check for loose motor wire connections.</td>
<td>1. Reconnect loose motor wire connections.</td>
</tr>
<tr>
<td></td>
<td>2. Check for disconnected or damaged J1 cable connections or for defective PI PCB or Controller.</td>
<td>2. Reconnect or replace cable. Substitute components, one at a time.</td>
</tr>
<tr>
<td>All pumps prime OK, but one or more pumps do not run on signal.</td>
<td>1. Check Machine Interface to Controller cable and connections.</td>
<td>1. Reconnect or replace J2 cable. Check and replace MI or Controller.</td>
</tr>
<tr>
<td></td>
<td>2. Confirm Pump Calibration.</td>
<td>2. If pumps are not calibrated, calibrate pumps.</td>
</tr>
<tr>
<td></td>
<td>4. Verify if valid signal is present by watching Machine Interface LEDs during washer operation or measure with meter.</td>
<td>4a. Confirm signal lasts longer than programmed Signal Filter Time. 4b. If LEDs light, check MI/Controller communication using “Trigger Status” menu in Controller's program mode. 4c. If no LEDs, check supply trigger wiring or troubleshoot washer for no signals. If signals OK, replace MI.</td>
</tr>
<tr>
<td></td>
<td>2. Check for input tube air leaks.</td>
<td>2. Change input tube or fittings.</td>
</tr>
<tr>
<td></td>
<td>3. Check if product is too viscous and/or if tubing run is too long.</td>
<td>3. Remedy this condition.</td>
</tr>
<tr>
<td>Not counting loads.</td>
<td>1. Check if the count pump (last/highest number) programmed non-zero pump runs?</td>
<td>1. Reprogram washer supply signals and/or Controller formulas.</td>
</tr>
</tbody>
</table>
Maintenance and Repair

Maintenance

Pump tubes should be replaced regularly. Many different factors effect tube life, including chemical compatibility, pumping pressures (size of supply tubes and distances pumped), time and operating conditions. Try to replace pump tubes before they fail and leak chemical into the pump housing. Periodically, wipe soil from housings, pump housings, etc. with a damp cloth.

Tube Replacement

1. Loosen the four captive thumbscrews and remove pump front cover.
2. Remove old pump tube. If tube was broken, clean out residual chemical with a damp cloth.
3. Position the roller assembly so it is at a 1:00 / 7:00 orientation. Place left end of tube in housing.
4. Rotate roller assembly clockwise as you push the tubing into the housing. This will aid the insertion of stiff or large tubes.
5. Lubricate tubing, if needed, with appropriate lubricant (as listed below) for your tube type.
6. Replace pump front and tighten captive thumbscrews.

Tube Lubrication

New tubes for the peristaltic pumps may be lubricated lightly with the appropriate lubricant. Excessive lubricant will cause premature tube wear. Use the correct lubrication for your tube type.

<table>
<thead>
<tr>
<th>Tube Type</th>
<th>Lubrication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Santoprene, EPDM, Viton</td>
<td>Silicone lube</td>
</tr>
<tr>
<td>Silicone</td>
<td>Silicone or Vaseline-type lube</td>
</tr>
<tr>
<td>C-Flex</td>
<td>No lube</td>
</tr>
</tbody>
</table>

Repair

CAUTION: The ORION pumpstand may contain a variety of PI PCBs. When replacing a pump motor or rewiring power, make certain that you have identified BOTH the type of board and the voltage specific to your installation.

Disassembly

1. Remove screws along top of the pumpstand cabinet and allow the front plate to hinge downward.
2. To remove the front plate and pump/motor assemblies, disconnect the motor plug connector from the Pump Interface PCB and disconnect the plate ground wire.
3. Remove two Phillips-head security screws (at front plate hinges) and lift plate off of end cap “hooks.”
4. Loosen four captive thumbscrews to remove the pump front cover. Gently remove pump tubing.
5. To remove pump spinner assembly, loosen set screw and slide spinner off of motor shaft. (For reassembly, note the location of the set screw in relation to the flat portion of the motor shaft.)
6. The pump rear and motor are secured to the cabinet front plate with four patch-lock, Phillipshead screws. Remove the four screws and lift the pump rear over the motor shaft.
7. Remove the pump motor from the backside of the front plate.

Pump Motor Assembly Replacement

1. To replace or add a motor (add a pump assembly to an empty pump location), plug the motor wires into the appropriate locations in the motor plug connector for that pump position, according to the Pump Interface PCB that is installed.
2. Install pump motor and pump rear, making sure to use the four new patch-lock, Phillips head screws that are provided with the new pump motor.
3. Continue assembly by reversing the order of the disassembly steps from the previous section.
Power Wiring (for all Pump Interface PCBs)
IMPORTANT: Depending upon your Pump Interface PCB, the power wiring terminal positions may vary. Use only the wiring diagram for the PI PCB that is appropriate to your installation. See the photos and wiring diagrams for each board (Figure 5, Figure 6 and Figure 7) to assist you in identifying your board type and using the appropriate wiring diagram.

The jumper configurations on the power terminal block determines the input voltage setting.

100-120VAC (inclusive) for all PI PCBs
1. Connect power to terminals 1 and 4.
2. Connect a jumper between terminals 1 and 2 and another between terminals 3 and 4.

200-240VAC (inclusive) for all PI PCBs
1. Connect power to terminals 1 and 4.
2. Connect a jumper between terminals 2 and 3.

CAUTION: Motor voltage rating of installed motors MUST match power wiring configuration!

ORION 6-Pump PI Power Wiring

ORION 2 PI Power Wiring

Figure 8 Orion 6-Pump Wiring Diagrams (115VAC and 208/230VAC voltage specific)

Figure 9 Orion 2 Wiring Diagrams (115VAC and 200-230VAC voltage specific)
ORION 8-Pump PI Motor Replacement and Power Wiring:

![Orion 8-Pump PI PCB](image)

110VAC Wiring and 200-230 VAC Wiring, Orion 8-Pump PI PCB

**Figure 10 Orion 8-Pump, Wiring Diagrams (110VAC and 200-230 voltage specific)**

**Washer Wiring–Contacts for Manufacturers**

If you are unfamiliar with the washer to which you are wiring, either contact the washer manufacturer or Hydro Systems for technical assistance. The following list of manufacturers and contact numbers is supplied for your reference. This list, current at the time of publication, may become outdated if manufacturers cease doing business or change their phone numbers.

When contacting a washer manufacturer, have the model and serial numbers of the machine handy, as ongoing washer upgrades may change the wire numbers from time to time.

The ORION Machine Interface can accept any single phase voltage signal from 24 VAC - 240 VAC or 22-24 VDC.

<table>
<thead>
<tr>
<th>Washer Manufacturers / Wash Machine Names</th>
<th>Location</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alliance Laundry Systems (Huebsch)</td>
<td>Ripon, WI</td>
<td>800.553.5120</td>
</tr>
<tr>
<td>Alliance Laundry Systems (Speed Queen)</td>
<td>Ripon, WI</td>
<td>800.345.5649</td>
</tr>
<tr>
<td>Alliance Laundry Systems (UniWash, UniMac, Ajax)</td>
<td>Ripon, WI</td>
<td>800.587.5458 or 920.748.3121</td>
</tr>
<tr>
<td>Brim Laundry Machinery Co.</td>
<td>Dallas, TX</td>
<td>800.527.5886 or 214.630.4517</td>
</tr>
<tr>
<td>Dexter Co.</td>
<td>Fairfield, IA</td>
<td>641.472.5131</td>
</tr>
<tr>
<td>Edro Corp. (DynaWash)</td>
<td>East Berlin, CT</td>
<td>860.828.0311</td>
</tr>
<tr>
<td>Ellis Corp.</td>
<td>Itasca, IL</td>
<td>800.453.9222</td>
</tr>
<tr>
<td>G A Braun Inc.</td>
<td>Syracuse, NY</td>
<td>800.432.7286 or 315.475.3123</td>
</tr>
<tr>
<td>Girbau Co.</td>
<td>Oshkosh, WI</td>
<td>800.256.1073 or 920.231.8222</td>
</tr>
<tr>
<td>IPSO, USA</td>
<td>Panama City, FL</td>
<td>800-872-4776</td>
</tr>
<tr>
<td>Jensen (Senking, D’Hooge, L-TRON)</td>
<td>Fort Mills, SC</td>
<td>803.548.3653</td>
</tr>
<tr>
<td>Kannegiesser USA (Favorit, Futura, PowerTrans, RotaFlex)</td>
<td>Grand Prairie, TX</td>
<td>800.344.0403</td>
</tr>
<tr>
<td>Pellerin Milnor</td>
<td>Kenner, LA</td>
<td>504.467.9591</td>
</tr>
<tr>
<td>Wascomat, Inc. (Wascomat, Wascator)</td>
<td>Inwood, NY</td>
<td>516.371.4400</td>
</tr>
<tr>
<td>Washex / Lavatec</td>
<td>Wichita Falls, TX</td>
<td>800.433.0933 or 940-855-3990</td>
</tr>
</tbody>
</table>
## Maintenance and Repair

<table>
<thead>
<tr>
<th>Reference Number</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>03-03609-02</td>
<td>Machine Interface Module, with J2 Cable</td>
</tr>
<tr>
<td></td>
<td>03-07902-012</td>
<td>Machine Interface Module, 12 VDC</td>
</tr>
<tr>
<td>2a</td>
<td>01-0890-00</td>
<td>Controller, Total Eclipse</td>
</tr>
<tr>
<td>2b</td>
<td>01-05970-00</td>
<td>Controller, Eclipse, US Units</td>
</tr>
<tr>
<td></td>
<td>01-05970-01</td>
<td>Controller, Eclipse, Metric Units</td>
</tr>
<tr>
<td>3</td>
<td>13-03213-1000</td>
<td>Circuit Breaker, 10 amp</td>
</tr>
<tr>
<td>4</td>
<td>40-06266-00</td>
<td>Flush Jumper Harness (for non-flush installations)</td>
</tr>
<tr>
<td>5</td>
<td>37-03105-00</td>
<td>Pump Rear, Standard</td>
</tr>
<tr>
<td></td>
<td>37-03105-01</td>
<td>Pump Rear, Modified</td>
</tr>
<tr>
<td>6</td>
<td>03-03157-01</td>
<td>Pump Spinner, Standard</td>
</tr>
<tr>
<td></td>
<td>03-03157-02</td>
<td>Pump Spinner, Modified</td>
</tr>
<tr>
<td>7</td>
<td>03-03156-01</td>
<td>Pump Front, Standard, w/ Captive Screws</td>
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<tr>
<td></td>
<td>03-03156-02</td>
<td>Pump Front, Modified, w/ Captive Screws</td>
</tr>
<tr>
<td>8</td>
<td>13-06723-10</td>
<td>Pump Tube, Santoprene, 12 oz., 10-pack</td>
</tr>
<tr>
<td></td>
<td>13-04273-23110</td>
<td>Pump Tube, Santoprene, 18 oz., 10-pack</td>
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<tr>
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<td>13-07971-10</td>
<td>Pump Tube, Silicone, 12 oz., 10-pack</td>
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<td>13-07972-10</td>
<td>Pump Tube, Silicone, 18 oz., 10-pack</td>
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<td>13-04273-33110</td>
<td>Pump Tube, EPDM, 18 oz., 10-pack</td>
</tr>
<tr>
<td></td>
<td>13-06724-10</td>
<td>Pump Tube, Viton, 12 oz., 10-pack</td>
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<tr>
<td></td>
<td>13-07976-10</td>
<td>Pump Tube, Viton, 18 oz., 10-pack</td>
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<tr>
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<td>13-06720-10</td>
<td>Pump Tube, EPDM, Modified, 10-pack</td>
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<td>13-07786-10</td>
<td>Pump Tube, Silicone, Modified, 10-pack</td>
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<tr>
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<td>13-07982-10</td>
<td>Pump Tube, Santoprene, Modified, 10-pack</td>
</tr>
<tr>
<td></td>
<td>13-07977-10</td>
<td>Pump Tube, Viton, Modified, 10-pack</td>
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<tr>
<td>9</td>
<td>13-03206-01</td>
<td>Pump Motor, 115 VAC, 60 Hz</td>
</tr>
<tr>
<td></td>
<td>13-03206-02</td>
<td>Pump Motor, 230 VAC, 50 Hz</td>
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<td>13-03206-03</td>
<td>Pump Motor, 208 VAC, 60 Hz</td>
</tr>
<tr>
<td>10</td>
<td>13-04039-00</td>
<td>Pump Interface Circuit Board, Orion 6-Pump, 100/115 VAC, 50/60 Hz</td>
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<tr>
<td>10</td>
<td>13-04039-01</td>
<td>Pump Interface Circuit Board, Orion 6-Pump, 208/230 VAC, 50/60 Hz</td>
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<td>11</td>
<td>50-06580-01</td>
<td>Pump Interface Circuit Board, Orion 2, 100/115 VAC, 50/60 Hz</td>
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<tr>
<td>11</td>
<td>50-06580-02</td>
<td>Pump Interface Circuit Board, Orion 2, 208/230 VAC, 50/60 Hz</td>
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<tr>
<td>12</td>
<td>50-04880-11</td>
<td>Pump Interface Circuit Board, Orion 8-Pump, 100/115 VAC, 50/60 Hz</td>
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<tr>
<td>12</td>
<td>50-04880-12</td>
<td>Pump Interface Circuit Board, Orion 8-Pump, 208/230 VAC, 50/60 Hz</td>
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<td>13-08088-10</td>
<td>Captive Screw, 10-pack</td>
</tr>
<tr>
<td></td>
<td>13-05516-150</td>
<td>J1 Cable, 15 foot (4.6 meter)</td>
</tr>
<tr>
<td></td>
<td>13-05516-300</td>
<td>J1 Cable, 30 foot (9.2 meter)</td>
</tr>
<tr>
<td></td>
<td>13-07492-07</td>
<td>J2 Cable, 7.5 foot (2.3 meter)</td>
</tr>
</tbody>
</table>

* Denotes items not shown
Specifications and Warranty

Specifications

Dimensions (6-Pump Unit)

<table>
<thead>
<tr>
<th>Size</th>
<th>30&quot; W x 6.5&quot; H x 6.0&quot; D (76.2 cm W x 16.5 cm H x 15.2 cm D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>41 lbs (18.6 kg)</td>
</tr>
</tbody>
</table>

Power Requirements

<table>
<thead>
<tr>
<th>Total Amperage draw during operation (per pump)</th>
<th>115 VAC nominal (+/- 10% fluctuation), 50/60 Hz. 2.5 amps (max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>208 VAC nominal (+/- 10% fluctuation), 60 Hz. 1.25 amps (max.)</td>
</tr>
<tr>
<td></td>
<td>230 VAC nominal (+/- 10% fluctuation), 50 Hz. 1.25 amps (max.)</td>
</tr>
</tbody>
</table>

General

| Pump Flow Rate | 12 oz./min. (355 mls/minute) |
|               | 18 oz./min. (532 mls/minute)  |
| Temperature   | 10° to 49° C (50° to 120° F) (max.) |
| Humidity      | 95% relative humidity (max.)  |
| Indoor Installation | Approved for indoor use only. Must not be installed outdoors. |
| Altitude      | Install at or below 6,500 ft. (2000m) max. |

NOTE: Specifications subject to change without notice.

Limited Warranty

Seller warrants solely to Buyer the Products will be free from defects in material and workmanship under normal use and service for a period of one year from the date of completion of manufacture. This limited warranty does not apply to (a) hoses; (b) and products that have a normal life shorter than one year; or (c) failure in performance or damage caused by chemicals, abrasive materials, corrosion, lightning, improper voltage supply, physical abuse, mishandling or misapplication. In the event the Products are altered or repaired by Buyer without Seller’s prior written approval, all warranties will be void. No other warranty, oral, express or implied, including any warranty of merchantability or fitness for any particular purpose, is made for these products, and all other warranties are hereby expressly excluded.

Seller’s sole obligation under this warranty will be, at Seller’s option, to repair or replace F.O.B. Seller’s facility in Cincinnati, Ohio any Products found to be other than as warranted.

Limitation of Liability

Seller’s warranty obligations and Buyer’s remedies are solely and exclusively as stated herein. Seller shall have no other liability, direct or indirect, of any kind, including liability for special, incidental, or consequential damages or for any other claims for damage or loss resulting from any cause whatsoever, whether based on negligence, strict liability, breach of contract or breach of warranty.
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