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**Particle Filter:** Hytrex II

**Cartridge Filters:**
- GX 30 - 4 7/8
- 30 Micron

Osmotics Inc., 5951 Clearwater Dr, Minnetonka, Minnesota 55343, USA

**Bisons part #:** 6502-0004

---

**Oxygen for removal:**

- Cartridge

---

**Barnstead/Thermolyne,** 255 S. Kerper Blvd, Dubuque, Iowa 52002
- 1-800-446-6060
Xray Anode Cooling Water

M & W unit

The M & W is utilized to provide high purity water to the rear surface of the xray source anode disk. The disk is aluminum on the electron beam (vacuum) side and copper on the external, water cooled side. If the water on the copper side is not very pure deposits will form on the copper that compromise the heat transfer.

It is important to maintain the cooling water temperature between 65 and 68 degrees F. The green lamp on the externally mounted deionizer will turn RED as the conductivity increases.

There is also a particulate filter inside the M & W unit that needs periodic replacement.

THE ANODE MUST BE REPLACED EVERY 6 MONTHS. THE DISK IS VERY THIN AND THE POSSIBILITY OF ERODING A HOLE IN THE THIN DISK MUST BE AVOIDED. A WATER LEAK THROUGH THE DISK INTO THE WATERTANK WILL FILL THE MAIN CHAMBER WITH WATER.!!

IT IS RECOMMENDED TO SLIGHTLY RECOMMENDS LEAVING THE WATER RECIRCULATOR ON CONTINUOUSLY.

HIGH PURITY WATER SHOULD ALSO BE CHANGED AS NEEDED.

CARBON VANE PRIMARY FILTER FOLLOWING THE PUMP WILL ACCUMULATE BLACK CARBON PARTICLES. AIR LEAKS ON THE INLET SIDE OF THE PUMP SHOULD BE AVOIDED AS THESE CAUSE UNRELIABLE TURBULENCE WHICH DAMAGES THE VANCES. WHEN THE VANES BREAK LARGE PIECES OF CARBON ARE FOUND BURNT IN THE DOWNSTREAM PUMP PIPING.
Maintenance Log

M & W recirculator

1/95 Carbon vane pump self-destructed again. This is second one to fail in three years. The removed one was stamped with 99psi. SSI recommended to M & W that they be set to 80psi. This one just installed is 80psi. Lubricated the motor 20 drops each end with SAB 10. The front panel pressure gauge had also failed (also the second in three years). The gauge internal mechanism had simply been worn out from pressure pulsations. A surge suppressor was installed this time.

Only a trickle of water is supposed to flow through the DI cylinder on the rear panel. M & W provided a plastic disk with a small hole in it to limit the flow but I cannot figure out where to put it without it getting lost in the plumbing. So we don't have one at the moment.

Cavitation is reported to kill the carbon vane pumps right quick. Be on guard for bubbles on the inlet side indicating an air leak.

Replaced the post-pump 30 micron filter.

2/1/96 CONDUCTIVITY LAMP WAS FICKERING FROM GREEN TO RED. INSTALLED A "NEW" D8809 CARTRIDGE. CARTRIDGE WAS UNUSED BUT PAST EXPIRATION DATE JUST SITTING ON THE SHELF. OLD CARTRIDGE WAS BLACK WITH CARBON POWDER.

5/1/96 1) REPLACED WATER IN ENTIRE SYSTEM WITH BI HOUSE BE-FON WATER.
2) INSTALLED LAST OF THE "EXPIRED" BUT UNUSED D8809 CARTRIDGES
3) LUBRICATED ELECTRIC MOTOR BEARINGS
4) REPLACED & LUBRICATED COPPER ALLOY PUMP-MOTOR COUPLING.
5) REPLACED POST-PUMP 30 MICRON FILTER ELEMENT.

5/2/96 INSTALLED NEW D8809 CARTRIDGE

4/30/96 REPLACED CARBON VANE PUMP. INSTALLED NEW COUPLING & POST-PUMP FILTER.

12/10/96 REPLACED COUPLING & POSTPUMP FILTER. REASSED MOTOR.
FLOWRITE

RECIRCULATING HEAT EXCHANGER

SYSTEM

INSTALLATION AND OPERATION

MANUAL

RPHX  12W-C-DI-CDDO
1.0 INTRODUCTION

The RPHX FLOWRITE Recirculating Cooling Systems are self-contained, compact, mobil liquid cooling systems for applications in laboratory, assembly, testing and manufacturing facilities. The various models have one or two closed-loop cooling systems with no back pressure.

The system offers a wide variety of models. Hermetically sealed refrigeration compressors and heat exchangers provide long uninterrupted service. The FLOWRITE cooling systems offer constant temperature cooling for water, or a number of other fluids as cooling media. Pressure, Temperature and Flowrate can be easily adjusted to fit any demand.

1.1 PRINCIPAL OF OPERATION

Coolant is pumped from the reservoir through a sensing and distribution manifold. Here, the coolant temperature, pressure and flow rates are monitored. These functions may be adjusted according to need. The coolant required for each circuit then flows out of the FLOWRITE Recirculating Cooling System to the item being cooled and then returns to the reservoir, where it is cooled down again.

1.2 OPTIONS

A number of options can be ordered and have to be included at the time of manufacture. The options for this model include:

-DI- This system is designed for the circulation and cooling of deionized water or other liquids which cannot be brought in contact with metals. All parts in the system are stainless steel or plastic materials that are compatible with D.I. water.

-CDDO- A mixed bed of deionization cartridge in a by-pass circuit provides continuous deionization and oxygen removal.

-SEC- Various security signals, such as Flowrate, Overtemperature, Pressure, may be generated to indicate a fault condition.

1.3 INSTALLATION

The RPHX models are quite easy to install. All that is needed is a grounded electrical receptacle and a water source must be available.
2.0 SITE REQUIREMENTS

Watercooled models require cooling water for heat removal. Water pressure between 20 and 40-PSI.

Grounded electrical receptacle properly fused.

3.0 HOOK-UP

Connect hoses on right side, as follows: (see sketch A)

A SUPPLY goes to unit being cooled.

A RETURN returns from unit being cooled.

FILTER SUPPLY to "IN" on -CDDO- unit.

FILTER RETURN from "OUT" on -CDDO- unit. C

HOUSEWATER SUPPLY water to cool heatexchanger.

HOUSEWATER RETURN to drain.

All connections are to be made with either 1/2 OD polyflow tubing or its equivalent. (Other sizes optional).

Plug in Powercord to Power Outlet.

3.1 FILLING AND START UP

-Remove top cover.
-Fill reservoir with coolant supplied with unit. Top off reservoir with water, preferably 50 - 150 u MHOSS range. DI option model must be filled with the required fluid.
-Check all hose fittings for tightness.
-Turn on unit by toggle switch.
-Red indicator light should now be activated.
-Set flow to required amounts by adjusting knob under flowmeter.
-Set pressure by adjusting knob.
-After original set-up, just turn on power and unit will cycle automatically.

4.0 SERVICE

The FLOWRITE Recirculating Cooling System requires a minimum of service. Normal checking of lines for tightness and leaks should be carried out. The RPHX Series have filters built in. The cartridges of these filters should be checked periodically and exchanged if necessary.

All models should be checked once annually for loose connections, loose screws and fasteners. All service inquiries should be made to the manufacturer.
PREVENTIVE SERVICE

In order that the FLOWRITE system continues to operate up to its specifications, it is suggested that the following steps be taken as preventive maintenance:

CONTINUOUS

Keep system clean.
Wipe up any spills.

SIX MONTHS INTERVALS

Check all water fittings for leaks.
Check and tighten V-Band Clamps that secures pump to pump motor.

TWELVE MONTHS INTERVALS

Oil pump motor.
Check and tighten all water fittings.
<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>CAUSE</th>
<th>CHECK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete unit will not turn on</td>
<td>No power</td>
<td>- Check plug</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Check circuit breaker</td>
</tr>
<tr>
<td>Power on unit will not pump</td>
<td>Pump not rotating</td>
<td>- Pump defective, replace</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump working but no pressure</td>
<td>No coolant</td>
<td>- Check hook-up autofill model's water supply</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Turn supply valve to autofill</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Fill tank on manual units</td>
</tr>
<tr>
<td></td>
<td>Below 50 PSI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Above 50 PSI</td>
<td>- Adjust pressure on front panel.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Valves not open</td>
<td>- Remove nut on right side of pump, turn screw</td>
</tr>
<tr>
<td></td>
<td>Blockage in lines</td>
<td>clockwise to increase pressure.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Pressure factory set at 50 PSI).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Adjust flow Valves (C1 &amp; 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Check hook-up and valving on unit being cooled</td>
</tr>
</tbody>
</table>

# PARTS LIST

## FLOWRITE RECIRCULATING HEAT EXCHANGER SYSTEM

**MODEL NO.: RPHX12W-C-DI-CDDO**

### A. WATER

<table>
<thead>
<tr>
<th>NO.</th>
<th>QTY</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1</td>
<td>Conductivity Light</td>
<td>024-018-0011</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
<td>Flow Meter 2 GPM Adj.</td>
<td>024-018-0214</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
<td>Flow Sensor, 240 V</td>
<td>024-018-1509</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
<td>Liquid Line Strainer</td>
<td>024-018-0251</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
<td>Pressure Gauge 0-100 psi, block type</td>
<td>024-018-0203</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
<td>Recirculating Pump</td>
<td>024-018-0020</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
<td>Reservoir</td>
<td>024-018-0231</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
<td>Temperature Gauge</td>
<td>024-018-5071</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
<td>Water Valve</td>
<td>024-018-5020</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
<td>Water Filter Housing 20&quot; long</td>
<td>024-018-6650</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
<td>Water Filter 20&quot; long BARNSTEAD D880F</td>
<td>024-018-6651</td>
</tr>
</tbody>
</table>

Please specify Model No., Serial Noo., Voltage and Hz when ordering the parts.

---

*Notations*
- Motor Speed: 1725 rpm
- SN 775 22 1 08
- D.E. Filter Restrictor
  - To be installed ahead of D.E. canister
  - PN 208-230 6016

---

**Notes:**
- M&W charges about $420 for the pump.
- Fisons charges $446.25.
- Fisons part # 6502-0016 Brass coupler to motor: 6502-0008 $4.20
- Small 4" particulate filter element: 6502-0004 FI
### PARTS LIST

#### FLOWRITE RECIRCULATING HEAT EXCHANGER SYSTEM

**MODEL NO.: RPHX12W-C-DI-CDDO**

## B. ELECTRONIC/ELECTRICAL

<table>
<thead>
<tr>
<th>NO.</th>
<th>QTY</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1</td>
<td>Enclosure, Electrical</td>
<td>024-018-2424</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
<td>Electrical Relay 240V</td>
<td>024-018-0364</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
<td>Light, Power</td>
<td>024-018-0344</td>
</tr>
<tr>
<td>1.</td>
<td>1</td>
<td>Switch, Toggle</td>
<td>024-018-0355</td>
</tr>
</tbody>
</table>

Please specify Model No., Serial No., Voltage and Hz when ordering the parts.
# PARTS LIST

FLOWRITE RECIRCULATING HEAT EXCHANGER SYSTEM

MODEL NO.: RPHX12W-C-D1-CDDO

## C. MECHANICAL

<table>
<thead>
<tr>
<th>NO.</th>
<th>QTY</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1</td>
<td>Frame</td>
<td>024-018-7710</td>
</tr>
<tr>
<td>2.</td>
<td>2</td>
<td>Casters, Locking</td>
<td>024-018-8840</td>
</tr>
<tr>
<td>3.</td>
<td>2</td>
<td>Casters, Non-locking</td>
<td>024-018-8850</td>
</tr>
</tbody>
</table>

Please specify Model No., Serial No., Voltage and Hz when ordering the parts.
FLOWRITE

RECIRCULATING COOLING SYSTEM

INSTALLATION AND OPERATING MANUAL

Model: RPHX-12-W
INTRODUCTION

The RPHX FLOWRITE Recirculating Cooling Systems are self-contained, compact, mobile liquid cooling systems for applications in laboratory, assembly, testing and manufacturing facilities. The various models have one or two closed-loop cooling systems with no back pressure. The system offers a wide variety of models.

Hermetically sealed refrigeration compressors and heat exchangers provide long uninterrupted service.

FLOWRITE cooling systems offer constant temperature cooling for water, or a number of other fluids as cooling media. Pressure, Temperature and Flowrate can be easily adjusted to fit any demand.

PRINCIPAL OF OPERATION:

Coolant is pumped from the reservoir through a sensing and distribution manifold. Here, the coolant temperature, pressure and flow rates are monitored. These functions may be adjusted according to need. The coolant required for each circuit then flows out of the FLOWRITE Recirculating Cooling System to the item being cooled and then returns to the reservoir, where it is cooled down again.

OPTIONS

A number of options can be ordered and have to be included at the time of manufacture. The options for this model include:

..D1.. This system is designed for the circulation and cooling of deionized water or other liquids which cannot be brought in contact with metals. All parts in the system are stainless steel or plastic materials that are compatible with D.I. water.

..C000.. A mixed bed of deionization cartridge in a by-pass circuit provides continuous deionization and oxygen removal.

..SEC.. Various security signals, such as Flowrate, Overtemperature, Pressure, may be generated to indicate a fault condition.

INSTALLATION

The RPHX models are quite easy to install. All that is needed is a grounded electrical receptacle and a water source must be available.
SITE REQUIREMENTS

Watercooled models require cooling water for heat removal. Water pressure between 20 and 40-PSI.

Grounded electrical receptacle properly fused.

HOOK-UP

Connect hoses on right side, as follows: (see sketch A)

A SUPPLY goes to unit being cooled.
A RETURN returns from unit being cooled.
FILTER SUPPLY to "IN" on -CDDO- unit.
FILTER RETURN from "OUT" on -CDDO- unit.
HOUSEWATER SUPPLY water to cool heat exchanger.
HOUSEWATER RETURN to drain.

All connections are to be made with either 1/2 OD polyflow tubing or its equivalent. (Other sizes optional).

Plug in Powercord to Power Outlet.

FILLING AND START UP

- Remove lower front cover.
- Fill reservoir with coolant supplied with unit. Top off reservoir with water, preferably 50 - 150 u MHOS range. DI option model must be filled with the required fluid.
- Check all hose fittings for tightness.
- Turn on unit by pushing switch.
  Red indicator light should now be activated.
- Set flow to required amounts by adjusting knob under flowmeter.
- Set pressure by adjusting knob.
- After original set-up, just turn on power and unit will cycle automatically.

SERVICE

The FLOWRITE Recirculating Cooling System requires a minimum of service. Normal checking of lines for tightness and leaks should be carried out. The RPHX Series have filters built in. The cartridges of these filters should be checked periodically and exchanged if necessary.
All models should be checked once annually for loose connections, loose screws and fasteners. All service inquiries should be made to the manufacturer.
FLOWRITE Recirculating Cooling Systems

Pump Adjustment (Bypass)

Models: 21-5020
         21-5021
         21-5023

1. Turn off pump power
2. Remove screw cap 'A'
3. Adjust screw 'B'
   For pressure increase, turn clockwise
   For pressure decrease, turn counterclockwise
4. Close screw cap 'A'
5. Test system pressure and repeat if necessary
FLOWRITE RECIRCULATING COOLING SYSTEM

Model: RPHX-12-4

M and W SYSTEMS
2346 Trinidad Way
HAYWARD, CA 94545
Tel. 415 887-7008 Fax. 415 887-7220
<table>
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<td>Pump working but no circulating</td>
<td>No coolant</td>
<td>- Pump defective, replace</td>
</tr>
<tr>
<td>Pump operates, but no pressure</td>
<td>Below 50 PSI</td>
<td>- Check hook-up autofill model's water supply</td>
</tr>
<tr>
<td></td>
<td>Above 50 PSI</td>
<td>- Turn supply valve to autofill</td>
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<tr>
<td></td>
<td></td>
<td>- Fill tank on manual units</td>
</tr>
<tr>
<td>Pump operates, but no flow</td>
<td>Valves not open</td>
<td>- Adjust pressure on front panel</td>
</tr>
<tr>
<td></td>
<td>Blockage in lines</td>
<td>- Adjust pressure relief valve on pump. Remove nut on right side of pump, turn screw clockwise to increase pressure. (Pressure factory set at 50 PSI).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Adjust flow Valves (C1 &amp; C2)</td>
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<tr>
<td></td>
<td></td>
<td>- Check hook-up and valving on unit being cooled</td>
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