

HX Digital Recirculating Chiller

NESLAB Manual P/N 002002
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Installation, Operation, and Maintenance Manual



NESLAB online

Product Service Information, Electronic Catalog,
Applications Notes, MSDS Forms, e-mail.

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HX Analog/Digital Recirculating Chiller Installation, Operation, and Maintenance Manual

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WARRANTY

Water-Cooled HX Series Quick Reference Operating Procedures

Installation

Position the unit in a clean environment with easy access to facility cooling water and a drain. The facility water requirements must meet those specified in the instruction or unit performance will be derated.

Ensure the voltage of the power source meets the specified voltage, $\pm 10\%$.

The plumbing connections are located on the rear of the unit and are labelled TAP WATER, DRAIN, SUPPLY and RETURN. Remove the plastic protective plugs from all the plumbing connections. Connect the TAP WATER fitting to the facility cooling water and the DRAIN fitting to a drain. Connect the SUPPLY fitting to the inlet of your application and the RETURN fitting to the outlet of your application.

To fill the reservoir open the access panel on the left rear corner of the case top and remove the reservoir cover by unscrewing the thumbscrews. Fill the reservoir to within one inch of the top. If the fluid capacity of your application and recirculation lines are significant, have extra fluid on hand.

Tap water is the recommended fluid for operation from $+8^{\circ}\text{C}$ to $+80^{\circ}\text{C}$. Below $+8^{\circ}\text{C}$, a non-freezing fluid must be used. A mixture of tap water and laboratory grade ethylene glycol is suggested.

Operation

Before starting the unit, double check all electrical and plumbing connections. Make sure the circulating system has been filled with cooling fluid.

Ensure the facility water is turned on.

On models HX-200 through HX-750, the unit must be connected to the power source for at least 12 hours to allow the oil to be heated and separated from the refrigerant

To start the unit, place the Power Switch to the ON position. The Cool and Idle LEDs on the front panel indicate the status of the refrigeration system. Cool is on when the unit is removing heat from the cooling fluid, Heat is on when the unit is in the hot gas by-pass mode. As the operating temperature approaches the setpoint, the LEDs cycle.

When the unit is shut off, wait five minutes before restarting to allow time for the refrigeration pressures to equalize. If the pressures are not allowed to equalize, the compressor will short-cycle and no cooling will occur.

Analog Controller Temperature Adjustment

To adjust the temperature setpoint, turn the $^{\circ}\text{C}$ dial on the front of the unit to the desired temperature.

Digital Controller Temperature Adjustment

To display the temperature setpoint, press and hold the DISPLAY switch. To adjust the temperature setpoint, press and hold the DISPLAY switch and turn the ADJUST knob until the desired temperature setpoint is indicated on the digital display. Once the setpoint is adjusted, release the DISPLAY switch. The display will now indicate the temperature of the fluid in the reservoir.

Flow Control

The RECIRCULATING FLOW CONTROL handle controls the flow rate to your application. In the "+" position you receive full flow, the "-" position is no flow.

Periodic Maintenance

Periodically inspect the reservoir fluid. If cleaning is necessary, flush the reservoir with a cleaning fluid compatible with the circulating system and the cooling fluid.

The cooling fluid should be replaced periodically. When operating at low temperatures, the concentration of water in the cooling fluid will increase over time, leading to a loss of cooling capacity.

Periodic vacuuming of the condenser fins is necessary. The frequency of cleaning depends on the operating environment. We recommend a visual inspection of the condenser be made monthly after initial installation. After several months, the cleaning frequency will be established.

Units with PD and TU pumps have a strainer. If debris is in the system, the strainer will prevent the material from being drawn into the pump and damaging the pump vanes.

After initial installation, the strainer may become clogged. The strainer must be cleaned after the first week of installation. After this first cleaning, a monthly visual inspection is recommended. After several months, the frequency of cleaning will be established.

Before cleaning the strainer, disconnect the power cord from the power source and drain the reservoir.

For complete information, including troubleshooting procedures, please refer to the instruction manual.

Air-Cooled HX Series Quick Reference Operating Procedures

Installation

Position the unit so the intake and discharge are not impeded. Inadequate ventilation will cause a reduction in cooling capacity and, in extreme cases, compressor failure.

Avoid excessively dusty areas and institute a periodic cleaning schedule. For proper operation, the unit needs to pull substantial amounts of air through a condenser. A build up of dust or debris on the fins of the condenser will lead to a loss of cooling capacity.

The unit will retain its full rated capacity in ambient temperatures up to approximately +24°C.

Ensure the voltage of the power source meets the specified voltage, ±10%.

The plumbing connections are located on the rear of the unit and are labelled SUPPLY and RETURN. These connections are ¾ inch FPT. Remove the plastic protective plugs from both plumbing connections. Connect the SUPPLY fitting to the inlet of your application. Connect the RETURN fitting to the outlet of your application.

To fill the reservoir open the access panel on the left rear corner of the case top and remove the reservoir cover by unscrewing the thumbscrews. Fill the reservoir to within one inch of the top. If the fluid capacity of your application and recirculation lines are significant, have extra fluid on hand.

Tap water is the recommended fluid for operation from +8°C to +80°C. Below +8°C, a non-freezing fluid must be used. A mixture of tap water and laboratory grade ethylene glycol is suggested.

Operation

Before starting the unit, double check all electrical and plumbing connections. Make sure the recirculating system has been filled with cooling fluid.

On models HX-200 through HX-750, the unit must be connected to the power source for at least 12 hours to allow the oil to be heated and separated from the refrigerant

To start the unit, place the Power Switch to the ON position. The Cool and Idle LEDs on the front panel indicate the status of the refrigeration system. Cool is on when the unit is removing heat from the cooling fluid, Heat is on when the unit is in the hot gas by-pass mode. As the operating temperature approaches the setpoint, the LEDs cycle.

When the unit is shut off, wait five minutes before restarting to allow time for the refrigeration pressures to equalize. If the pressures are not allowed to equalize, the compressor will short-cycle and no cooling will occur.

Analog Controller Temperature Adjustment

To adjust the temperature setpoint, turn the °C dial on the front of the unit to the desired temperature.

Digital Controller Temperature Adjustment

To display the temperature setpoint, press and hold the DISPLAY switch. To adjust the temperature setpoint, press and hold the DISPLAY switch and turn the ADJUST knob until the desired temperature setpoint is indicated on the digital display. Once the setpoint is adjusted, release the DISPLAY switch. The display will now indicate the temperature of the fluid in the reservoir.

Flow Control

The RECIRCULATING FLOW CONTROL handle controls the flow rate to your application. In the “+” position you receive full flow, the “-” position is no flow.

Periodic Maintenance

Periodically inspect the reservoir fluid. If cleaning is necessary, flush the reservoir with a cleaning fluid compatible with the circulating system and the cooling fluid.

The cooling fluid should be replaced periodically. When operating at low temperatures, the concentration of water in the cooling fluid will increase over time, leading to a loss of cooling capacity.

Periodic vacuuming of the condenser fins is necessary. The frequency of cleaning depends on the operating environment. We recommend a visual inspection of the condenser be made monthly after initial installation. After several months, the cleaning frequency will be established.

Units with PD and TU pumps have a strainer. If debris is in the system, the strainer will prevent the material from being drawn into the pump and damaging the pump vanes.

After initial installation, the strainer may become clogged. The strainer must be cleaned after the first week of installation. After this first cleaning, a monthly visual inspection is recommended. After several months, the frequency of cleaning will be established.

Before cleaning the strainer, disconnect the power cord from the power source and drain the reservoir.

For complete information, including troubleshooting procedures, please refer to the instruction manual.

Preface

Compliance

Products tested and found to be in compliance with the requirements defined in the EMC standards defined by 89/336/EEC as well as Low Voltage Directive (LVD) 73/23/EEC can be identified by the CE label on the rear of the unit. The testing has demonstrated compliance with the following directives:

LVD, 73/23/EEC	Complies with UL 3101-1:93
EMC, 89/336/EEC	EN 55011, Class A Verification EN 50082-1:1992 IEC 1000-4-2:1995 IEC 1000-4-3:1994 IEC 1000-4-4:1995

For any additional information refer to the Letter of Compliance that shipped with the unit (Declaration of Conformity).

Unpacking

Retain all cartons and packing material until the unit is operated and found to be in good condition.

On units with a remote control box, the box is packed in a separate carton. Be sure to locate this separate carton; do not dispose of it by mistake.

If the unit shows external or internal damage, or does not operate properly, contact the transportation company and file a damage claim. Under ICC regulations, this is your responsibility.

Warranty

The unit has a warranty against defective parts and workmanship for one full year from date of shipment. Refer to the last page of this manual for complete warranty details.

After-sale Support

NESLAB is committed to customer service both during and after the sale. If you have questions concerning the operation of your unit or the information in this manual, contact our Sales Department. If your unit fails to operate properly or if you have questions concerning spare parts or Service Contracts, contact our Service Department.

Before calling, please refer to the serial number label on the rear of the case top to obtain the following information (see Section II, Description for the serial number label location):

- *BOM number* _____

- *Serial number* _____

Section I Safety

Warnings

Make sure you read and understand all instructions and safety precautions listed in this manual before installing or operating your unit. If you have any questions concerning the operation of your unit or the information in this manual, contact our Sales Department for assistance (see Preface, After-sale Support).

Performance of installation, operation, or maintenance procedures other than those described in this manual may result in a hazardous situation and may void the manufacturer's warranty.

Transport the unit with care. Sudden jolts or drops can damage the refrigeration lines.

Do not attempt to defeat any of the interlock switches or safety features built into the unit.

Observe all warning labels.

Never remove warning label.

Never operate damaged or leaking equipment.

Never operate the unit without cooling fluid in the fluid reservoir.

Make sure the unit is off before connecting or disconnecting the power cord or other cables.

Always turn off the unit and disconnect the power cord from the power source before performing any service or maintenance procedures, or before moving the unit.

Always empty the fluid reservoir before moving the unit.

Never operate equipment with damaged power cords.

Refer service and repairs to a qualified NESLAB technician.



In addition to the safety warnings listed above, warnings are posted throughout the manual. These warnings are designated by an exclamation mark inside an equilateral triangle with text highlighted in bold. Read and follow these important instructions. Failure to observe these instructions can result in permanent damage to the unit, significant property damage, or personal injury or death.

Section II General Information

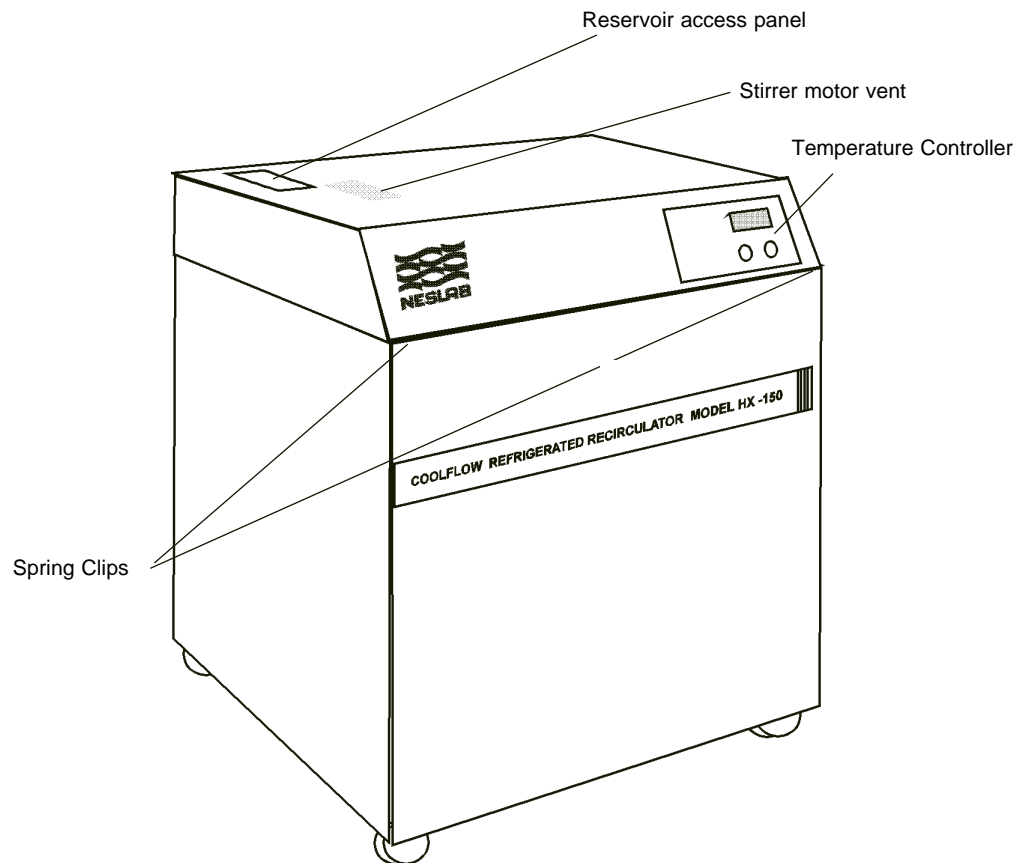
Description

The HX Series Recirculating Chiller is designed to provide a continuous flow of cooling fluid at a constant temperature and volume.

The unit consists of an air-cooled or water-cooled refrigeration system, a fluid reservoir, a fluid recirculation pump, and a temperature controller.

HX units are available with a large number of options. This manual explains how to install, operate, and maintain a "standard" HX unit. This manual also explains some of the available options. Supplemental manuals are supplied with units equipped with options not covered in this manual.

Throughout the manual, you will be asked to consult the unit's serial number label, or the pump identification label, or both, for specific information. The labels are located on the rear of the case top.



Specifications

	HX-75	HX-100	HX-150	
Temperature Range	+5°C to +35°C			
Temperature Stability	±0.1°C			
Unit Dimensions¹ (H x W x D) <i>Inches</i> <i>Centimeters</i>	35 ¾ x 23 ¼ x 18 ¾ 90.8 x 59.0 x 47.6	39 5/8 x 26 ¼ x 21 1/8 100.6 x 66.6 x 53.6		
Reservoir Volume <i>Gallons</i> <i>Liters</i>	5.0 19.0	8.0 30.3		
Shipping Weight <i>Pounds</i> <i>Kilograms</i>	261 118	300 136	320 145	
	HX-200	HX-300	HX-500	HX-750
Temperature Range	+5°C to +35°C			
Temperature Stability	±0.1°C			
Unit Dimensions^{1,2} (H x W x D) <i>Inches</i> <i>Centimeters</i>	45 7/8 x 33 ¾ x 25 ¼ 116.5 x 85.7 x 64.1	50 5/8 x 46 x 28 ¾ 128.3 x 116.8 x 73.0	63 ¾ x 46 x 29 162.0 x 116.8 x 73.6	
Reservoir Volume <i>Gallons</i> <i>Liters</i>	15.0 56.8	28.0 106.0	40.0 151.0	
Shipping Weight <i>Pounds</i> <i>Kilograms</i>	471 214	531 241	746 338	971 440

1. For additional dimensions see page 47.

2. HX-750 with a water-cooled refrigeration system has the same dimensions as the HX-500.

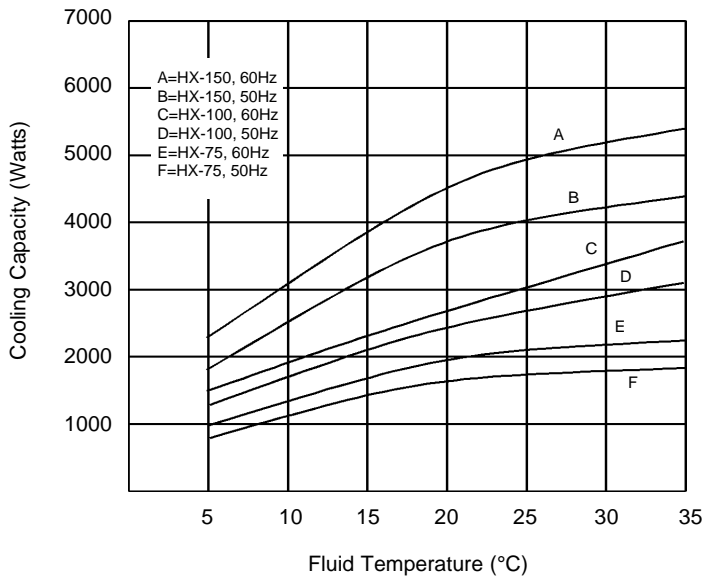
Cooling Capacity

Cooling capacity will vary depending on fluid temperature, ambient temperature, and cooling fluid.

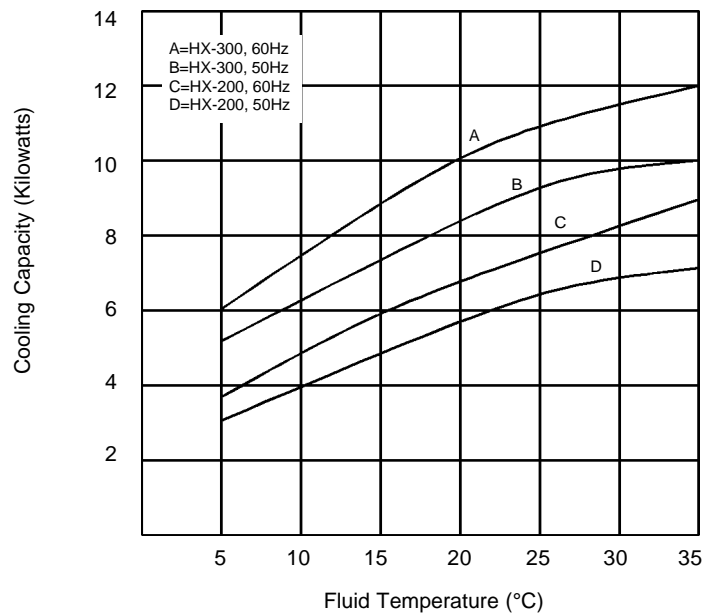
Cooling capacities for models HX-75 through HX-750 were obtained under the following conditions:

1. air-cooled unit operating at +20°C (+68°F) ambient temperature.
2. cooling fluid with specific heat of 1.0 was used for fluid temperatures from +5°C to +35°C.

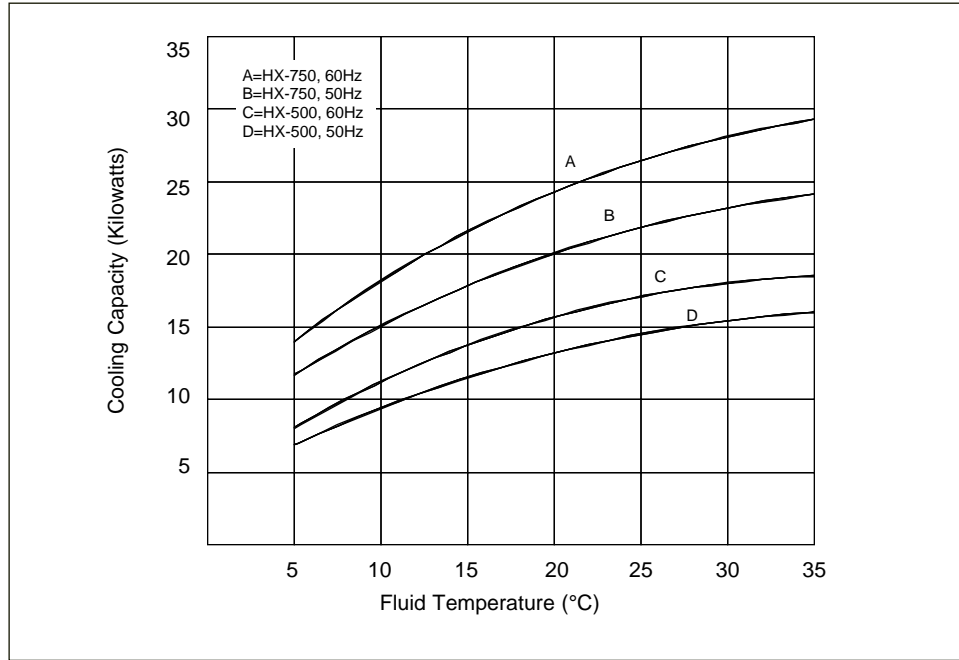
HX-75, 100, & 150



HX-200 & 300



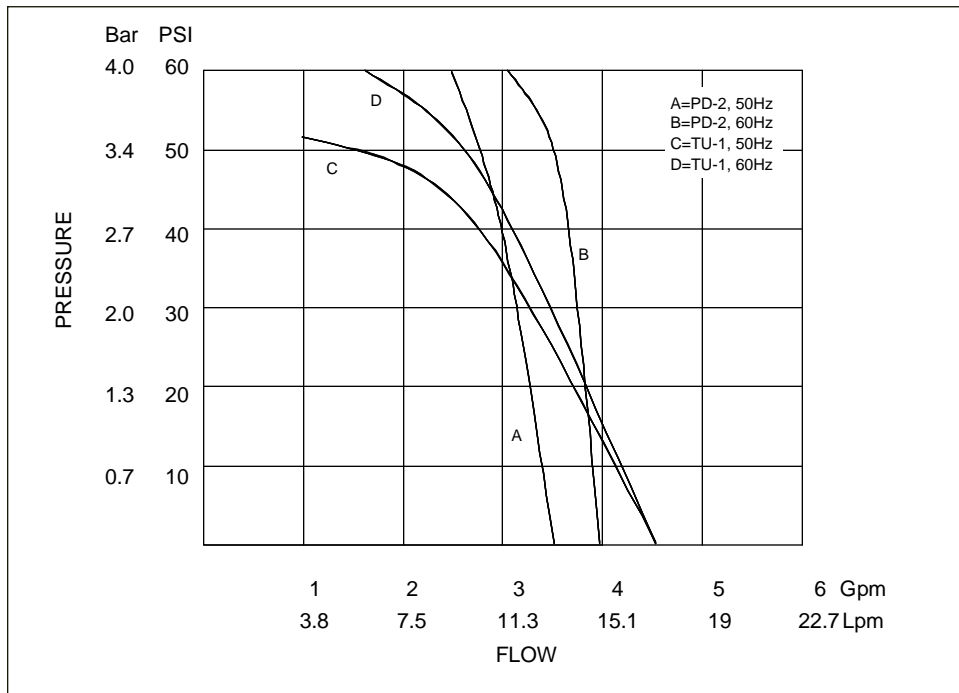
HX-500 & 750



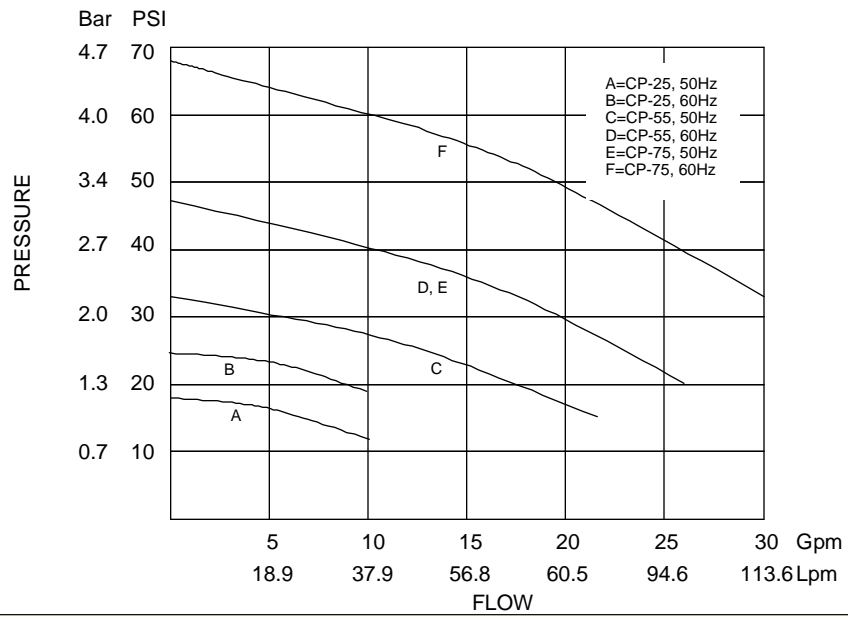
Pump Capacity

HX units are available with one of three standard pump types: positive displacement (PD), centrifugal (CP), and turbine (TU). Refer to the pump identification label on the rear of the case top or rear of analog temperature controller to identify the specific pump in your unit.

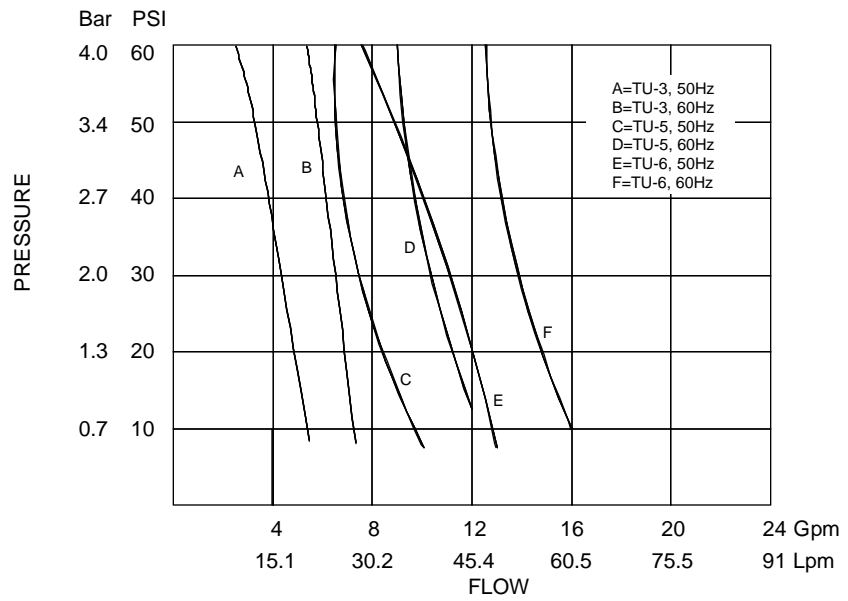
PD2 & TU1



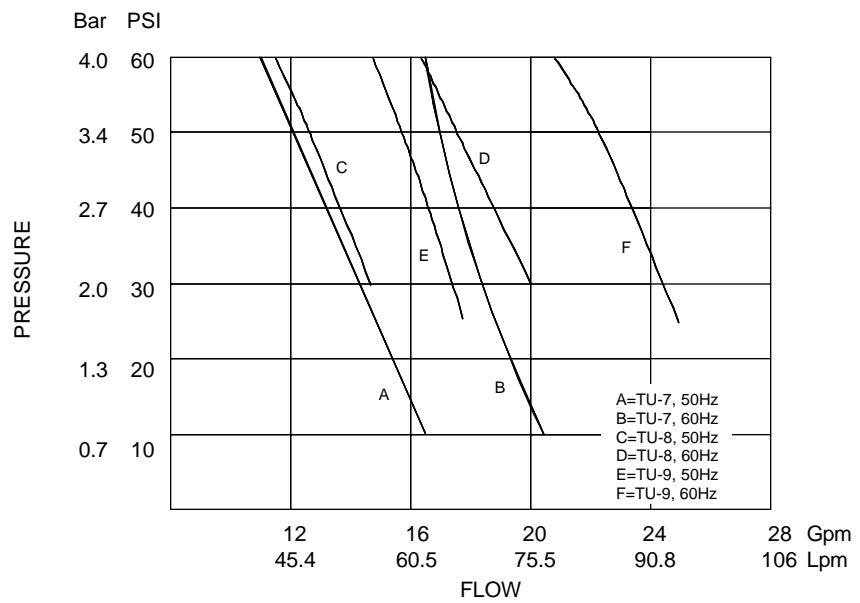
CP



TU-3, 5 & 6



TU-7, 8 & 9



Section III Installation

Site (Air-cooled Units)

The unit should be located in a laboratory or clean industrial environment where ambient temperatures are inside the range of +55°F to +95°F (+13°C to +35°C).

The unit will retain its full rated capacity in ambient temperatures to approximately +75°F (+24°C). Above +75°F, derate the cooling capacity 1% for every 1°F above +75°F, to a maximum ambient temperature of +95°F. In degrees Celsius, derate the cooling capacity 1% for every 0.5°C above +24°C, to a maximum ambient temperature of +35°C.



Never place the unit in a location where excessive heat, moisture, or corrosive materials are present.

The unit has an air-cooled refrigeration system. It must be positioned so the air intake and discharge are not impeded.

On models HX-75 through HX-150, air is drawn through the left side of the unit and discharged through the right and rear. A minimum clearance of 2 feet (0.6 meter) on these three sides is necessary for adequate ventilation.

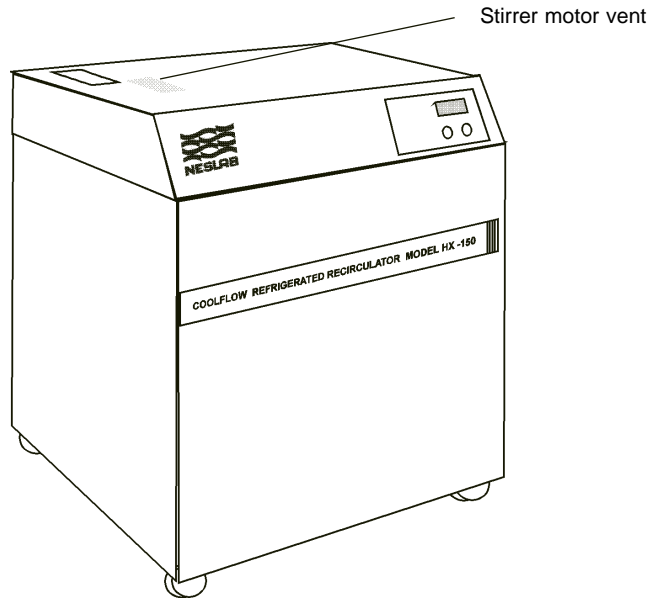
On models HX-200 — HX-750, air is drawn through the front of the unit and discharged through the side and rear. A minimum of 5 feet (1.5 meters) on all four sides of the unit is necessary for adequate ventilation.

In some applications where space is at a premium, the minimum ventilation clearance can be compromised. However, consult our Sales Department before positioning the unit in a location with less minimum clearance than listed above. Inadequate ventilation will cause a reduction in cooling capacity and, in extreme cases, compressor failure.

Excessively dusty areas should be avoided and a periodic cleaning schedule should be instituted (see Section VII, Condenser Cleaning).

On digital models HX-100 through HX-750 the stirrer motor is located under the case top. (Models HX-500 and HX-750 have two stirrer motors.) Heat generated by the stirrer motor is discharged through vents in the case top. Do not block the vents. A minimum clearance of 2 inches (5 centimeters) is necessary for adequate ventilation.

NOTE: Units with plate heat exchangers do not have stirrer motors.



Refer to the table below to determine the approximate amount of air intake required for the unit to retain its full rated capacity. If the air intake does not meet these standards, cooling capacity will be derated.

	HX-75	HX-100	HX-150	HX-200	
Air Intake					
<i>Cubic feet per minute</i>	600	710	1050	2000	
<i>Liters per minute</i>	17000	20100	29730	56640	
	HX-300		HX-500		HX-750
Air Intake					
<i>Cubic feet per minute</i>	1900		5000		5600
<i>Liters per minute</i>	53800		141750		158800

Site (Water-cooled units)

The unit should be located in a laboratory or clean industrial environment with easy access to a facility cooling water supply and a drain.

All units are equipped with castors for easy movement. This allows the unit to be placed in a small area, as long as there is ample space for the unit to be moved for access on all four sides. A minimum access clearance of 3 feet (1 meter) on two adjacent sides is recommended.

The facility cooling water supply must meet or exceed the requirements listed in the table shown on the next page for the unit to operate at its full rated capacity. If the facility cooling water does not meet these standards, the cooling capacity will be derated.

As the temperature of the cooling water supply increases, the required flow rate and pressure of the cooling water supply increases.

For example, with a model HX-150, if the temperature of the cooling water supply is +65°F, the flow rate must be at least 1.5 gallons per minute, with a pressure differential of at least 3.5 PSI. However, if the temperature of the cooling water supply is +85°F, the flow rate must be at least 4.0 gallons per minute, with a pressure differential of at least 10 PSI.

If the unit is being used with a building water supply, the back pressure of the drain must be less than the supply pressure.

A water regulating valve, located in the TAP WATER line, regulates the flow rate of the cooling water supply as it enters the unit. The valve regulates the flow rate based on the heat load. Flow through the unit stops automatically when the unit is shut off.

On digital models HX-100 through HX-750 the stirrer motor is located under the case top. (Models HX-500 and HX-750 have two stirrer motors.) Heat generated by the stirrer motor is discharged through vents in the case top. Do not block the vents. A minimum clearance of 2 inches (5 centimeters) is necessary for adequate ventilation. See illustration on previous page.

NOTE: Units with plate heat exchangers do not have stirrer motors.

Temperature of cooling water supply				
	+55°F (+13°C)	+65°F (+18°C)	+75°F (+24°C)	+85°F (+29°C)
HX-75				
Flow Rate				
<i>Gallons per minute</i>	0.7*	1.0	1.5	3.0
<i>Liters per minute</i>	2.8*	3.7	5.7	11.4
Pressure Drop				
<i>PSI</i>	1.5*	2.0	3.5	8.0
<i>Bar</i>	0.10*	0.13	0.24	0.55
HX-100				
Flow Rate				
<i>Gallons per minute</i>	1.0*	1.5	2.0	3.5
<i>Liters per minute</i>	3.7*	5.7	7.6	13.2
Pressure Drop				
<i>PSI</i>	2.0*	3.5	5.0	10.0
<i>Bar</i>	0.13*	0.24	0.34	0.69
HX-150				
Flow Rate				
<i>Gallons per minute</i>	1.0*	1.5	2.5	4.0
<i>Liters per minute</i>	3.7*	5.7	9.5	15.1
Pressure Drop				
<i>PSI</i>	2.0*	3.5	6.0	10.0
<i>Bar</i>	0.13*	0.24	0.41	0.69
HX-200				
Flow Rate				
<i>Gallons per minute</i>	1.8*	2.5	3.5	6.0
<i>Liters per minute</i>	6.8*	9.5	13.2	22.7
Pressure Drop				
<i>PSI</i>	5.0*	6.0	7.0	18.0
<i>Bar</i>	0.34*	0.41	0.48	1.24
HX-300				
Flow Rate				
<i>Gallons per minute</i>	2.5*	4.0	6.5	11.0
<i>Liters per minute</i>	9.5*	15.1	24.6	41.6
Pressure Drop				
<i>PSI</i>	6.0*	8.0	13.5	25.0
<i>Bar</i>	0.41*	0.55	0.93	1.72
HX-500				
Flow Rate				
<i>Gallons per minute</i>	3.5	5.0	8.0	16.0
<i>Liters per minute</i>	13.2	18.9	30.3	60.6
Pressure Drop				
<i>PSI</i>	13.0	17.0	23.0	57.0
<i>Bar</i>	0.89	1.17	1.58	3.93
HX-750				
Flow Rate				
<i>Gallons per minute</i>	6.0	8.0	12.5	16.6
<i>Liters per minute</i>	22.7	30.3	47.3	62.8
Pressure Drop				
<i>PSI</i>	14.0	20.0	28.5	40.0
<i>Bar</i>	0.96	1.38	1.96	2.76

*Estimated values

Electrical Requirements

Refer to the table below to determine electrical requirements of your unit. Verify the requirements by reviewing the ratings listed on the serial number label on the rear of the case top or rear of analog temperature controller.

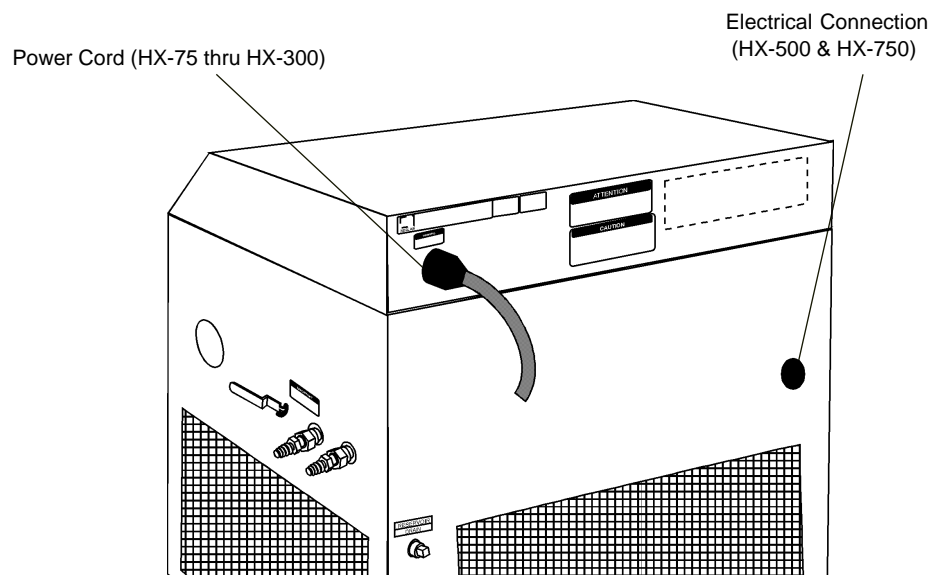
	HX-75		HX-100		HX-150	
Volts	208/230		220/240			
Hertz	60		50			
Phase	1		1			
Plug	NEMA L6-30P or L6-20P					
	HX-200		HX-300		Hx-500	HX-750
Volts	208/230	200/220	380/420		208/230	380/420
Hertz	60	50	50		60	50
Phase	3	3	3		3	3
Plug	NEMA L15-30P or L16-20P				N/A	

Make sure the voltage of the power source agrees with the unit's voltage and frequency rating. The unit is designed to tolerate deviations of $\pm 10\%$ from the rated line voltage.

Models HX-75 through HX-300 have an 8 foot (2.4 meter) power cord installed on the unit at the time of shipment.

NOTE: Custom units equipped with heaters may not have a power cord. See Section VI, Special Features.

NOTE: 380V WYE connections are shown in Appendix B.





The unit construction provides extra protection against the risk of electric shock by grounding appropriate metal parts. The extra protection may not function unless the power cord is connected to a properly grounded outlet. It is the user's responsibility to assure a proper ground connection is provided.

Models HX-500 and HX-750 are not equipped with a power cable. Installation of the cable is the user's responsibility. Wire the unit in conformance to local, state, and federal electrical codes. Double check all wiring to make sure it is properly connected and protected from the elements.

Models HX-200 through HX-750 are equipped with a compressor crankcase heater. The crankcase heater warms the oil in the compressor and prevents refrigerant from mixing with the oil. Before start up, the unit must be connected to its power source for at least 12 hours. This allows time for the oil to be heated and separate from the refrigerant.

Plumbing Requirements

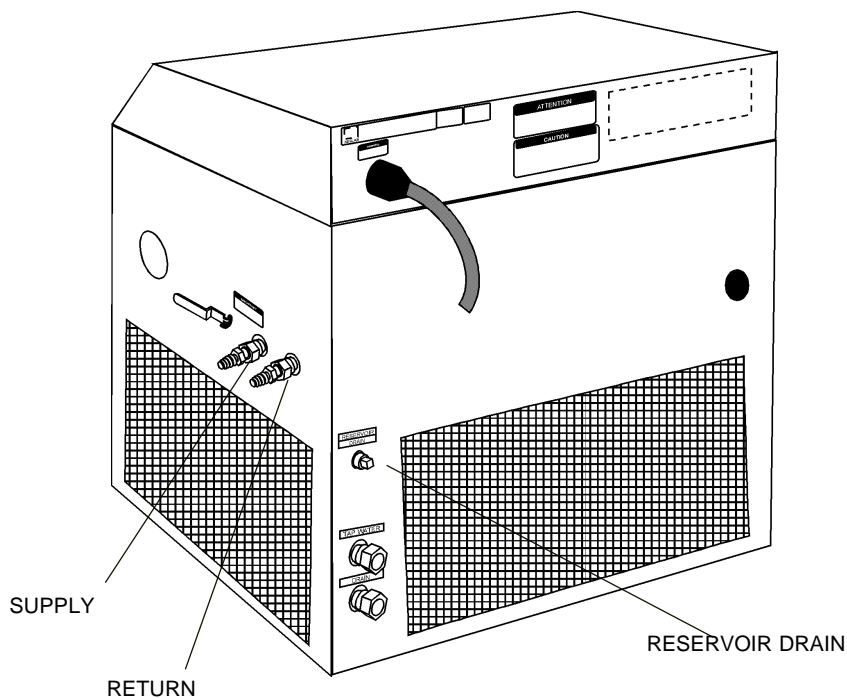
Air-cooled and water-cooled units

Before installing the unit to an instrument that previously used tap water as a cooling fluid, flush the instrument several times to remove any rust or scale that has built up. Consult the manufacturer of the instrument for a cleaning fluid recommendation.

The plumbing fittings used to connect the HX to the instrument being cooled are located on the right side of the unit (labelled SUPPLY and RETURN). These connections are $\frac{3}{4}$ inch FPT.

Remove the protective plugs from the SUPPLY and RETURN connections. Connect the SUPPLY fitting to the inlet of the instrument being cooled. Connect the RETURN fitting to the outlet of the instrument being cooled.

The RESERVOIR DRAIN connection on the rear of the unit is a $\frac{1}{2}$ inch FPT fitting connected internally to the unit's fluid reservoir. This fitting provides a means for draining the reservoir. The unit is shipped with a $\frac{1}{2}$ inch MPT plug installed in this fitting. Remove the plug to drain the reservoir.



Two plumbing adapters ($\frac{3}{4}$ inch MPT x $\frac{5}{8}$ inch hose) are included with the unit. If the unit is being plumbed to the instrument being cooled using flexible tubing, install the adapters in the SUPPLY and RETURN plumbing ports. To prevent leaking, wrap the threads of the adapters with Teflon[®] sealing tape before installing them in the plumbing ports. The adapters will accept $\frac{1}{2}$ or $\frac{5}{8}$ inch ID flexible tubing.

If the unit is "hard plumbed" to the instrument being cooled or to the cooling water supply, damage can occur if the unit is bumped or jolted from its site. Provisions should be made to prevent the unit from being moved after installation. Once the unit is plumbed, secure the locking castors on the unit's base. If the unit is located in a heavy traffic area where the possibility of collision is imminent, it may be necessary to secure the unit to the site using blocks or mounting brackets.

Flexible tubing, if used, should be heavy wall or reinforced construction. All tubing should be rated to withstand 110 psi at +35°C. Make sure all tubing connections are securely clamped. Avoid running tubing near radiators, hot water pipes, etc. If substantial lengths of tubing are necessary, insulation may be required to prevent loss of cooling capacity.

Tubing and insulation are available from NESLAB. Contact our Sales Department for more information (see Preface, After-sale Support).

It is important to keep the distance between the unit and the instrument being cooled as short as possible, and to use the largest diameter tubing practical. Tubing should be straight and without bends. If diameter

reductions must be made, they should be made at the inlet and outlet of the instrument being cooled, not at the HX.

If substantial lengths of connecting tubing are required, they should be pre-filled with cooling fluid before connecting them to the unit.

Water-cooled units

The plumbing connections used to connect the water-cooled condenser in the HX to the facility cooling water supply are located at the rear of the unit (labelled TAP WATER and DRAIN). On models HX-75 through HX-300, these fittings are ½ inch FPT. On models HX-500 and HX-750, these fittings are 1 inch FPT.

Remove the plastic protective plugs from the TAP WATER and DRAIN connections. Connect the TAP WATER fitting to the facility cooling water supply. Connect the DRAIN fitting to a drain.

Fluids

The selected cooling fluid must have a viscosity of 50 centistokes or less at the lowest operating temperature.



If your unit is equipped with a plate heat exchanger, do not use 100% water as a recirculating fluid. Due to the physical nature of a plate heat exchanger, and its response to temperature changes, using 100% water may cause the plate heat exchanger to rupture.



Never use flammable or corrosive fluids with this unit. Distilled and deionized water may be aggressive and cause material corrosion. Please contact NESLAB before subjecting this unit to prolonged exposure to distilled or deionized water.

Tap water is the recommended fluid for operation from +8°C to +35°C.

Below +8°C, a non-freezing solution is required. A 50/50 mixture, by volume, of water and laboratory grade ethylene glycol is suggested.



Do not use automobile anti-freeze. Commercial anti-freeze contains silicates that can damage the pump seals. Use of automobile anti-freeze will void the manufacturer's warranty.

For units with extended temperature ranges above +35°C, tap water is the recommended fluid up to +80°C. Above +80°C, the user is responsible for the fluid(s) used.

Water Quality Recommendations

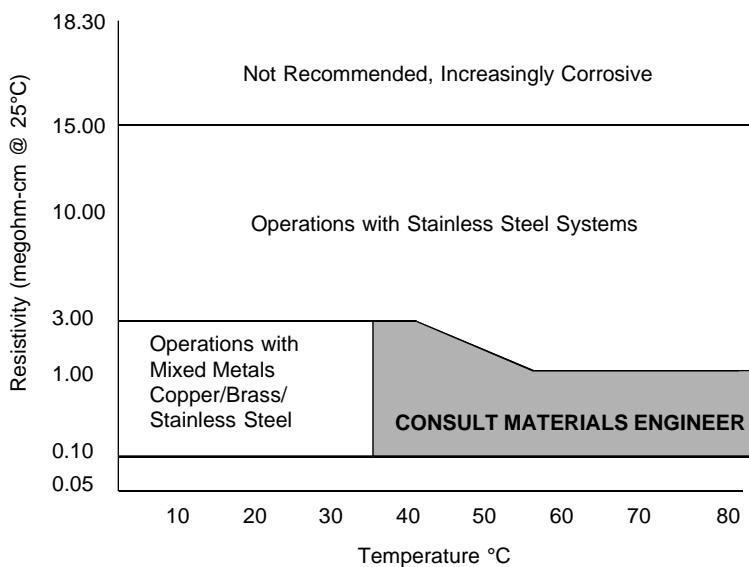
Unfavorably high total ionized solids (TIS) can accelerate the rate of galvanic corrosion. These contaminants can function as electrolytes which increase the potential for galvanic cell corrosion and lead to localized corrosion such as pitting which can be observed at the studs and on the outside surface of cooling coils. Eventually, the pitting will become so extensive that the coil will leak refrigerant into the water reservoir.

As an example, raw water in the United States averages 171 ppm (as NaCl). The recommended level for use in a water system is between 0.5 to 5.0 ppm (as NaCl).

Recommendation: Initially fill the tank with distilled/deionized water. Do not use untreated tap water as the total ionized solids level may be too high.

Maintain this water quality at a resistivity of between 1 to 10 megohm-cm (compensated at 25°C) by using a purification system. Although the initial fill may be as high as 10 megohm-cm (compensated at 25°C), the desired level for long time usage is 1 to 3 megohm-cm (compensated at 25°C).

The above two recommendations will reduce the electrolytic potential of the water and prevent or reduce the galvanic corrosion observed.



Filling Requirements

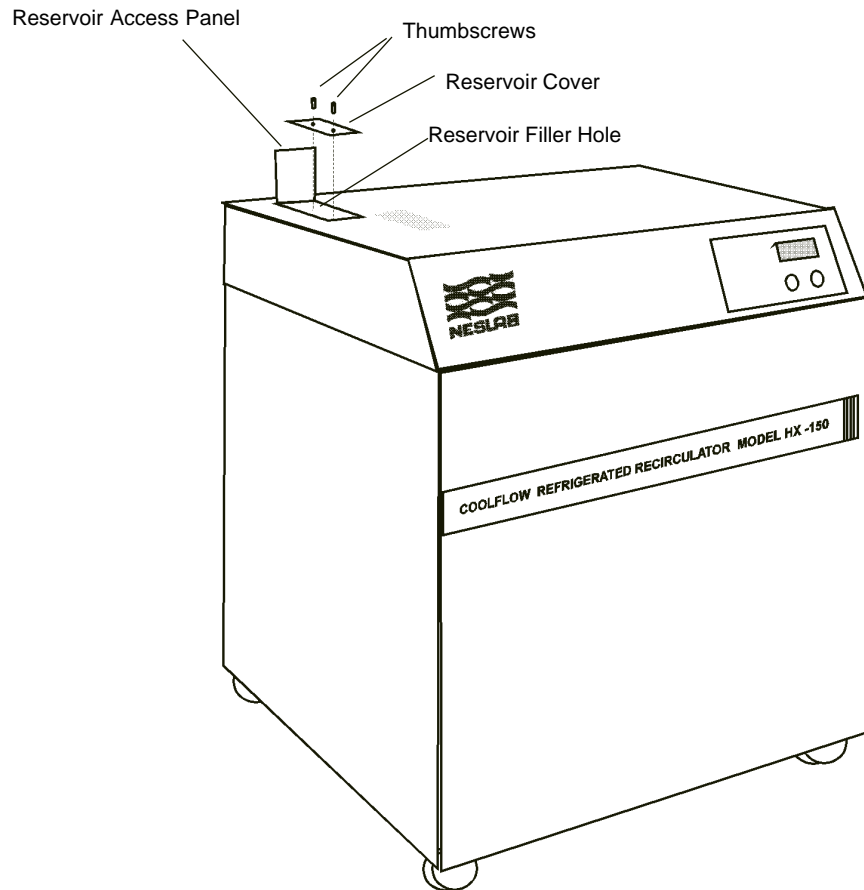
The reservoir access panel is located at the left rear corner of the case top, below an access panel. To open the access panel, slide the latch back (towards the rear of the unit) and lift.

Loosen the thumbscrews and remove the reservoir cover.

Fill the fluid reservoir with cooling fluid to within 1 inch of the top.

The fluid capacity of the instrument being cooled and the recirculation lines may be significant. To prevent the lowering of the fluid level in the reservoir below the operating level, have extra cooling fluid on hand to keep the reservoir filled to within 1 inch of the top.

When the recirculating system is full, replace the reservoir cover. Close the access panel.



Section IV Temperature Controllers

Temperature Controllers

The standard temperature controllers available with HX units are: Digital (Panel mounted or Remote) and Digital with Interlock. This section explains the installation (if applicable) and operation of the controllers.

Refrigeration Control

On “standard” units, the refrigeration compressor runs continuously, unless the fluid temperature exceeds +40°C. However, on some “custom” units equipped with an extended temperature range, the compressor may operate at higher temperatures. A hot gas by-pass system is used to maintain constant temperature in all units.

The Idle and Cool indicators, located on the control panel, indicate the status of the refrigeration system. The Idle indicator is lit when the unit is in the hot gas by-pass mode. The Cool indicator is lit when the refrigeration system is removing heat from the cooling fluid. As the fluid temperature approaches the temperature setpoint, the indicators cycle on and off to indicate the duty cycle of the system. The unit can be in Cool or Idle, but never both at the same time. A balance between Cool and Idle controls the temperature.

Start Up

Before starting, check all electrical and plumbing connections and make sure the recirculating system (the HX, your application, and the recirculation lines) has been properly filled with cooling fluid. Also, make sure the flow control valve is fully closed (see Section V, Flow Control). For CE Mark units ensure the circuit breaker on the right hand side of the unit is on.

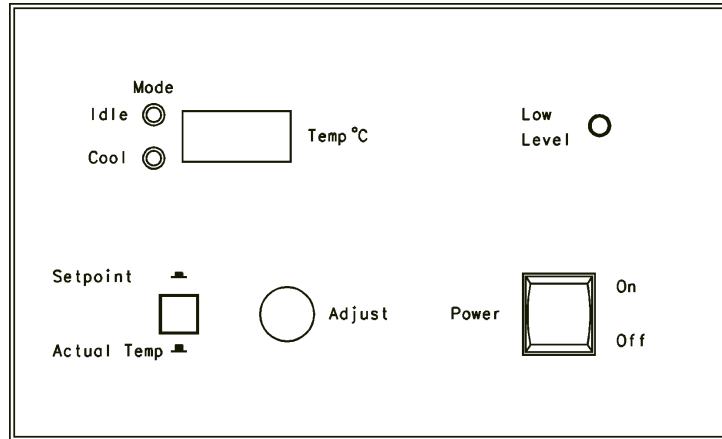
For water-cooled units — ensure that the facility water is turned on.

Models HX-200 through HX-750 are equipped with a compressor crankcase heater. The crankcase heater warms the oil in the compressor and prevents refrigerant from mixing with the oil. Before start up, the unit must be connected to its power source for at least 12 hours. This allows time for the oil to be heated and separate from the refrigerant.

To start the unit, place the Power On/Off switch in the On position. The pump and refrigeration system will start. The Temp°C display will indicate the reservoir fluid temperature. After starting recheck the fluid level, a "top off" may be needed. To shut the unit off, place the Power On/Off switch in the Off position.

When the unit is shut off, wait approximately five minutes before restarting. This allows time for the refrigeration pressures to equalize. If the pressures are not allowed to equalize, the compressor will short-cycle (clicking sound) and no cooling will occur.

Digital (Panel mounted)



Digital Temperature Controller

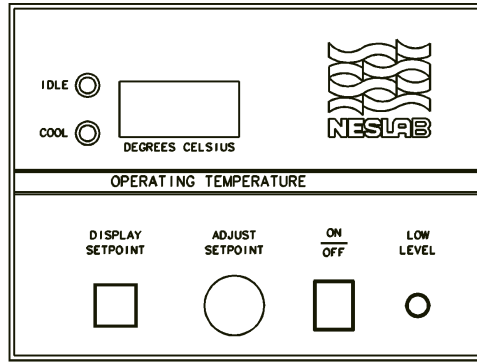
Temperature Adjustment

To display the temperature setpoint, press and hold the Setpoint/Actual Temp button. To adjust the setpoint, press and hold the Setpoint/Actual Temp button and turn the Adjust dial until the desired temperature setpoint is indicated on the Temp°C LED display. Once the setpoint is adjusted, release the Setpoint/Actual Temp button. The Temp°C LED display will indicate the temperature of the fluid in the reservoir.

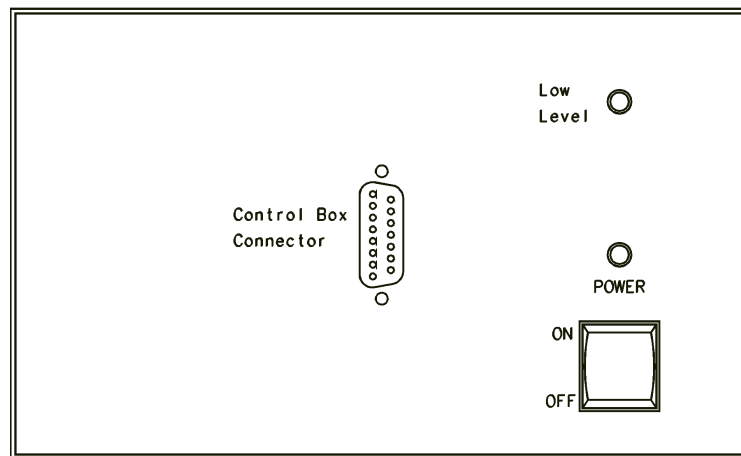
NOTE: Inadvertent movement of the Adjust dial will result in a change in the setpoint. The change will not be immediately reflected on the Temp°C display unless the Setpoint/Actual Temp button is pressed. The display will eventually change as the unit responds to the new setpoint

Low Level Warning

The Low Level indicator is connected to a float switch in the reservoir. The indicator warns the user of a low cooling fluid level in the reservoir. A low fluid level condition occurs when the cooling fluid in the reservoir drops below the operating level. The indicator serves only as a warning. The unit will not shut down as a result of a low fluid level condition.



Digital Temperature Controller
(remote)



Digital Temperature Controller

Installation

Controller dimensions are 4³/₄" x 7³/₄" x 3³/₄" (H x W x D).

Connect the Digital remote box to the unit by securing the connector on the remote box's cable to the Control Box Connector receptacle on the operator panel on the front of the case top.

Start Up

To start the unit, place the ON/OFF switch on the operator panel of the unit in the ON position and press the ON/OFF button on the remote box. The pump and refrigeration system will start, the POWER indicator on the operator panel will light and the DEGREES CELSIUS display on the remote box will indicate the fluid temperature. Either ON/OFF switch will shut the unit off.

Temperature Adjustment

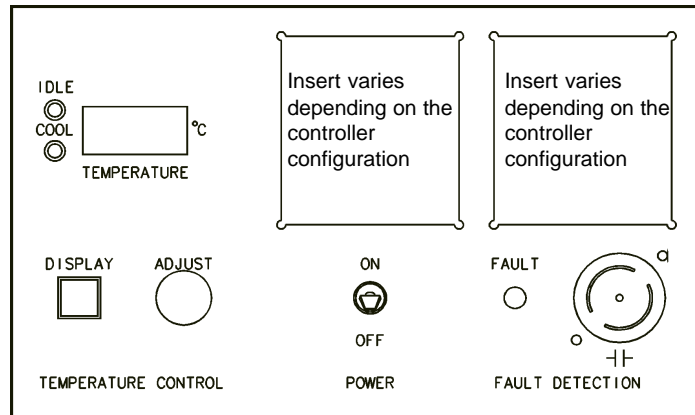
To display the temperature setpoint, press and hold the DISPLAY/SETPOINT button. To adjust the setpoint, press and hold the DISPLAY/SETPOINT button and turn the ADJUST SETPOINT dial until the desired temperature setpoint is indicated on the DEGREES CELSIUS LED display. Once the setpoint is adjusted, release the DISPLAY/SETPOINT button. The DEGREES CELSIUS LED display will indicate the temperature of the fluid in the reservoir.

NOTE: Inadvertent movement of the ADJUST SETPOINT dial will result in a change in the setpoint. The change will not be immediately reflected on the DEGREES CELSIUS display unless the DISPLAY/SETPOINT button is pressed. The display will eventually change as the unit responds to the new setpoint.

Low Level Warning

The LOW LEVEL indicator is connected to a float switch in the reservoir. The indicator warns the user of a low cooling fluid level in the reservoir. A low fluid level condition occurs when the cooling fluid in the reservoir drops below the operating level. The indicator serves only as a warning. The unit will not shut down as a result of a low fluid level condition.

Digital with Interlock



Digital with Interlock Temperature Controller

Description

The Digital with Interlock temperature controller is a Digital temperature controller with up to four monitoring options: low temperature, high temperature, low fluid level, and low flow. The controller can be built with any combination of these four monitors.

Temperature Adjustment

To display the temperature setpoint, press and hold the DISPLAY button. To adjust the temperature setpoint, press and hold the DISPLAY button and turn the ADJUST dial until the desired temperature setpoint is indicated on the TEMPERATURE °C LED display. Once the setpoint is adjusted, release the DISPLAY button. The TEMPERATURE °C display will indicate the temperature of the fluid in the reservoir.

NOTE: Inadvertent movement of the ADJUST dial will result in a change in the setpoint. The change will not be immediately reflected on the TEMPERATURE °C display unless the DISPLAY button is pressed. The display will eventually change as the unit responds to the new setpoint.

Fault Response

Controllers with a START switch are configured to shut off in the event that a fault occurs. Controllers NOT equipped with a START switch will allow the unit to continue to operate if a fault occurs. This option is available for customers who are willing to accept the risk of damage to the unit in order to continue to provide cooling fluid to the instrument being cooled.

With either controller configuration, the relay contacts connected to the controller receptacle will open and the FAULT indicator will light if a fault occurs. The cause of the fault must be identified and corrected before the unit can be restarted.

START Switch

If the controller is equipped with a START switch, a fault will cause the unit to shut down. Press the START switch to restart the unit after the fault has been corrected. If the fault has not been corrected, the unit will not start and the FAULT indicator will light when the START switch is pressed.

Temperature Monitors

The optional high and low temperature monitors are connected to sensors that monitor the temperature of the cooling fluid as it exits the reservoir. The monitors protect the system from exposure to excessively hot or cold cooling fluid. A temperature fault occurs when the fluid temperature exceeds the set temperature limit.

To adjust either temperature monitor, turn the appropriate calibrated dial to the desired temperature limit.

Low Fluid Level Monitor

The low fluid level monitor is connected to a float switch in the reservoir. If the controller is equipped with a LOW LEVEL indicator, the low level monitor is not connected to the fault circuit. The indicator will light if the reservoir cooling fluid drops below the operating level. The indicator serves only as a warning. A fault will not occur as a result of a low level condition.

If the controller is NOT equipped with a LOW LEVEL indicator, the low level monitor is connected to the fault current. A fault will occur if the reservoir cooling fluid level drops below the operating level.

Low Flow Monitor

The optional low flow monitor is connected to a flow switch in the RETURN line. A low flow fault occurs when the flow rate of the returning cooling fluid drops below 0.3 gallons per minute (1.0 liters per minute).

When starting a unit with a controller equipped with both a low flow monitor and a START switch, the START switch must be held in the ON position until the flow switch “closes” (2 or 3 seconds). If time is not allowed for the flow switch to close, the unit will stop when the START switch is released.

Interlock Relay Contacts

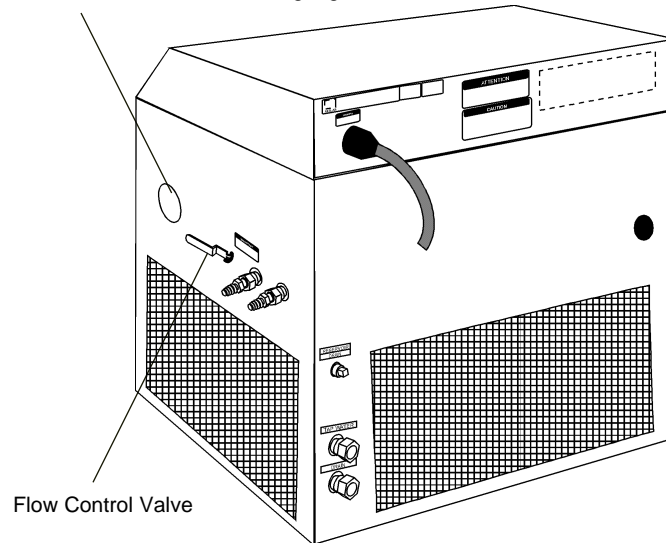
A set of contacts are connected to a receptacle on the operator panel. The contacts are rated 15A, 125V. This is not a power inlet or outlet. The receptacle is isolated from the circuitry. Its ground pin is connected to the chassis. The contacts are normally open: they are closed when the unit is running normally (no faults present), and they are open when the unit is off or when a fault occurs.

Section V Operation

Flow Control

The flow control handle is connected to a valve that controls the flow rate of the cooling fluid to the instrument being cooled. The handle is located on the right side of the unit and is labelled RECIRCULATING FLOW CONTROL.

RECIRCULATING PRESSURE gauge



Flow Control Valve

When the handle is in the “+” position, the valve is open and all possible cooling fluid is supplied to the instrument being cooled. When the handle is in the “-” position, the valve is closed and no cooling fluid is supplied to the instrument being cooled. When the handle is between these two positions, the flow rate of the cooling fluid is between full flow and no flow. Use a flow meter on the SUPPLY line to adjust the desired flow rate.

Make sure the flow control handle is closed before starting the unit. Once the unit is running, use the handle to slowly open the valve until the desired flow rate is adjusted.

On units equipped to detect a low flow condition (Digital with Interlock temperature controllers equipped with a low flow monitor), the flow control valve must be opened slightly to allow fluid to circulate through the flow switch that monitors the flow rate. A flow rate of more than 0.3 gallons per minute (1.0 liters per minute) is necessary. If the flow is completely shut off, or if flow is not adequate, a low flow fault will occur and the unit will not start.



Never “crank” the valve wide open from the closed or slightly open position.

Pressure Gauge

The RECIRCULATING PRESSURE gauge is located next to the flow control handle. The gauge indicates the operating pressure of the system.

Pressure Relief Valve (PD and TU Pumps Only)

Units with a PD-2 or any TU type pump have an adjustable pressure relief valve. Refer to the pump identification label on the rear of the case top or rear of analog controller to identify the specific pump in your unit.

The pressure relief valve establishes the maximum operating pressure of the unit. If the pressure of the fluid leaving the pump exceeds the valve setting, the relief valve will bypass the fluid within the unit to relieve the pressure. The valve does not determine the actual operating pressure; the operating pressure of the system is determined by the back pressure of the connected equipment and the setting of the flow control valve. If adjustment seems necessary, consult our Service Department for assistance.

Before calling, refer to the serial number label on the rear of the case top to obtain the following:

- *unit part number*
- *unit serial number*

High Pressure Cutout (Water-Cooled Units Only)

Should the unit's refrigeration discharge pressure become too high the high pressure cutout will activate and shut down the unit. High pressures can be caused by a lack of cooling water to the compressor or debris in the refrigeration lines.

Once the cause of the problem has been identified and corrected you must manually reset the cutout. The cutout location depends on the size of your unit. On the HX-75, it is behind the right side panel, on the HX-100 and HX-150 it is behind the left side panel, and on the HX-200 through HX-750 it is behind the rear panel.

Locate the white reset switch on the high pressure cutout. Press in on the switch until a "click" is heard. If the reset does not "click" the cutout was not activated and the unit shut down occurred for another reason.

Section VI Special Features

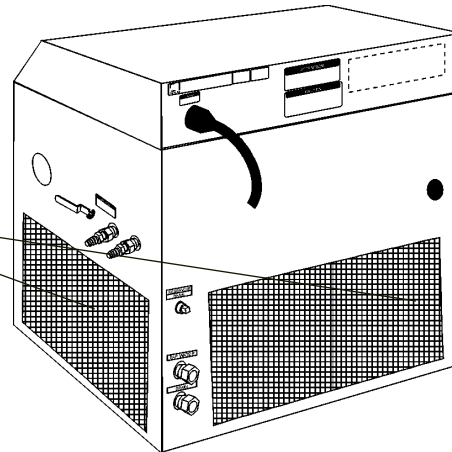
Pump Motor Overload Protector

Refer to the serial number label for the specific electrical requirements of your unit; specifically, identify the phase requirements of your unit.

The pump motor overload protector prevents the pump motor from exposure to excessive current. If an overload fault occurs, due, for example, to excessive pressure or flow, or excessive ambient temperature, the overload protector will shut off the pump motor. The overload protector will automatically reset after approximately one to two minutes.

If a fault occurs, a red lamp on the protector enclosure will light while the pump motor is off. The lamp goes out once the protector resets.

The pump motor overload protector enclosure is located directly under the fluid reservoir. It is at the left rear corner for HX200s and HX300s units. It is at the side access panel for HX500s and HX750s units.



The unit's fault response also varies depending on the unit's configuration.

If the unit has a Digital temperature controller and a single phase pump motor, the unit will continue to run if an overload fault occurs. The pump will restart as soon as the protector resets.

If the unit has a Digital controller and a three phase pump motor, the pump and refrigeration system will both shut down until the protector resets.

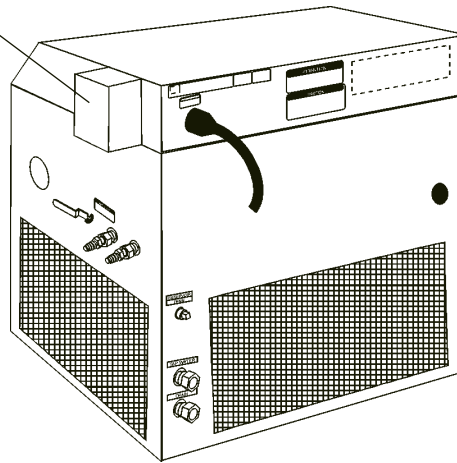
If the unit has a Digital with Interlock temperature controller with a low flow monitor, the unit will shut down due to a low flow fault. The unit must be manually restarted after the protector resets.

The overload protector can be adjusted to require manual resetting after an overload fault. If you are unsure of the phase of the pump motor in your unit, contact our Service Department (see Preface, After-sale Support).

Heater Package (Optional)

The heater package option consists of an immersion heater in the unit's fluid reservoir, a high temperature limit device, a solid state zero-crossing relay, a heater ENABLE/DISABLE switch and a FAULT indicator. The ENABLE/DISABLE switch and the FAULT indicator are located on a small control box appended to the right side of the case top. The FAULT indicator will light if the high temperature limit device is tripped. The high temperature limit device will disconnect power to the heater if the heater surface temperature exceeds a preset limit.

Heater Package Control Box (Typical)



With the ENABLE/DISABLE switch set to ENABLE, the heater will cycle on and off under the control of the temperature controller. With the switch in the DISABLE position, the heater will remain off.

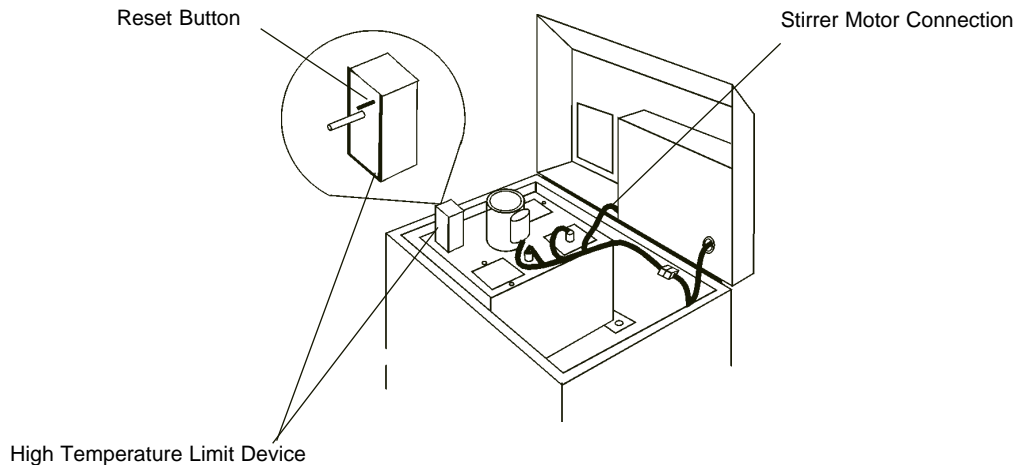
The heater high temperature limit device senses the surface temperature of the heater. If the heater temperature becomes too high, the limit device opens a mechanical relay to remove power from the heater.

The heater surface temperature may operate several degrees higher than the reservoir fluid. The limit device is factory set to a temperature above the upper limit of the temperature controller's range.



For personal safety and equipment reliability, the following procedure must only be performed by a qualified technician. Contact our Service Department for assistance (see Preface, After-sale Support).

To reset a tripped temperature limit device, lift and open the case top. The case top is secured to the unit base by a hinge between the case top and the base (along the rear of the unit), and by two spring clips located at the front corners, see page 7. To gain access to the temperature limit device, disengage the spring clips with a flat bladed screw driver and lift the front of the case top and tilt it back. A support brace, located on the right side of the inner case, will stop and support the case top.



You must identify and correct the fault before restarting the unit.

The protection device and the heater power connections are located in a small stainless steel box on top of the fluid reservoir. The protection device has a reset button and a temperature limit adjustment shaft. Press the reset button to restore operation.

Some units equipped with heaters do not have a power cable. Installation of the cable is your responsibility. Wire the unit in conformance to local, state and federal electrical codes. Double check all wiring to make sure it is properly connected and protected from the elements.



The unit construction provides extra protection against the risk of electric shock by grounding appropriate metal parts. The extra protection may not function unless the power cord is connected to a properly grounded outlet. It is your responsibility to assure a proper ground connection is provided. For personal safety and equipment reliability, the following procedure should only be performed by a qualified technician.

To access the power cable connection box and install the cable:

- Lift the unit's bonnet.
- Remove the panel under the right half of the bonnet by removing the screws and the stirrer motor connection. (The stirrer motor connection is located at the lower left corner of the bonnet, see illustration above.)
- Remove the plastic plug on the rear of the bonnet. We recommend that you install an electrical conduit in place of the plastic plug.
- Insert your cable through the conduit.
- Locate the connection box and connect your cable to L1 and L2 (both connections are labeled) and to the ground stud (not labeled).
- Replace the panel and stirrer motor connection.

Remote Condenser (Optional)

Units with the optional remote air-cooled condenser are equipped with high and low refrigeration pressure monitors. The monitors are connected internally to a pressure gauge that monitors refrigeration pressure at the suction side of the compressor. The monitors protect the refrigeration system from operating under excessively high and low refrigeration pressures. A pressure fault occurs when the refrigeration pressure exceeds the set pressure limit.

The status of the monitors is indicated by the COMPRESSOR LOW PRESSURE and COMPRESSOR HIGH PRESSURE indicators located on the operator panel.

In the event of either a low or high refrigeration pressure fault, the unit will shut down. The unit must be manually restarted after the cause of the fault has been identified and corrected. If both indicators are lit simultaneously, an interruption in the main power supply has occurred.

Nitrogen Purge (Optional)

Units equipped with nitrogen purge valves are designed to accept a constant flow of dry nitrogen into the reservoir. The nitrogen blankets the cooling fluid reducing fluid evaporation.

Remove the reservoir cover by removing the screws. Fill the reservoir with fluid. Replace the reservoir cover and screws. Connect the nitrogen line to the valve on the reservoir cover.

A pressure regulator, set to 0.5 psig (0.35 kg/cm³) or lower, should be used to prevent fluid overflow.

Particulate Filters (Optional)

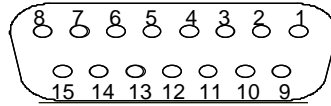
Some custom units are fitted with particulate filter assemblies attached to the supply side of the recirculation water. The frequency for cleaning/changing the filter depends on your usage. Should the unit's performance be degraded, check the filter.

Filters are available from NESLAB, contact our Customer Service Center. Before calling refer to the serial number label on the rear of the unit to obtain the following information:

- unit serial number
- unit part number

15 pin Accessory Connector (Optional)

Units with digital controllers may be modified with a 15 pin accessory connector. To enable the connector slide the LOCAL/REMOTE switch on the temperature controller to the REMOTE position. The pin out information is listed below.



15 pin D-subminiature female receptacle

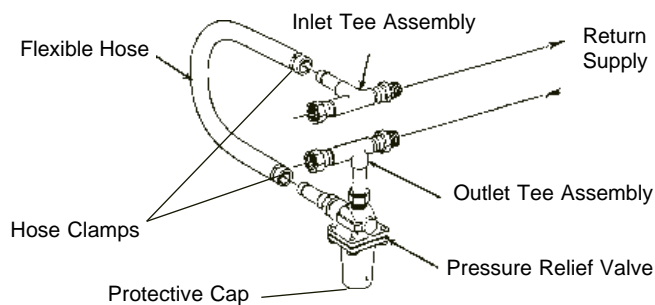
Pin # Function

1	Chassis ground.
2	No connection.
3	Span +. Indicates the maximum setpoint value the unit can be set to operate. The temperature scale is 10mV/°C, referenced to analog ground, pin 6 (example: +350mV = +35.0°C).
4	Span -. Indicates the minimum setpoint value the unit can be set to operate. The temperature scale is 10mV/°C, referenced to analog ground, pin 6 (example: +50mV = +5.0°C).
5	No connection.
6	Analog ground. The analog ground is physically separated from the power ground throughout the unit. To prevent offsets that result from ground currents, the analog and power grounds are only connected at the unit's power supply. Analog ground should only be used as a reference pin .
7	Sensor temperature (current limited through 2.7K OHM resistor). The fluid temperature, as measured by the controller's sensor located in the reservoir, can be read at this pin. The temperature scale is 10mV/°C, referenced to analog ground, pin 6 (example: +150mV = +15.0°C).
8	Setpoint out. The present temperature setpoint can be read at this pin. The temperature scale is 10mV/°C, referenced to analog ground, pin 6 (example: +150mV = +15.0°C).
9	Power Ground.
10	Heater output. Will source 3V at 6mA.
11	No connection.
12	Digital display (input only). An external voltage can be displayed on the operator panel digital display by applying the voltage to this pin. The display has a low input resistance and a full scale rating of ±1.99VDC. Input is referenced to analog ground, pin 6. The maximum voltage applied to the display should be limited to ±2VDC.
13	- 5V. Power supply of -5VDC (15mA maximum).
14	+5V. Power supply of +5VDC (15mA maximum).
15	Setpoint in. The temperature setpoint can be controlled by applying a known voltage to this pin. The temperature scale is 10mV/°C, referenced to analog ground, pin 6 (example: +230mV = +23.0°C).

External Pressure Regulator (Optional)

For applications requiring a maximum pressure less than 55 psi, an External Pressure Reducer (EPR) is available. An EPR allows an adjustable operating pressure of 10 to 50 psi. If the pressure of the fluid leaving the unit exceeds the valve setting the relief valve will bypass the fluid back into the unit to relieve the pressure. The pressure of the system is determined by the back pressure of the connected equipment and the flow rate of the recirculating fluid to your application.

Connect the EPR assembly as shown below. Tighten the hose clamps tight enough to prevent leakage. Do not over-tighten or the clamps will “bite” into the flexible tubing and can cause excessive wear.



Connect the outlet tee assembly to the inlet of your application. Connect the inlet tee assembly to the outlet of your application.

Adjustment

When adjusting the relief valve some leaking may occur, place a container under the valve during adjustment.

Remove the protective cap and locate a threaded fitting with a slot for a large screwdriver. Hold the threaded fitting in place and loosen the lock nut on the valve body until it is almost flush with the threaded fitting. Unscrew the threaded fitting three to four turns. (If the threaded fitting unscrews completely from the valve housing, screw it back in two to three turns.)

To simulate blockage, close (or pinch off) the hose between the EPR outlet tee assembly and your application. Monitor the operating pressure of the HX unit. Turn the threaded fitting until the desired relief pressure is set (the EPR valve cannot be set lower than the total back pressure of your instrument, or flow will not be received).

Tighten the locknut to secure the position of the threaded fitting. Open the hose between the EPR outlet tee assembly and your application.

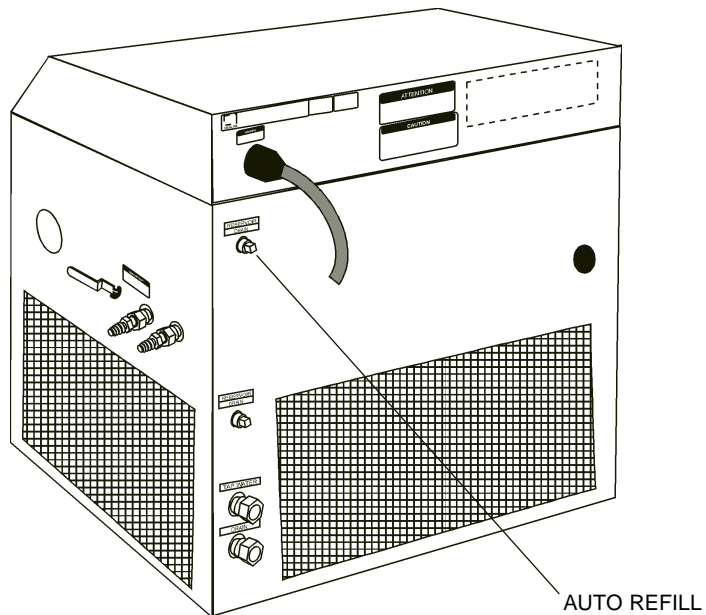
Automatic Refill Device (Optional)

The automatic refill device is designed to maintain the correct level of cooling fluid in the reservoir. The device consists of a float switch in the reservoir and a solenoid valve on top of the reservoir. If the cooling fluid level falls, the float switch will drop, opening the solenoid valve and allowing make-up fluid to fill the reservoir. Once the cooling fluid level reaches the proper level, the float switch will rise and the solenoid valve will close.

The plumbing connection for the refill device is located at the right rear corner of the unit and is labelled AUTO REFILL. This connection is a $\frac{3}{8}$ inch OD stainless steel barbed fitting.

Connect this fitting to a make-up fluid source using $\frac{5}{16}$ or $\frac{3}{8}$ inch ID flexible tubing. Make sure all tubing connections are securely clamped.

Tubing is available from NESLAB. Contact our Sales Department for more information (see Preface, After-sale Support).



Section VII Maintenance

Service Contracts

NESLAB offers on-site Service Contracts that are designed to provide extended life and minimal down-time for your unit. For more information, contact our Service Department (see Preface, After-sale Support).

Condenser Cleaning (Air-cooled units only)

For proper operation, the unit needs to pull substantial amounts of air through a finned condenser. A build up of dust or debris on the fins of the condenser will lead to a loss of cooling capacity.

The frequency of cleaning depends on the operating environment. It is recommended that a visual inspection of the condenser be made monthly after initial installation. After several months, the frequency of cleaning will be established.

For "standard" air-cooled units, periodic vacuuming of the fins on the condenser is necessary.

For units with the optional remote air-cooled condenser, remove any debris from around the condenser site. If a visible accumulation of dust or dirt is found on the condenser fins, the condenser should be cleaned with a condenser cleaning solvent and rinsed with water.



Exercise caution not to damage the condenser fins or coil. Condenser fin or coil damage can result in a loss of performance and, in extreme cases, refrigeration system failure.

Hoses

The unit's internal and external hoses and clamps should be inspected and tightened on at least a semiannual basis.

Algae

To restrict the growth of algae in the fluid reservoir, it is recommended that the reservoir cover be kept in place and that all recirculation lines be opaque. This will eliminate the entrance of light which is required for the growth of most common algae.

NESLAB recommends the use of Chloramine-T, one gram per gallon.

Section VIII Service



For personal safety and equipment reliability, the following procedure should only be performed by a qualified technician. Contact our Service Department for assistance (see Preface, After-sale Support).

Configuration

Case Top

The unit has a hinged case top to allow service access. The case top is secured to the top of the unit base by a hinge between the case top and base (along the rear of the unit), and by two spring clips located at the front corners, see illustration on page 7. To gain access to the pump assembly or the reservoir area, disengage the spring clips with a flat bladed screw driver and lift the front of the top cover and tilt it back. A support brace, located on the right side of the inner base, will stop and support the case top. Ensure the spring clips engage when the top is lowered back into position.

Reservoir Cover

Access to the inside of the fluid reservoir is necessary to clean the reservoir. The figure on the next page illustrates a typical layout of the components mounted on top of the reservoir cover. The component layout varies depending on the unit size. If you are unable to identify the components on your unit's reservoir cover, contact our Service Department for assistance (see Preface, After-sale Support).

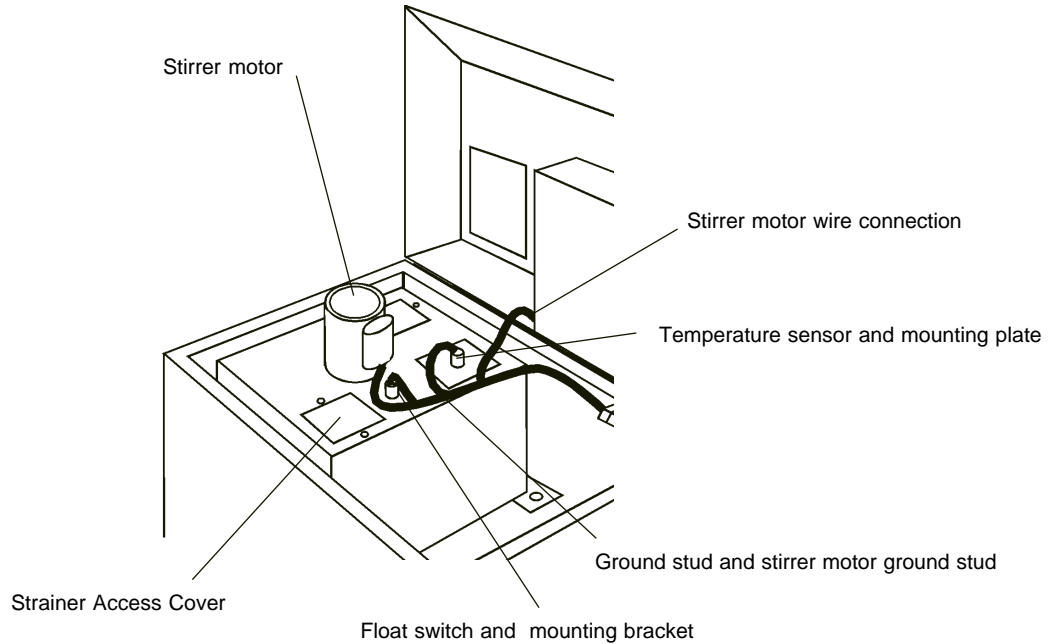


Disconnect the unit from its power source before removing the reservoir cover.

Locate the reservoir stirrer motor (units with plate heat exchangers and HX-75s do not have a stirrer motor; HX-500s and HX-750s have two stirrer motors). Disconnect the motor wires at the plug located on the side of the electrical box cover. Also disconnect the green ground wire that connects the ground stud on the reservoir cover to the unit's grounding bar.

Locate the float switch mounting bracket. Remove the two stainless steel screws that secure the bracket to the reservoir cover. Carefully remove the mounting bracket and place the assembly in an area adjacent to the reservoir. Make sure not to strain the connecting wires.

Locate the temperature sensor mounting plate. Remove the two stainless steel screws that secure the bracket to the reservoir. Carefully remove the sensor mounting plate with the sensor(s) attached and place the assembly in a protected area adjacent to the reservoir. Make sure not to damage the sensor(s) or strain the connecting wires.



Remove the stainless steel screws that secure the reservoir cover to the reservoir. Remove the cover and place it to one side in a manner that protects the stirrer motor blades from being bent.

Service Access Panels

Service panels on your unit allow easy access to the pump and refrigeration assemblies. Panel location varies with the size and type of unit. The panels are designed to allow removal without disconnecting the HX from the instrument being cooled.



Disconnect the unit from its power source before removing any of the access panels.

Reservoir Cleaning

Periodic reservoir cleaning is necessary. It is recommended that a visual inspection of the reservoir be made monthly after initial installation. After several months, the frequency of cleaning will be established.



Disconnect the unit from its power source and drain the reservoir before cleaning the reservoir.

Lift the top cover to access the reservoir. Remove the reservoir cover as described in Section VIII, Configuration.

Clean the reservoir with a cleaning fluid compatible with the recirculating system and the cooling fluid.



Do not use steel wool or other abrasive materials. They can scratch the stainless steel surface and initiate rusting.

When the reservoir is clean, re-assemble the cover assembly and close the case top.

Refer to Section III, Filling Requirements for instructions on replacing the cooling fluid.

Pump Strainer (PD and TU Pumps Only)

If debris is drawn into the recirculating system, the strainer will prevent the material from being sucked into the pump and damaging the pump vanes.

After initial installation, the strainer may become clogged with debris and scale. Therefore, the strainer must be cleaned after the first week of use. After this first cleaning, a monthly visual inspection is recommended. After several months, the cleaning frequency will be established.



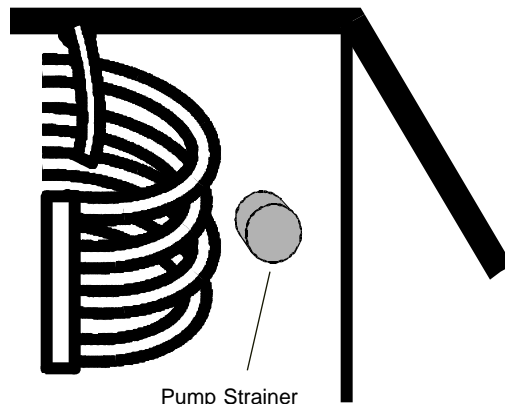
Disconnect the power cord from the power source and drain the fluid reservoir before cleaning the strainer. Do not operate the unit with the strainer removed.

PD-2 and TU Pumps

The wire mesh pump strainer is located in the reservoir on the pump suction line. Remove the strainer access panel located on top of the reservoir cover to access the strainer.

Cover the strainer with a plastic bag to help catch any debris which may become free.

Unscrew the strainer and rinse it with water. Replace the strainer. Refer to Section III, Filling Requirements for instructions on replacing fluid.



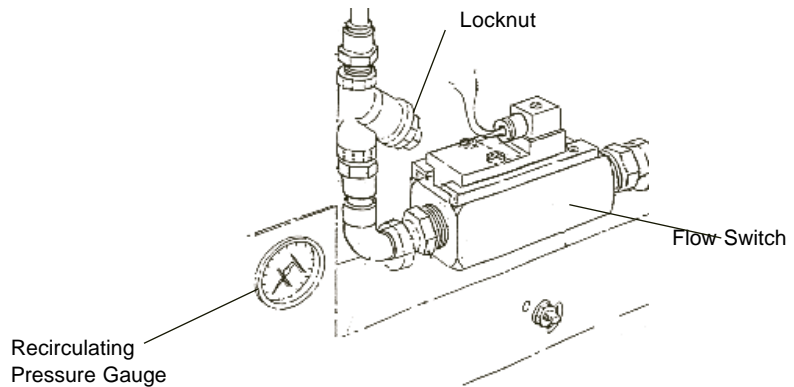
Reservoir cover deleted for clarity

Flow Filter Strainer (Optional)

Unit's equipped with flow switches have flow filter strainers located behind the top right access panel on the inlet side of the flow switch.

Unscrew the locknut and remove the screen. Clean the screen by rinsing it with water.

Replace the strainer and locknut. Refer to Section III, Filling Requirements for instructions on replacing the cooling fluid.



Phase Rotation

Refer to the serial number label on the rear of the case top or rear of analog controller for the specific electrical requirements of your unit; specifically, identify the phase requirements of your unit.

Three phase units with three phase pump motors have a phase rotation interlock. The interlock prevents the unit from starting if the phase rotation is wrong. If the unit will not start, see Section IX, Checklist. If the options in the checklist are not applicable, the problem may be phase rotation.

Disconnect the unit from its power source, remove the rear panel and the junction box cover (if so equipped). Reverse any two line conductors on the line side of the relay.

Never remove the green ground wire.



Replace the junction box and the rear panel. Reconnect the unit to its power source. If the unit will not start, contact our Service Department.

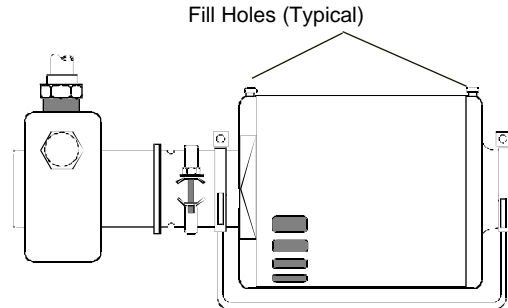
If you are unsure whether your three phase unit has a three phase pump motor, contact our Service Department (see Preface, After-sale Support).

Pump Lubrication

Units with PD-2 pumps require pump motor lubrication. Refer to the pump identification label on the rear of the case top to identify the specific pump in your unit.

Motors used to drive the pump are manufactured by several companies. These motors use sleeve type bearings with large oil reservoirs. Oiling instructions are generally posted on each motor. In the absence of instructions, add approximately 30 to 35 drops of SAE 20 non-detergent oil in each fill hole on the following schedule (SAE 20 = 142 CS viscosity):

Duty Cycle	Oiling Frequency
Continuous	Once every year
Intermittent	Once every 2 years
Occasional	Once every 5 years



**Suction Discharge
Pressure
Speed Check**

Air-Cooled Standard and High Temperature Units (All Pump Types)¹

Unit	Suction(psi)	Discharge(psi)	Speed Check(°C/Minute)
HX-75	77 - 84	225 - 250	1.5 - 1.7
HX-100	75 - 83	245 - 265	1.3 - 1.6
HX-150	70 - 73	240 - 270	2.0 - 2.5
HX-200	85 - 105	230 - 255	1.6 - 1.9
HX-300	84 - 105	270 - 305	2.4 - 2.7
HX-500	80 - 90	215 - 235	2.0 - 2.4
HX-750	65 - 75	185 - 215	

Water-Cooled Standard and High Temperature Units (All Pump Types)²

Unit	Suction(psi)	Discharge(psi)
HX-75	72	170
HX-100	86 - 92	180
HX-150	65	175
HX-200	85 - 90	180
HX-300	73 - 78	180
HX-500	75 - 82	150
HX-750	50 - 60	180

1. 27°C unit temperature, water in reservoir, access panel removed.
2. 25°C unit temperature, water in reservoir.

NOTE: For low temperature units please call NESLAB.

Section IX Troubleshooting

Checklist

Unit will not start

For CE Mark units, check the position of the circuit breaker on the right side of the unit.

Check power source for correct voltage output. Refer to the serial number label on the rear of the unit or rear of analog temperature controller for the specific electrical requirements of your unit. Power source must be specified voltage, $\pm 10\%$.

Check house circuit breaker.

On three phase units with three phase pump motors, the phase rotation may be reversed (see Section VIII, Phase Rotation).

On water-cooled units, make sure the cooling water supply is connected to the TAP WATER connection, not the DRAIN connection. Ensure the facility water is turned on.

Check the High Pressure Cutout, it may need to be reset (see Section V, Operation).

Unit will not circulate fluid

Check the tubing between the unit and your application for obstructions.

The pump strainer may require cleaning (PD and TU pumps only). Refer to the pump identification label on the rear of the case top or rear of analog temperature controller to identify the specific pump in your unit. For instructions on cleaning the pump strainer, see Section VIII, Pump Strainer.

On units with CP type pumps, if the back pressure of the instrument being cooled is greater than the maximum pressure of the pump, adequate flow may not be obtained. Check for obstructions in the tubing.

Inadequate temperature control

Make sure the installation of the unit is in compliance with the conditions described in Section III.

Make sure the heat load of the instrument being cooled is not greater than the cooling capacity of the unit.

When the unit is shut off, wait approximately five minutes before restarting. This allows time for the refrigeration pressures to equalize. If the pressures are not allowed to equalize, the compressor will short-cycle (clicking sound) and no cooling will occur.

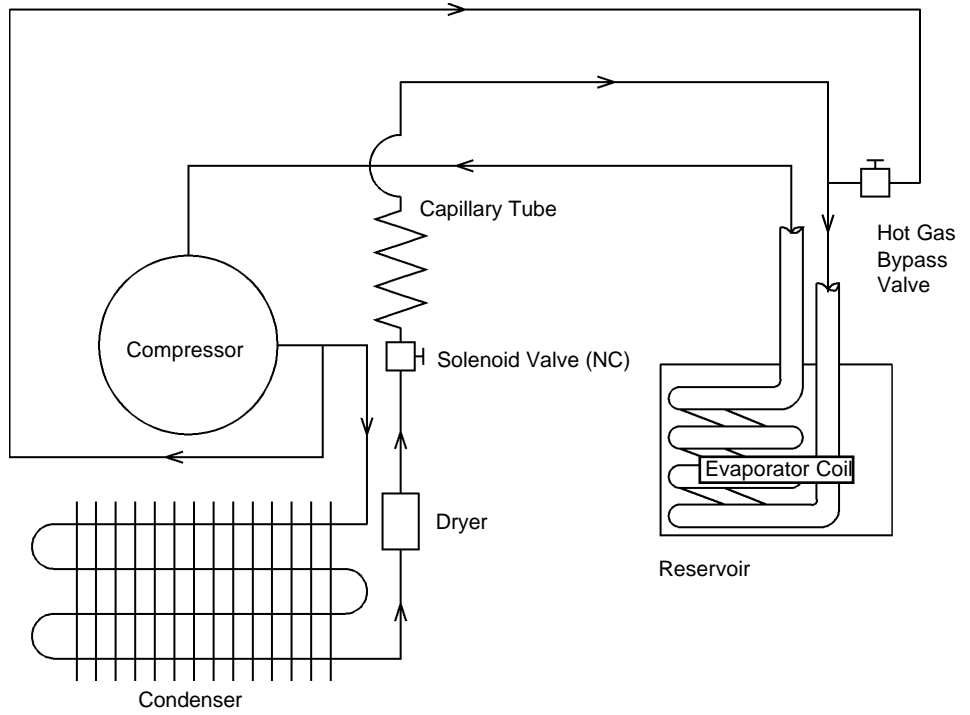
Service Assistance

If, after following these troubleshooting steps, your unit fails to operate properly, contact our Service Department for assistance (see Preface, After-sale Support). Before calling, please obtain the following information:

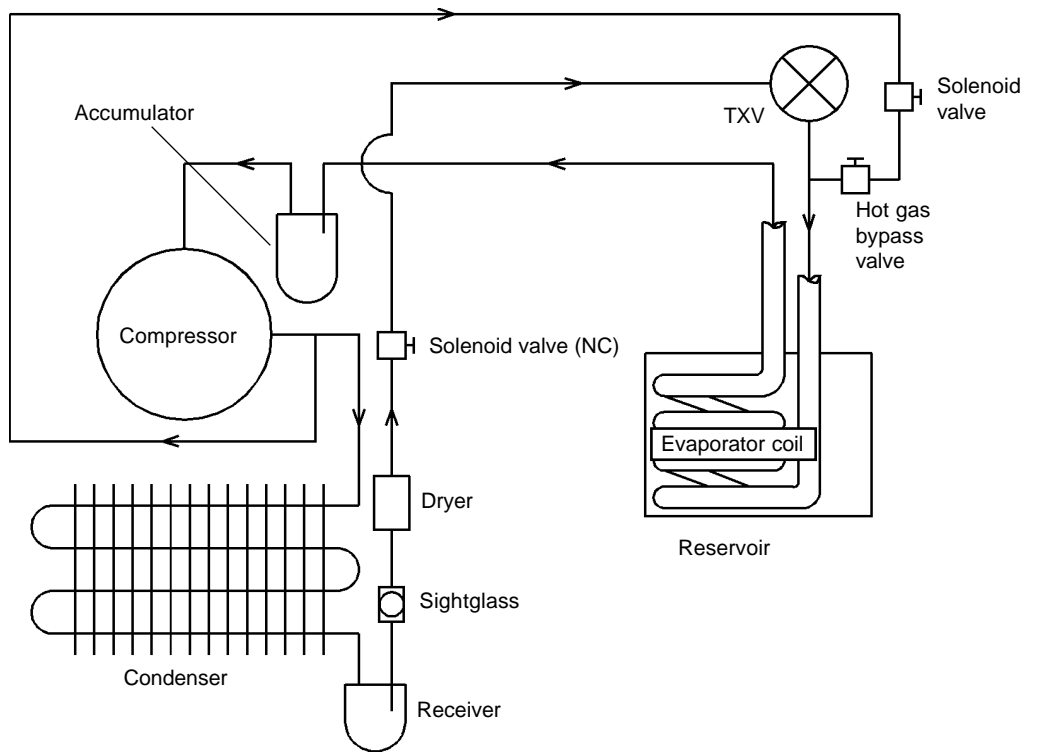
- *unit part number*
- *unit serial number*

Section X Diagrams

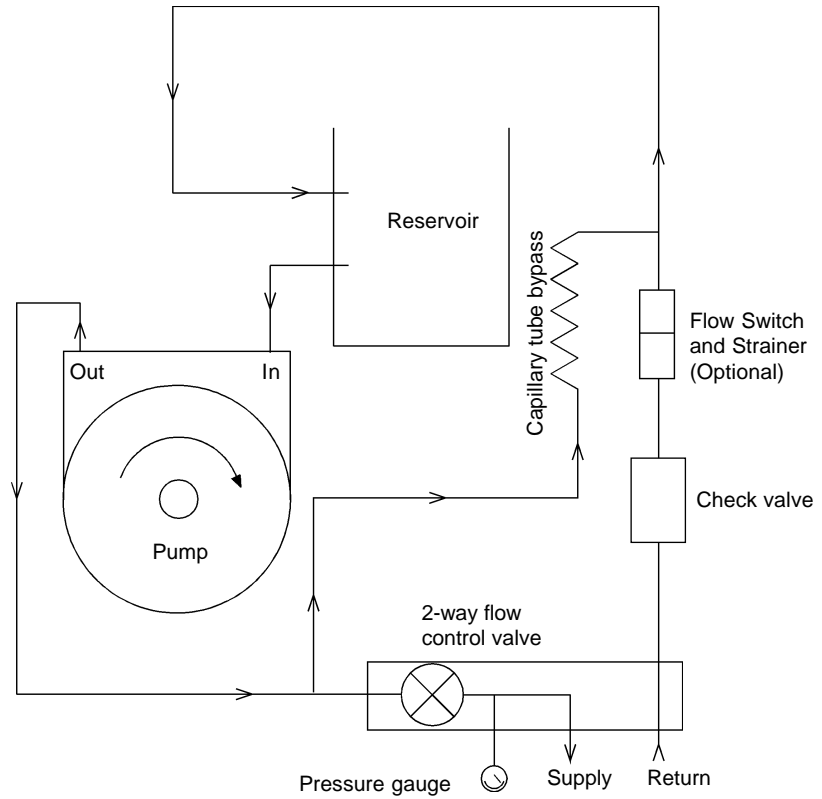
**Refrigeration
Flow Diagram
(HX-75 through HX-150)**



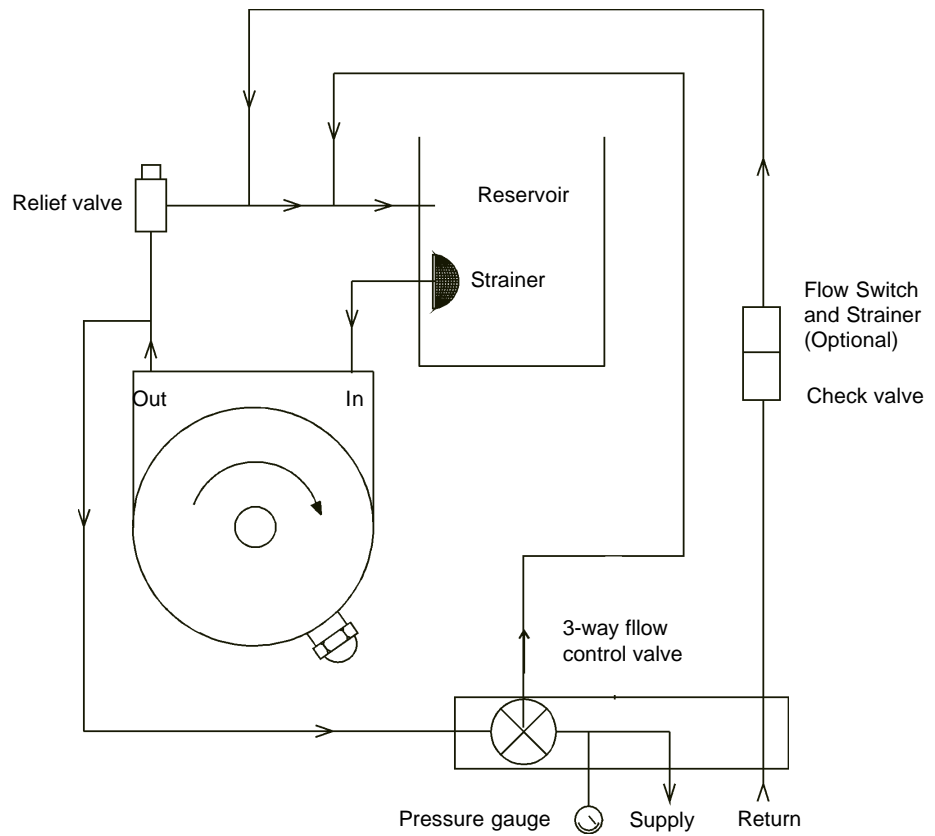
**Refrigeration
Flow Diagram
(HX-200 through HX-750)**



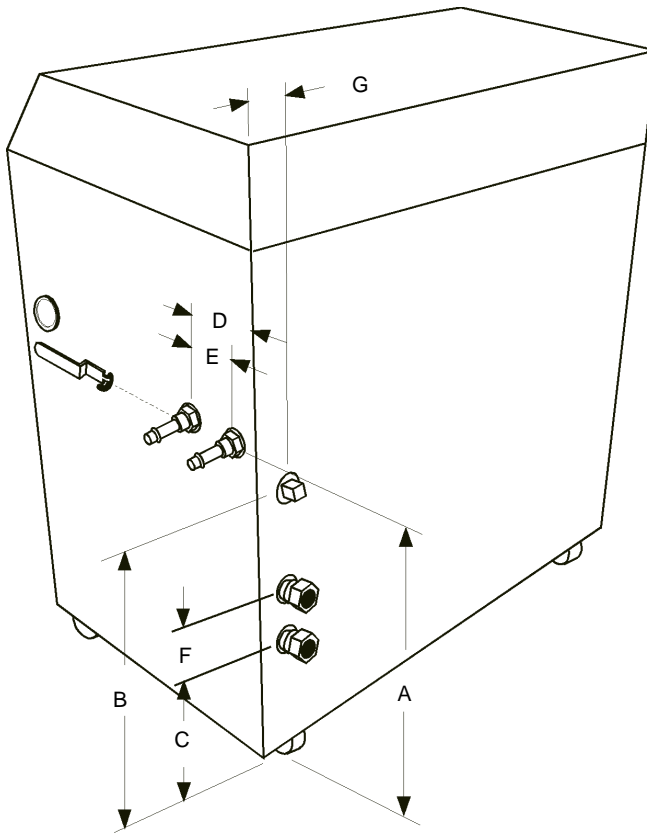
Pump Flow Diagram (CP Pumps)



Pump Flow Diagram (PD and TU Pumps)



Dimensions



	HX75	HX100/HX150	HX200/HX300	HX500	HX750*
Unit Dimensions					
<i>Dimension A</i>	16	20	25 3/8	25 1/4	41
<i>Dimension B</i>	15 1/4	19 1/4	23 1/2	21 1/8	33 3/4
<i>Dimension C</i>	8 1/4	9 1/4	8 3/8	5 1/2	NA
<i>Dimension D</i>	7 1/4		7 1/2		9 1/2
<i>Dimension E</i>				3	
<i>Dimension F</i>	3		3	5 1/2	NA
<i>Dimension G</i>	1 3/8		1 1/2	2 1/4	NA
<i>Dimension H</i>	2 1/2		2 3/8		2 1/4
<i>Dimension I</i>	24 7/8	27 1/2	31 1/2	35 1/8	35
<i>Dimension J</i>	48 1/2	54	64 7/8	73 1/2	86 1/4
Crate Dimensions (H x W x D)	46x30x27	49x33x29	55x40x33	61x54x36	74x54x36

* HX-750 air-cooled units. HX-750 water-cooled are the same size as the HX-500 units.

1. Dimensions are given in inches, $\pm 1/8$ inch.
2. Model HX-750 with a water-cooled condenser has the same dimensions as an HX-500.
3. Dimension A is the distance from the floor to the center of the SUPPLY and RETURN connections.
4. Dimension B is the distance from the floor to the center of the DRAIN connection.
5. Dimension C is the distance from the floor to the center of the tap water outlet connection.
6. Dimension D is the distance from the center of the SUPPLY connection to the rear of the unit case.
7. Dimension E is the distance between the SUPPLY and RETURN connections
8. Dimension F is the distance between the center of the TAP WATER connections (upper inlet and lower outlet).
9. Dimension G is the distance from the edge of the unit case to the center of the three plumbing connections.
10. Dimension H is the distance from the floor to the bottom of the case, height of the castors (not shown).
11. Dimension I is the depth of the unit with the case top open (not shown).
12. Dimension J is the height of the unit with the case top open (not shown).

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APPENDIX A INTERNATIONAL QUICK REFERENCE GUIDES

HX - Serie luftgekühlt Kurzbedienungsanleitung

Installation

Das Gerät muß so plaziert werden, daß weder das Ansaugen noch Ausströmen von Luft behindert wird. Bei ungenügender Ventilation wird die Kühlleistung reduziert und kann in extremen Situationen zu einem Ausfall des Kühlsystems (Kompressors) führen.

Aufstellorte mit hoher Staubentwicklung sollten vermieden werden, und es sollte eine regelmäßige Reinigung des Gerätes durchgeführt werden. Um einwandfrei zu funktionieren, muß das Gerät große Luftmengen durch den Kondensator ansaugen. Bei Staub- und Schmutzablagerungen auf dem Kondensatorheizkörper kommt es zu einem Verlust von Kühlleistung.

Das Gerät behält seine maximale Kühlleistung bis zu einer Umgebungstemperatur von ca. +24°C.

Vergewissern Sie sich, daß die Spannung Ihrer Stromanschlüsse mit der für das Gerät vorgesehenen Spannung übereinstimmt ($\pm 10\%$).

Die Schlauchanschlüsse (3/4 Zoll FPT) des Gerätes befinden sich an der Rückseite und sind mit SUPPLY und RETURN bezeichnet. Bitte entfernen Sie die Gummiabdichtung von beiden Anschlüssen. Schließen Sie den SUPPLY-Anschluß an den Eingang Ihres Instruments und den RETURN-Anschluß an den Ausgang Ihres Instruments an.

Um das Reservoir zu füllen, öffnen Sie die Abdeckplatte in der linken hinteren Ecke der Gehäuseoberseite und entfernen Sie die Reservoirabdeckung, indem Sie die Flügelschrauben lösen. Füllen Sie das Reservoir bis 1 Zoll unterhalb des Randes mit sauberer Kühlflüssigkeit. Wenn das zu kühlende Instrument und die Zirkulationsleitungen sehr viel Kühlflüssigkeit aufnehmen können, sollten Sie zusätzliche Kühlflüssigkeit zur Hand haben, um gegebenenfalls nachfüllen zu können.

Für den Betrieb im Arbeits-Temperaturbereich von +8°C bis +80°C empfiehlt NESLAB Leitungswasser als Kühlmittel, bei niedrigeren Temperaturen als +8°C muß eine nicht gefrierende Flüssigkeit verwendet werden. Wir empfehlen eine Mischung aus Leitungswasser und Labor Ethylen Glykol.

Inbetriebnahme

Vor Inbetriebnahme des Gerätes vergewissern Sie sich bitte, daß die elektrischen Anschlüsse und die Rohr- u. Schlauchanschlüsse sachgemäß installiert sind und daß das gesamte System mit Kühlflüssigkeit gefüllt ist.

Die Modelle HX-200 bis HX-750 müssen vor dem Starten mindestens 12 Stunden an die Stromversorgung angeschlossen werden, damit das Öl im Kompressor erwärmt werden kann und sich von der Kühlflüssigkeit abscheiden kann.

Um das Gerät einzuschalten, müssen Sie den Hauptschalter auf „ON“ stellen. Die „COOL“- und „IDLE“-Anzeigen auf der Steuertafel geben den Status des Kühlsystems an. Die COOL-Anzeige leuchtet, wenn das Kühlsystem der Kühlflüssigkeit Wärme entzieht. Die HEAT-Anzeige leuchtet, wenn sich das Gerät im Hot Gas Bypass Modus befindet. Wenn die Temperatur der Kühlflüssigkeit sich der gewünschten Temperatur nähert, blinken die Anzeigen, um den Arbeitszyklus des Systems anzugeben.

Nach dem Ausschalten des Gerätes sollten Sie vor dem Wiedereinschalten ca. 5 Minuten warten, damit das Kühlsystem einen Druckausgleich durchführen kann. Beachtet man diese Wartezeit nicht, kommt es zu kurzen Schaltfrequenzen des Kompressors und eine Kühlung ist nicht möglich.

Einstellung der Analog-Temperatursteuerung

Um die Temperatur einzustellen (setpoint), drehen Sie den °C-Schalter an der Vorderseite des Gerätes auf die gewünschte Temperatur.

Einstellung der Digital-Temperatursteuerung

Um sich den Temperatur-Setpoint anzeigen zu lassen, drücken Sie den DISPLAY-Schalter und halten Sie ihn gedrückt. Um den Temperatur-Setpoint einzustellen, drücken Sie den Display-Schalter, halten diesen, und drehen gleichzeitig den ADJUST-Schalter so lange, bis die gewünschte Temperatur in der Digitalanzeige angezeigt wird. Wenn die Temperatur eingestellt ist, lassen Sie den Display-Schalter los. Die Digitalanzeige zeigt dann die Temperatur der Kühlflüssigkeit im Reservoir an.

Flußsteuerung

Der RECIRCULATION FLOW CONTROL Hebel kontrolliert die Durchflußmenge der Kühlflüssigkeit zu Ihrer Anwendung. In der „+“-Stellung wird die gesamte verfügbare Kühlflüssigkeit an die Anwendung abgegeben, in der „-“-Stellung wird keine Kühlflüssigkeit an die Anwendung abgegeben.

WHX - Serie wassergekühlt

Kurzbedienungsanleitung Installation

Stellen Sie das Gerät in einer sauberen Umgebung mit einfachem Zugang zu einem Gebäudewasseranschluß und einem Abfluß auf. Das Gebäudewasser muß den in der Anleitung festgelegten Anforderungen genügen, sonst wird die Leistung des Gerätes herabgesetzt. Unzureichende Wasserzufuhr kann zu einer Überhitzung des Kompressors und so zu einem Ausfall des Gerätes führen.

Vergewissern Sie sich, daß die Spannung Ihrer Stromanschlüsse mit der für das Gerät vorgesehenen Spannung übereinstimmt ($\pm 10\%$).

Die Schlauchanschlüsse des Gerätes befinden sich an der Rückseite und sind mit TAP WATER, DRAIN, SUPPLY und RETURN bezeichnet. Bitte entfernen Sie die Gummiabdichtung von allen Anschlüssen. Schließen Sie den TAP WATER-Anschluß an das Gebäudewasser und den DRAIN-Anschluß an den Abfluß an. Schließen Sie den SUPPLY-Anschluß an den Eingang Ihres Instruments und den RETURN-Anschluß an den Ausgang Ihres Instruments an.

Um das Reservoir zu füllen, öffnen Sie die Abdeckplatte in der linken hinteren Ecke der Gehäuseoberseite und entfernen Sie die Reservoirabdeckung, indem Sie die Flügelschrauben lösen. Füllen Sie das Reservoir bis 1 Zoll unterhalb des Randes mit sauberer Kühlflüssigkeit. Wenn das zu kühlende Instrument und die Zirkulationsleitungen sehr viel Kühlflüssigkeit aufnehmen können, sollten Sie zusätzliche Kühlflüssigkeit zur Hand haben, um gegebenenfalls nachfüllen zu können.

Für den Betrieb im Arbeits-Temperaturbereich von +8°C bis +80°C empfiehlt NESLAB Leitungswasser als Kühlmittel, bei niedrigeren Temperaturen als +8°C muß eine nicht gefrierende Flüssigkeit verwendet werden. Wir empfehlen eine Mischung aus Leitungswasser und Labor Ethylen Glykol.

HX - Serie wassergekühlt Kurzbedienungsanleitung

Installation

Stellen Sie das Gerät in einer sauberen Umgebung mit einfachem Zugang zu einem Gebäudewasseranschluß und einem Abfluß auf. Das Gebäudewasser muß den in der Anleitung festgelegten Anforderungen genügen, sonst wird die Leistung des Gerätes herabgesetzt. Unzureichende Wasserzufuhr kann zu einer Überhitzung des Kompressors und so zu einem Ausfall des Gerätes führen.

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Um das Reservoir zu füllen, öffnen Sie die Abdeckplatte in der linken hinteren Ecke der Gehäuseoberseite und entfernen Sie die Reservoirabdeckung, indem Sie die Flügelschrauben lösen. Füllen Sie das Reservoir bis 1 Zoll unterhalb des Randes mit sauberer Kühlflüssigkeit. Wenn das zu kühlende Instrument und die Zirkulationsleitungen sehr viel Kühlflüssigkeit aufnehmen können, sollten Sie zusätzliche Kühlflüssigkeit zur Hand haben, um gegebenenfalls nachfüllen zu können.

Für den Betrieb im Arbeits-Temperaturbereich von $+8^{\circ}\text{C}$ bis $+80^{\circ}\text{C}$ empfiehlt NESLAB Leitungswasser als Kühlmittel, bei niedrigeren Temperaturen als $+8^{\circ}\text{C}$ muß eine nicht gefrierende Flüssigkeit verwendet werden. Wir empfehlen eine Mischung aus Leitungswasser und Labor Ethylen Glykol.

Inbetriebnahme

Vor Inbetriebnahme des Gerätes vergewissern Sie sich bitte, daß die elektrischen Anschlüsse und die Rohr- u. Schlauchanschlüsse sachgemäß installiert sind und daß das gesamte System mit Kühlflüssigkeit gefüllt ist.

Die Modelle HX-200 bis HX-750 müssen vor dem Starten mindestens 12 Stunden an die Stromversorgung angeschlossen werden, damit das Öl im Kompressor erwärmt werden kann und sich von der Kühlflüssigkeit abscheiden kann.

Um das Gerät einzuschalten, müssen Sie den Hauptschalter auf „ON“ stellen. Die „COOL“- und „IDLE“-Anzeigen auf der Steuertafel geben den Status des Kühlsystems an. Die COOL-Anzeige leuchtet, wenn das Kühlsystem der Kühlflüssigkeit Wärme entzieht. Die HEAT-Anzeige leuchtet, wenn sich das Gerät im Hot Gas Bypass Modus befindet. Wenn die Temperatur der Kühlflüssigkeit sich der gewünschten Temperatur nähert, blinken die Anzeigen, um den Arbeitszyklus des Systems anzugeben.

Nach dem Ausschalten des Gerätes sollten Sie vor dem Wiedereinschalten ca. 5 Minuten warten, damit das Kühlsystem einen Druckausgleich durchführen kann. Beachtet man diese Wartezeit nicht, kommt es zu kurzen Schaltfrequenzen des Kompressors und eine Kühlung ist nicht möglich.

Einstellung der Analog-Temperatursteuerung

Um die Temperatur einzustellen (setpoint), drehen Sie den $^{\circ}\text{C}$ -Schalter an der Vorderseite des Gerätes auf die gewünschte Temperatur.

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Flußsteuerung

Der RECIRCULATION FLOW CONTROL Hebel kontrolliert die Durchflußmenge der Kühlfüssigkeit zu Ihrer Anwendung. In der „+“-Stellung wird die gesamte verfügbare Kühlfüssigkeit an die Anwendung abgegeben, in der „-“-Stellung wird keine Kühlfüssigkeit an die Anwendung abgegeben.

Wartung

Überprüfen Sie regelmäßig die Kühlfüssigkeit im Reservoir. Sollte eine Säuberung notwendig sein, spülen Sie das Reservoir mit einer speziellen Reinigungsflüssigkeit, die mit dem Umlaufsystem und der Kühlfüssigkeit kompatibel ist.

Das Kühlmittel sollten Sie regelmäßig erneuern. Wenn Sie das Gerät bei niedrigen Temperaturen betreiben, erhöht sich mit der Zeit der Wasseranteil in der Kühlfüssigkeit. Dies führt zum Verlust von Kühlkapazität.

Regelmäßiges Absaugen des Kondensator-Heizkörpers ist erforderlich. Die Reinigungshäufigkeit hängt von der Betriebsumgebung ab. Eine monatliche Überprüfung des Kondensators ist empfehlenswert. So werden Sie nach einigen Monaten einen Reinigungsrhythmus gefunden haben.

Geräte mit PD- und TU-Pumpen sind mit einem Pumpenfilter ausgestattet. Der Filter sorgt dafür, daß kleine Teilchen und Schmutzablagerungen nicht in die Pumpe gelangen und so die Pumpflügel beschädigen können.

Nach der Erstinstallation kann es zu einer Blockierung des Filters kommen. Die erste Reinigung sollte daher nach einer Woche erfolgen. Danach empfehlen wir eine monatliche Überprüfung des Filters. So können Sie nach einiger Zeit abschätzen, wie oft der Filter gereinigt werden muß.

Bevor Sie den Filter reinigen, ziehen Sie den Netzstecker aus der Steckdose und leeren Sie das Reservoir.

Luftkølet HX-serie Kvik reference.

Installation:

Opstilles i rene omgivelser.

Steder med meget støv skal undgås, og periodisk rensning skal udføres, hvis utilsigtet nedbrud skal undgås. Opbygning af støv vil medføre fald i kølekapasiteten og i værste fald overophedning af systemet.

Check at netspændingen er den nominelle 240V ± max. 10%.

Slangetilgang er på bagsiden mærket „Supply“ til indgang på dit emne og „Return“ på udgangen.

Ledningsvand (ionbyttet) kan anvendes mellem +8 til 80° C, under +8° C skal væsken blandes op med ethylenglycol.

Fyldning af reservoiret foregår ved at fjerne panelet, som er forsynet med fingerskruer, og påfyld egnet rent kølevæske, max 5 cm fra toppen

Betjening:

Før opstart checkes elektriske forbindelser, slangeforbindelser, væske stand og brugsvand er tilsluttet.

Analog temperatur kontrol:

Drej på knappen mærket C til den rigtige temperatur.

Digital temperatur kontrol:

Setpunktet vises ved at holde „Display“ tasten inde, skal temperaturen ændres drejes herefter på „Adjust“ knappen. Slip „Display“ knappen og aktuel temperatur vises.

Flow kontrol:

Drej på „RECIRCULATING FLOW CONTROL“ + for at åbne og - for at lukke.

Periodisk vedligeholdelse:

Check standen af væske periodisk. Check med mellemrum vakuomet på pumpesiden, rens systemet og check for aflejringer, vækst, utætheder, check vakuumpumpen med kondenser og evt. filtre. Husk åben aldrig instrumentet uden strømmen er afbrudt, og strømkablet er taget ud!

Vandkølet HX-serie Kvik reference.

Installation:

Opstilles i rene omgivelser

Steder med meget støv skal undgås og periodisk rensning skal udføres, hvis utilsigtet nedbrud skal undgås. Opbygning af støv vil medføre fald i kølekapaciteten og i værste fald overophedning af systemet.

Check at netspændingen er den nominelle 240V ± max. 10%.

Slangetilgang er på bagsiden mærket „TAP WATER“ (hanevand) og „DRAIN“ (ud), samt „Supply“ og „Return“. Inden tilslutning af fittings fjernes plaststøvkappen fra rørstudsene. „TAP WATER“ tilsluttes ledningsvand og „DRAIN“ til afløb. Tilslut dernæst „Supply“ til indgang på dit emne og „Return“ på udgangen.

Ledningsvand (ionbyttet) kan anvendes mellem +8 til 80 deg. C, under +8 deg C skal væsken blandes op med ethylenglycol.

Fyldning af reservoiret foregår ved at fjerne panelet, som er forsynet med fingerskruer og påfyld egnet rent kølevæske, max 5 cm fra toppen

Betjening:

Før opstart chekes elektriske forbindelser, slangeforbindelser, væske stand og brugsvand er tilsluttet.

Analog temperatur kontrol:

Drej på knappen mærket C til den rigtige temperatur.

Digital temperatur kontrol:

Setpunktet vises ved at holde „Display“ tasten inde, skal temperaturen ændres drejes herefter på „Adjust“ knappen. Slip „Display“ knappen og aktuel temperatur vises.

Flow kontrol:

Drej på „RECIRCULATING FLOW CONTROL“ + for at åbne og - for at lukke.

Periodisk vedligeholdelse:

Check standen af væske periodisk. Check med mellemrum vacuummet på pumpesiden, rens systemet og check for aflejringer, vækst, utætheder, check vacuumpumpen med kondenser og evt. filtre. Husk åbn aldrig instrumentet uden strømmen er afbrudt og strømkablet er taget ud!

Watergekoelde HX Series, Handleiding voor snelle installatie-procedures

Installatie

Plaats het apparaat in een ruimte waar gebouwenwater en de mogelijkheid tot afvoer daarvan binnen handbereik zijn. De eisen van de waterfaciliteiten moeten overeenkomen met die gespecificeerd in de handleiding, anders zal het apparaat onvoldoende prestaties leveren. Onvoldoende watertoevoer kan ertoe leiden dat de compressor oververhit raakt en het apparaat uitgeschakeld wordt.

Let erop dat de netspanning gelijk is aan de aangegeven voltage, $\pm 10\%$.

De slangaansluitingen zijn bevestigd aan de achterkant van het apparaat en zijn voorzien van de labels TAPWATER, DRAIN, SUPPLY en RETURN. Verwijder de plastic beschermingspluggen van alle slangaansluitingen. De TAPWATER plug dient aangesloten te worden aan de watertoevoer en de DRAIN plug dient te worden aangesloten aan de afvoer. Bevestig de SUPPLY plug aan de ingang van uw applicatie en bevestig de RETURN plug aan de uitgang van uw applicatie.

Om het reservoir te vullen dient men het toegangspaneel aan de linkerachterkant te openen en het reservoir door middel van het losdraaien van de duimschroeven te verwijderen. Vul nu het reservoir tot maximaal 1 inch aan de bovenkant. Indien de vloeistof level van uw toepassingen en de toe- en afvoer leidingen voldoende zijn, dient u altijd extra vloeistof achter de hand te houden.

Kraanwater is aan te bevelen bij een arbeidsproces van 8°C tot +80°C. Beneden de +8°C dient men een non-freezing vloeistof te gebruiken. Een combinatie van kraanwater en laboratorium gerichte ethylene glycol wordt in het algemeen aanbevolen.

Operationeel gebruik

Alvorens het apparaat te starten, dient men de elektrische- en slangaansluitingen te controleren. Controleer tevens of het systeem gevuld is met koelvloeistof.

De modellen HX-200 tot HX-750 dienen 12 uur aangesloten te zijn aan de netspanning, zodat de olie verhit kan worden en gescheiden kan worden van de koelvloeistof.

Om het apparaat te starten moet men de schakelaar op "ON" zetten. De "Cool" en "Idle LEDs" aan de voorkant van het apparaat geven de status van het koelsysteem weer. "Cool" is in werking wanneer het apparaat warmte van de koelvloeistof onttrekt, "Heat" is in werking wanneer het apparaat in de Hot Gas Bypass stand is gesteld. Indien de ingegeven temperatuur bereikt is, zal de LED switchen.

Wanneer het apparaat uitgeschakeld is, gelieve 5 minuten te wachten alvorens u het apparaat weer in werking stelt. Deze tijd is nodig voor de drukken in het koelsysteem. Indien dit niet gebeurt, zal er short-cycle optreden binnen de compressor en er vindt geen koeling plaats.

Analog Controller Temperature Adjustment

Om de temperatuur set-point aan te passen, gelieve de Gr.C. knop aan de voorkant van het apparaat te draaien naar de gewenste temperatuur.

Digital Controller Temperature Adjustment

Om de temperatuur set-point aan te duiden, houdt u de "DISPLAY" knop ingedrukt. Om de temperatuur set-point aan te passen, houdt u de "DISPLAY" knop ingedrukt en draait u de "ADJUST" knop totdat de gewenste temperatuur set-point af te lezen is van de display. Als de set-point is aangepast, kunt u de "DISPLAY" knop loslaten. De display zal nu de temperatuur weergeven van de vloeistof in het reservoir.

Flow Control

Met de RECIRCULATING FLOW CONTROL kunt u het debiet van uw applicatie regelen. De "+" positie geeft u een volledig debiet weergegeven, de "-" positie geeft geen debiet.

Periodiek Onderhoud

De vloeistof in het reservoir dient regelmatig gecontroleerd te worden. Indien reiniging noodzakelijk is, zal het reservoir schoongespoeld moeten worden met een vloeistof welke gelijk is aan het circulatiesysteem en de koelvloeistof..

De koelvloeistof dient periodiek vervangen te worden. Wanneer u werkt met lage temperaturen, zal de concentratie van het water in de koelvloeistof gedurende die tijd toenemen, wat verlies van koelcapaciteit tot gevolg kan hebben.

Het periodiek luchtvrij maken van de condensor is noodzakelijk. Het aantal malen dat dit moet gebeuren hangt af van de omgeving waar het apparaat staat opgesteld en tevens gebruikt wordt. Wij raden een algemene maandelijkse inspectie van de condensor aan na de installatie. Na enkele maanden zal duidelijk zij hoe vaak men de condensor moet reinigen.

Apparaten met PD en TU pompen hebben een afvoer. Indien vuil aanwezig is in het systeem, zal de afvoer ervoor zorgen dat het materiaal niet in de pomp terecht komt en daardoor de pompleidingen niet beschadigd.

Nadat het apparaat geïnstalleerd is, zou de afvoer verstopt kunnen raken. De afvoer zal in de eerste week na de installatie schoongemaakt moeten worden. Nadien is een maandelijkse inspectie aan te raden. Na enkele maanden zal duidelijk zijn hoe vaak men de afvoer moet reinigen.

Alvorens de afvoer te reinigen, gelieve het apparaat uit te schakelen en het reservoir te ledigen.

Luchtgekoelde HX Series, Handleiding voor snelle installatie-procedures

Installatie

Plaats het apparaat op een dusdanige manier dat luchttoevoer en afvoer niet wordt belemmerd. Inadequate ventilatie kan leiden tot afname van koelcapaciteit en, in extreme gevallen, tot het niet functioneren van de compressor.

Het is aan te raden stoffige ruimtes te vermijden en de condensor regelmatig schoon te houden.

Voor een juiste werking moet het apparaat een voldoende hoeveelheid lucht aanzuigen door middel van een condensor. Een opeenhoping van stof en vuil op de condensor kan leiden tot een verlies van koelcapaciteit.

Het apparaat behoudt haar integrale capaciteit bij een omgevingstemperatuur tot ongeveer +24°C.

Let erop dat de netspanning gelijk is aan het aangegeven voltage, $\pm 10\%$.

De slangaansluitingen zijn bevestigd aan de achterkant van het apparaat en zijn voorzien van het label SUPPLY en RETURN. Deze aansluitingen zijn 3/4 inch FPT. Verwijder de plastic beschermingspluggen van beide slangaansluitingen. Bevestig de SUPPLY plug met de ingang van het apparaat welke gekoeld wordt. Bevestig de RETURN plug aan de uitgang van van uw applicatie.

Om het reservoir te vullen, gelieve het toegangspaneel te verwijderen door middel van het losdraaien van de duimschroeven. Vul nu het reservoir tot 2 inches van het maximum wanneer het apparaat de gewenste temperatuur heeft bereikt. Indien het vloeistof level van uw toepassingen de toe-afvoer leidingen voldoende zijn.

Kraanwater wordt in het algemeen aanbevolen, indien men werkt met temperaturen van +8°C tot +80°C.

Beneden de +8°C. moet een non-freezing vloeistof gebruikt worden. Een combinatie van kraanwater en ethylene glycol wordt aanbevolen.

Operationeel gebruik

Alvorens het apparaat in gebruik te nemen, gelieve eerst alle elektrische- en slangaansluitingen te controleren. Controleer ook of het systeem gevuld is met koelvloeistof.

De modellen HX-200 tot HX-750 dienen 12 uur aangesloten te zijn aan de netspanning, zodat de olie verhit en gescheiden kan worden van de koelvloeistof.

Om het apparaat te starten moet men de schakelaar op "ON" zetten. De "Cool" en "Idle LEDs" aan de voorkant van het apparaat duiden de status van het koelsysteem aan. "Cool" is in werking wanneer het apparaat warmte van de koelvloeistof ontlucht, "Heat" is in werking wanneer het apparaat in de Hot Gass Bypass stand is gesteld. Indien de ingegeven temperatuur bereikt is, zal de LED switchen.

Wanneer het apparaat uitgeschakeld is, gelieve 5 minuten te wachten alvorens u het apparaat weer in werking stelt. Deze tijd is nodig om de drukken in het koelsysteem. Indien dit niet gebeurt, zal er short-cycle binnen de compressor optreden en er vindt geen koeling plaats.

Analog Controller Temperature Adjustment

Om de temperatuur set-point aan te passen, gelieve de Gr.C. knop aan de voorkant van het apparaat te draaien naar de gewenste temperatuur.

Digital Controller Temperature Adjustment

Om de temperatuur set-point aan te duiden, houdt u de "DISPLAY" knop ingedrukt. Om de temperatuur set-point aan te passen, houdt u de "DISPLAY" knop ingedrukt en draait u de "ADJUST" knop totdat de gewenste temperatuur set-point af te lezen is van de display. Als de set-point is aangepast, kunt u de "DISPLAY" knop loslaten. De display zal nu de temperatuur weergeven van de vloeistof in het reservoir.

Flow Control

Met de RECIRCULATING FLOW CONTROL kunt u het debiet van uw applicatie regelen. De "+" positie geeft u een volledig debiet, de "-" positie geeft geen debiet.

Periodiek Onderhoud

De vloeistof in het reservoir dient regelmatig gecontroleerd te worden. Indien reiniging noodzakelijk is, zal het reservoir schoongespoeld moeten worden met een vloeistof, welke gelijk is aan het circulatiesysteem en de koelvloeistof.

De koelvloeistof dient periodiek vervangen te worden. Wanneer u werkt met lage temperaturen, zal de concentratie van het water in de koelvloeistof gedurende die tijd toenemen, wat verlies van koelcapaciteit tot gevolg kan hebben.

Periodiek luchtvrij maken van de condensor is noodzakelijk. Het aantal malen dat dit moet gebeuren hangt af van de omgeving waar het apparaat staat opgesteld en gebruikt wordt. Wij raden een algemene maandelijkse inspectie van de condensor na de installatie aan. Na enkele maanden zal duidelijk zijn hoe vaak men het apparaat moet reinigen.

Apparaten met PD en TU pompen hebben een afvoer. Indien vuil aanwezig is in het systeem, zal de afvoer ervoor zorgen dat het materiaal niet in de pomp terecht komt en daardoor de pompleidingen niet beschadigd.

Nadat het apparaat geïnstalleerd is, zou de afvoer verstopt kunnen raken. De afvoer zal in de eerste week na de installatie schoongemaakt moeten worden. Nadat dit gebeurd is, is een maandelijkse inspectie aan te raden. Na enkele maanden zal duidelijk zijn hoe vaak men de afvoer moet reinigen.

Alvorens de afvoer te reinigen, gelieve het apparaat uit te schakelen en het reservoir te ledigen.

Kortfattad Bruksanvisning för Vattenkyld HX-serie

Installation

Ställ maskinen i en ren miljö med lätt tillgång till kylningsvatten och ett vattenavlopp.

Kylningsvattnet måste möta de krav som är specificerade i instruktionerna annars minskas maskinens prestations förmåga.

Försäkra att spänningen är den samma som den som är given i instruktionerna $\pm 10\%$.

Röranslutningarna finns på baksidan av maskinen och är märkta "TAP WATER, DRAIN SUPPLY/ RETURN". Ta bort de skyddande plast bitarna. Anslut "TAP WATER" inpassningen till byggnads vattnet och "DRAIN" inpassningen till avloppet. Anslut "SUPPLY" inpassningen till insläppet av din anordning och "RETURN" inpassningen till utsläppet av din anordning.

För att fylla tanken, öppna luckan på den bakre vänstra delen av toppen på maskinen och lösgör skruvarna som håller den undre luckan på plats. Fyll tanken tills 2,5 cm återstår. Var beredd att fylla på om din anordning kräver extra vätska.

Vanligt kran vatten är den rekommenderade vätskan vid en temperatur mellan $+8^{\circ}\text{C}$ och $+80^{\circ}\text{C}$. Under $+8^{\circ}\text{C}$ måste en vätska som inte fryser användas. En blandning av vanligt vatten och etylenglykol (laboratorie kvalitet) föreslås.

Användning

Innan maskinen startas, kontrollera alla elektriska och alla rör anslutningar. Se till att cirkulationssystemen har fyllts med vätska.

Var säker på att byggnads vattnet är påsatt.

På alla modeller från HX-200 till HX-750 måste maskinen vara kopplad till energikällan minst 12 timmar innan användning så att oljan tillåts att värmas upp och separera från köldmedlet.

Sätt start knappen på ON för att starta maskinen. COOL och IDLE på framsidan visar statusen på kylningssystemet. Cool lyser när värme tas bort från köldmedlet. Heat är på när "the hot gas bypass mode" används. När temperaturen närmar sig den förbestämda önskade temperaturen kommer de två att växla.

Vänta 5 minuter innan maskinen sätts på igen efter att ha varit avstängd för att låta kylningstrycken att utjämnas. Ingen kylning kommer att utföras om inte trycken tillåts att utjämnas.

Analog Kontroll, Temperatur Ändring

För att ändra den önskade förbestämda temperaturen, vrid $^{\circ}\text{C}$ knappen på framsidan av maskinen tills den önskade temperaturen är nådd.

Digital Kontroll, Temperatur Ändring

Håll Display knappen intryckt för att visa den önskade temperaturen. Håll Display knappen intryckt och vrid Adjust knappen för att ändra den önskade temperaturen. Släpp Display knappen efter att den önskade temperaturen visas på kontroll panelen. Temperaturen på vätskan i tanken visas nu på kontroll panelen.

Flödeskontroll

"RECIRCULATING FLOW CONTROL" handtaget kontrollerar flödet till din anordning. i "+" positionen får man fullt flöde, "-" positionen innebär inget flöde.

Periodiskt Underhåll

Inspektera vätskan i tanken periodiskt. Om rengöring är nödvändigt, spola tanken med en rengörings vätska som är förenlig med cirkulationssystemet och kylvätskan.

Kylvätskan bör bytas periodvis. När enheten används vid låga temperaturer kommer vätskans koncentration av vatten att öka vilket leder till en minskad kylningskapacitet.

Periodisk rengöring av kondensorn är nödvändig. Hur ofta rengöring är nödvändig beror på miljön. Vi rekommenderar en visuell inspektion av kondensorn varje månad efter installation. Efter flera månader kan det avgöras hur ofta kondensorn måste rengöras i framtiden.

Maskiner med PD och TU pumpar har ett filter. Filtret måste rengöras efter en veckas användning. Efter första rengöringen bör filtret inspekteras varje månad. Efter flera månader kan det avgöras hur ofta filtret måste rengöras.

Drag ur kontakten och töm tanken innan filtret rengörs.

Kortfattad Bruksanvisning för Luft Kyld HX-serie

Installation

Ställ maskinen så att luft intaget och uttaget inte är blockerade. Otillräcklig ventilation leder till minskad kylningskapacitet och vid vissa tillfällen kan kompressorn gå sönder.

Undvik dammiga områden och rengör maskinen periodvis. För att fungera ordentligt måste mycket luft passera genom kondensorn. Damm och smuts i kondensorn leder till minskad kylningskapacitet.

Maskinen har full kylningskapacitet upp till en temperatur av +75°F (24°C).

Försäkra att spänningen är den samma som den som är given i instruktionerna $\pm 10\%$.

För att fylla tanken, öppna luckan på den bakre vänstra delen av toppen på maskinen och lösgör skruvarna som håller den undre luckan på plats. Fyll tanken tills 2,5 cm återstår. Var beredd att fylla på om din anordning kräver extra vätska.

Innan maskinen startas, kontrollera alla elektriska och alla rör anslutningar. Se till att cirkulationssystemen har fyllts med vätska.

Användning

Innan maskinen startas, kontrollera alla elektriska och alla rör anslutningar. Se till att cirkulationssystemen har fyllts med vätska.

Var säker på att byggnads vattnet är påsatt.

På alla modeller från HX-200 till HX-750 måste maskinen vara kopplad till energikällan minst 12 timmar innan användning så att oljan tillåts att värmas upp och separera från köldmedlet.

Sätt start knappen på ON för att starta maskinen. COOL och IDLE på framsidan visar statusen på kylningssystemet. Cool lyser när värme tas bort från köldmedlet. Heat är på när "the hot gas bypass mode" används. När temperaturen närmar sig den förbestämda temperaturen kommer de två att växla.

Vänta 5 minuter efter att maskinen stängts av innan den sätts på igen för att låta kylningstrycken att utjämnas. Ingen kylning kommer att utföras om inte trycken tillåts att utjämnas.

Analog Kontroll, Temperatur Ändring

För att ändra den önskade förbestämda temperaturen, vrid °C knappen på framsidan av maskinen tills den önskade temperaturen är nådd.

Digital Kontroll, Temperatur Ändring

Håll Display knappen intryckt för att visa den önskade temperaturen. Håll Display knappen intryckt och vrid Adjust knappen för att ändra den önskade temperaturen. Släpp Display knappen efter att den önskade temperaturen visas på kontroll panelen. Temperaturen på vätskan i tanken visas nu på kontroll panelen.

Flödeskontroll

"RECIRCULATING FLOW CONTROL" handtaget kontrollerar flödet till din anordning. i "+" positionen får man fullt flöde, "-" positionen innebär inget flöde.

Periodiskt Underhåll

Inspektera vätskan i tanken periodiskt. Om rengöring är nödvändigt, spola tanken med en rengörings vätska som är förenlig med cirkulationssystemet och kylvätskan.

Kylvätskan bör bytas periodvis. När enheten används vid låga temperaturer kommer vätskans koncentration av vatten att öka vilket leder till en minskad kylningskapacitet.

Periodisk rengöring av kondensorn är nödvändig. Hur ofta rengöring är nödvändig beror på miljön. Vi rekommenderar en visuell inspektion av kondensorn varje månad efter installation. Efter flera månader kan det avgöras hur ofta kondensorn måste rengöras i framtiden.

Maskiner med PD och TU pumpar har ett filter. Filtret måste rengöras efter en veckas användning. Efter första rengöringen bör filtret inspekteras varje månad. Efter flera månader kan det avgöras hur ofta filtret måste rengöras.

Innan filtret rengörs, drag ur kontakten och töm tanken.

NOTICE D'UTILISATION

REFROIDISSEUR TYPE HX VERSION AIR

INSTALLATION

Ces appareils ont un système de réfrigération refroidi par air. L'air est aspiré sur le devant et rejeté à l'arrière et sur les côtés

Positionner l'appareil afin que l'admission et l'émission ne soient pas obstruées. Une ventilation insuffisante serait la cause d'une réduction de la capacité de refroidissement, voire, d'une défaillance du compresseur.

Dans une zone excessivement poussiéreuse, le nettoyage périodique est recommandé. En mode de fonctionnement, l'appareil aspire de l'air à travers le condenseur. De la poussière et des particules sur la grille atténueraient sa capacité de refroidissement.

L'appareil conserve sa pleine puissance de refroidissement sur une plage de température allant de l'ambiante à + 24°C.

S'assurer que l'alimentation électrique soit celle requise à $\pm 10\%$.

Les connexions, d'un diamètre 0.75 pouce FPT, sont situées à l'arrière de l'appareil et sont référencées " SUPPLY " et " RETURN ". Retirer les embouts plastiques. Connecter le tuyau enfiché sur " SUPPLY " vers l'entrée de l'équipement et celui sur " RETURN " vers la sortie.

Pour remplir le réservoir, ôter la tôle à l'aide des deux vis. Dévisser le bouchon et remplir le réservoir avec un liquide approprié. L'eau du robinet est recommandée pour un fonctionnement entre + 8 °C et + 30°C; à une température inférieure, mieux vaut rajouter du glycol-éthylène.

MISE EN ROUTE

Vérifier les connexions électriques, les tuyaux d'eau et le niveau de remplissage du liquide. Sur les modèles HX 200 à HX 750, il faut alimenter l'appareil 12 heures avant pour chauffer et séparer l'huile du réfrigérant.

Mettre en route en appuyant sur " ON ". Un voyant s'allume qui indique que l'appareil est en fonctionnement. Pour l'éteindre, appuyer sur " OFF ".

Les voyants LED " Cool " et " IDLE " indiquent le mode de fonctionnement du système de réfrigération. " Cool " est allumé quand l'appareil évacue la chaleur du fluide, " HEAT " est allumé quand l'appareil est en mode de " By-pass ". Quand la température obtenue approche de la température souhaitée, le voyant s'allume et s'éteint.

Après avoir éteint l'appareil, attendre environ cinq minutes avant de le rallumer, pour un bon équilibrage des pressions. Autrement, le cycle au niveau du compresseur serait trop bref et le refroidissement n'aurait pas lieu.

REGLAGE DU CONTROLEUR DE TEMPERATURE ANALOGIQUE

Tourner le potentiomètre situé à l'avant jusqu'à ce que la température désirée coïncide avec la graduation.

REGLAGE DU CONTROLEUR DE TEMPERATURE NUMERIQUE

Pour afficher la température souhaitée, maintenir appuyé l'interrupteur et tourner le bouton de réglage jusqu'à ce que la température souhaitée soit affichée. Relâcher ensuite l'interrupteur. L'affichage indique alors la température du fluide dans le réservoir.

CONTROLEUR DE DEBIT

La poignée " Recirculating Flow control " règle le débit de recirculation. En position " + ", votre application reçoit un débit maximum; en position " - ", il n'y a plus de débit.

MAINTENANCE PREVENTIVE

Vérifier régulièrement le niveau du réservoir,

Changer de temps à autre le liquide utilisé,

En cas de nettoyage, rincer avec un produit de lavage compatible,

Aux basses températures, la concentration en eau a tendance à augmenter ce qui peut générer une perte de puissance de refroidissement,

Avant de changer de liquide, recirculer à une température plus élevée pour réchauffer le serpent,

Nettoyer régulièrement selon les conditions de travail la grille d'aspiration. Nous recommandons d'effectuer la première inspection du condenseur un mois après l'installation,

Les modèles fonctionnant avec des pompes type PD ou TU sont équipés d'un filtre qui retient les impuretés. Il est recommandé de nettoyer ce filtre après la première semaine et, ensuite, une fois par mois. Ce nettoyage s'effectue après avoir débranché l'appareil et vidangé le réservoir

NOTICE D'UTILISATION

REFROIDISSEUR TYPE HX VERSION EAU

INSTALLATION

Installer l'appareil dans un environnement propre avec un accès facile à une arrivée d'eau. Cette source d'eau doit correspondre à ce qui est spécifié dans la notice pour ne pas altérer les performances de l'équipement. Une source non conforme pourrait causer une surchauffe du compresseur et un arrêt de l'appareil.

S'assurer que la tension électrique soit celle requise à $\pm 10\%$.

Les connexions sont situées à l'arrière et référencées :

- " TAP WATER "
- " DRAIN "
- " SUPPLY "
- " RETURN "

Retirer les embouts plastique. Connecter le " Tap water " vers l'arrivée d'eau ; le " Drain " au robinet; " Supply " vers l'entrée de votre application et le " Return " à la sortie.

Utiliser un fluide antigel dont la viscosité doit être inférieure à 50 centistokes à la température la plus basse.

Pour remplir le réservoir, ouvrir la tache en haut à gauche et retirer le couvercle en dévissant. Remplir jusqu'à 1 " pouce " du sommet (niveau). Si le volume total à refroidir est important, il convient d'avoir une réserve de fluide immédiatement disponible sous la main pour ne pas désamorcer la pompe.

MISE EN ROUTE

Vérifier les connexions électriques, les tuyaux d'eau et le niveau de remplissage du liquide. Sur les modèles HX 200 à HX 750, il faut alimenter l'appareil 12 heures avant pour chauffer et séparer l'huile du réfrigérant.

Mettre en route en appuyant sur " ON ". Un voyant s'allume qui indique que l'appareil est en fonctionnement. Pour l'éteindre, appuyer sur " OFF ".

Les voyants LED " Cool " et " IDLE " indiquent le mode de fonctionnement du système de réfrigération. " Cool " est allumé quand l'appareil évacue la chaleur du fluide, " HEAT " est allumé

quand l'appareil est en mode de " By-pass ". Quand la température obtenue approche de la température souhaitée, le voyant s'allume et s'éteint.

Après avoir éteint l'appareil, attendre environ cinq minutes avant de le rallumer, pour un bon équilibrage des pressions. Autrement, le cycle au niveau du compresseur serait trop bref et le refroidissement n'aurait pas lieu.

REGLAGE DU CONTROLEUR DE TEMPERATURE ANALOGIQUE

Tourner le potentiomètre situé à l'avant jusqu'à ce que la température désirée coïncide avec la graduation.

REGLAGE DU CONTROLEUR DE TEMPERATURE NUMERIQUE

Pour afficher la température souhaitée, maintenir appuyé l'interrupteur et tourner le bouton de réglage jusqu'à ce que la température souhaitée soit affichée. Relâcher ensuite l'interrupteur. L'affichage indique alors la température du fluide dans le réservoir.

CONTROLEUR DE DEBIT

La poignée " Recirculating flow control " règle le débit de recirculation. En position " + ", votre application reçoit un débit maximum; en position " - ", il n'y a plus de débit.

MAINTENANCE PREVENTIVE

Changer de temps à autre le liquide utilisé,

Aux basses températures, la concentration en eau a tendance à augmenter ce qui peut générer une perte de puissance de refroidissement,

Avant de changer de liquide, recirculer à une température plus élevée pour réchauffer le serpent,

Nettoyer régulièrement selon les conditions de travail la grille d'aspiration. Nous recommandons d'effectuer la première inspection du condenseur un mois après l'installation,

Les modèles fonctionnant avec des pompes type PD ou TU sont équipés d'un filtre qui retient les impuretés. Il est recommandé de nettoyer ce filtre après la première semaine et, ensuite, une fois par mois. Ce nettoyage s'effectue après avoir débranché l'appareil et vidangé le réservoir

PROCEDIMIENTOS DE OPERACION DE REFERENCIA RAPIDA PARA LA SERIE HX REFRIGERADA POR AGUA

INSTALACION

Sitúe la unidad en un entorno limpio con fácil acceso a la instalación de agua de enfriamiento y un desagüe. Los requerimientos de la instalación de agua deben adaptarse a las especificadas en el manual de instrucciones o el funcionamiento de la unidad se verá mermado. Un suministro de agua inadecuado podría causar que el compresor se sobrecalentara y se apagara la unidad.

Asegúrese de que el voltaje de la fuente de energía sea igual que el voltaje especificado, $\pm 10\%$.

Las conexiones de tuberías están situadas en la parte trasera de la unidad y están marcadas como TAP WATER, DRAIN, SUPPLY y RETURN. Saque los protectores de plástico de todas las conexiones de tuberías. Conecte el adaptador TAP WATER a la instalación de agua de enfriamiento y el adaptador DRAIN a un desagüe. Conecte el adaptador SUPPLY a la entrada de su aplicación y el adaptador RETURN a la salida de su aplicación.

Para llenar el reservorio, abra el panel de acceso situado en la esquina trasera izquierda del tope de la caja y saque la tapa del reservorio desatornillando los tornillos. Llene el reservorio hasta una pulgada del tope. Si la capacidad de fluido de su aplicación y las líneas de recirculación son significativas, tenga fluido extra a mano.

Se recomienda el agua corriente como fluido para operar desde $+8\text{ }^{\circ}\text{C}$ hasta $+80\text{ }^{\circ}\text{C}$. Por debajo de $+8\text{ }^{\circ}\text{C}$, debe utilizarse un fluido no congelador. Sugerimos una mezcla de agua corriente y etileno glicol de grado laboratorio.

OPERACION

Antes de poner en marcha la unidad, compruebe todas las conexiones eléctricas y de tuberías. Asegúrese de que el sistema circulador se ha llenado con fluido refrigerante.

En los modelos HX-200 hasta HX-750, la unidad debe conectarse a la red de energía durante al menos 12 horas para permitir que el aceite se caliente y se separe del refrigerante.

Para poner en marcha la unidad, ponga el

interruptor de encendido en posición ON. Los LED Cool y Idle del panel frontal indican la situación del sistema de refrigeración. Cool está en marcha cuando la unidad está eliminando calor del fluido de enfriamiento. Heat está en marcha cuando la unidad está en el modo by-pass gas caliente. A medida que la temperatura de funcionamiento se aproxima al punto fijado, el LED ciclará.

Cuando se apaga la unidad, espere aproximadamente cinco minutos antes de volver a ponerla en marcha para permitir que las presiones de refrigeración se equalicen. Si no se permite equalizarse las presiones, el compresor se cortocircuitará y no enfriará.

AJUSTE DE LA TEMPERATURA CON EL CONTROLADOR ANALOGICO

Para fijar el punto de ajuste de la temperatura, gire el dial $^{\circ}\text{C}$ situado en el frontal de la unidad hasta la temperatura deseada.

AJUSTE DE LA TEMPERATURA CON EL CONTROLADOR DIGITAL

Para que el punto de ajuste de temperatura aparezca en pantalla, mantenga presionado el interruptor DISPLAY. Para fijar el punto de ajuste de temperatura, mantenga presionado el interruptor DISPLAY y gire el botón ADJUST hasta que la pantalla digital indique el punto de ajuste de temperatura deseado. Una vez fijado el punto de ajuste, suelte el interruptor DISPLAY. La pantalla indicará la temperatura del fluido en el reservorio.

CONTROL DE FLUJO

El mango RECIRCULATING FLOW CONTROL controla la escala de flujo a su aplicación. En la posición + recibirá flujo completo, en la posición - no hay flujo.

MANTENIMIENTO PERIODICO

Inspeccione periódicamente el fluido del reservorio. Si es necesaria una limpieza, rocíe el reservorio con un fluido de limpieza compatible con el sistema de circulación y el fluido refrigerante.

El fluido refrigerante debe sustituirse periódicamente. Cuando se funciona a baja temperatura, la concentración de agua en el fluido refrigerante aumentará con el tiempo, ocasionando una pérdida de capacidad refrigerante.

Es necesario un vaciado periódico de las aletas del condensador. La frecuencia de limpieza depende del entorno en que funciona el aparato. Recomendamos una inspección visual mensual del condensador después de la instalación inicial. Después de varios meses, quedará establecida la frecuencia de limpieza.

Las unidades con bombas PD y TU tienen un filtro. Si hay residuos en el sistema, el filtro prevendrá que el material entre en la bomba y dañe las paletas de la bomba.

Después de la instalación inicial, el filtro puede bloquearse. El filtro debe limpiarse después de la primera semana de la instalación. Después de esta primera limpieza, se recomienda una inspección visual mensual. Después de varios meses, se establecerá la frecuencia de limpieza.

Antes de limpiar el filtro, desenchufe el aparato y vacíe el reservorio.

PROCEDIMIENTOS DE OPERACION DE REFERENCIA RAPIDA PARA LA SERIE HX REFRIGERADA POR AIRE

INSTALACION

Sitúe la unidad para no impedir la entrada y descarga. Una ventilación inadecuada causará una reducción en la capacidad de enfriamiento y, en casos extremos, un fallo en el compresor.

Deben evitarse las zonas excesivamente polvorientas y debe instituirse un calendario de limpiezas periódicas. Para un funcionamiento adecuado, la unidad necesita empujar una cantidad sustancial de aire a través de un condensador. Un cúmulo de polvo o residuos en las aletas del condensador ocasionaría una pérdida de capacidad de enfriamiento.

La unidad retendrá su capacidad completa en temperaturas ambiente de hasta aproximadamente + 75 °F.

Asegúrese de que el voltaje de la fuente de energía sea igual que el voltaje especificado, $\pm 10\%$.

Las conexiones de tuberías están situadas en la parte trasera de la unidad y están marcadas como SUPPLY y RETURN. Estas conexiones son 3/4" FPT. Saque los protectores de plástico de ambas conexiones de tuberías. Conecte el adaptador SUPPLY en la entrada de su aplicación. Conecte el adaptador RETURN a la salida de su aplicación.

Para llenar el reservorio, abra el panel de acceso situado en la esquina trasera izquierda del tope de la caja y saque la tapa del reservorio desatornillando los tornillos. Llene el reservorio hasta una pulgada del tope. Si la capacidad de fluido de su aplicación y las líneas de recirculación son significativas, tenga fluido extra a mano.

Se recomienda el agua corriente como fluido para operar desde +8 °C hasta +80 °C. Por debajo de +8 °C, debe utilizarse un fluido no congelador. Sugerimos una mezcla de agua corriente y etileno glicol de grado laboratorio.

OPERACION

Antes de poner en marcha la unidad, compruebe todas las conexiones eléctricas y de tuberías. Asegúrese de que el sistema circulador se ha llenado con fluido refrigerante.

En los modelos HX-200 hasta HX-750, la unidad debe conectarse a la red de energía durante al menos 12 horas para permitir que el aceite se caliente y se separe del refrigerante.

Para poner en marcha la unidad, ponga el interruptor de encendido en posición ON. Los LED Cool y Idle del panel frontal indican la situación del sistema de refrigeración. Cool está en marcha cuando la unidad está eliminando calor del fluido de enfriamiento. Heat está en marcha cuando la unidad está en el modo by-pass gas caliente. A medida que la temperatura de funcionamiento se aproxima al punto fijado, el LED ciclará.

Cuando se apaga la unidad, espere aproximadamente cinco minutos antes de volver a ponerla en marcha para permitir que las presiones de refrigeración se equalicen. Si no se permite equalizarse las presiones, el compresor se cortocircuitará y no enfriará.

AJUSTE DE LA TEMPERATURA CON EL CONTROLADOR ANALOGICO

Para fijar el punto de ajuste de la temperatura, gire el dial °C situado en el frontal de la unidad hasta la temperatura deseada.

AJUSTE DE LA TEMPERATURA CON EL CONTROLADOR DIGITAL

Para que el punto de ajuste de temperatura aparezca en pantalla, mantenga presionado el interruptor DISPLAY. Para fijar el punto de ajuste de temperatura, mantenga presionado el interruptor DISPLAY y gire el botón ADJUST hasta que la pantalla digital indique el punto de ajuste de temperatura deseado. Una vez fijado el punto de ajuste, suelte el interruptor DISPLAY. La pantalla indicará la temperatura del fluido en el reservorio.

CONTROL DE FLUJO

El mango RECIRCULATING FLOW CONTROL controla la escala de flujo a su aplicación. En la posición + recibirá flujo completo, en la posición - no hay flujo.

MANTENIMIENTO PERIODICO

Inspeccione periódicamente el fluido del reservorio. Si es necesaria una limpieza, rocíe el reservorio con un fluido de limpieza compatible con el sistema de circulación y el fluido refrigerante.

El fluido refrigerante debe sustituirse periódicamente. Cuando se funciona a baja temperatura, la concentración de agua en el fluido refrigerante aumentará con el tiempo, ocasionando una pérdida de capacidad refrigerante.

Es necesario un vaciado periódico de las aletas del condensador. La frecuencia de limpieza depende del entorno en que funciona el aparato. Recomendamos una inspección visual mensual del condensador después de la instalación inicial. Después de varios meses, quedará establecida la frecuencia de limpieza.

Las unidades con bombas PD y TU tienen un filtro. Si hay residuos en el sistema, el filtro prevendrá que el material entre en la bomba y dañe las paletas de la bomba.

APPENDIX B 380V WYE MODIFICATION.

Refer to the serial number label on the rear of the unit for the specific electrical requirements of your unit.

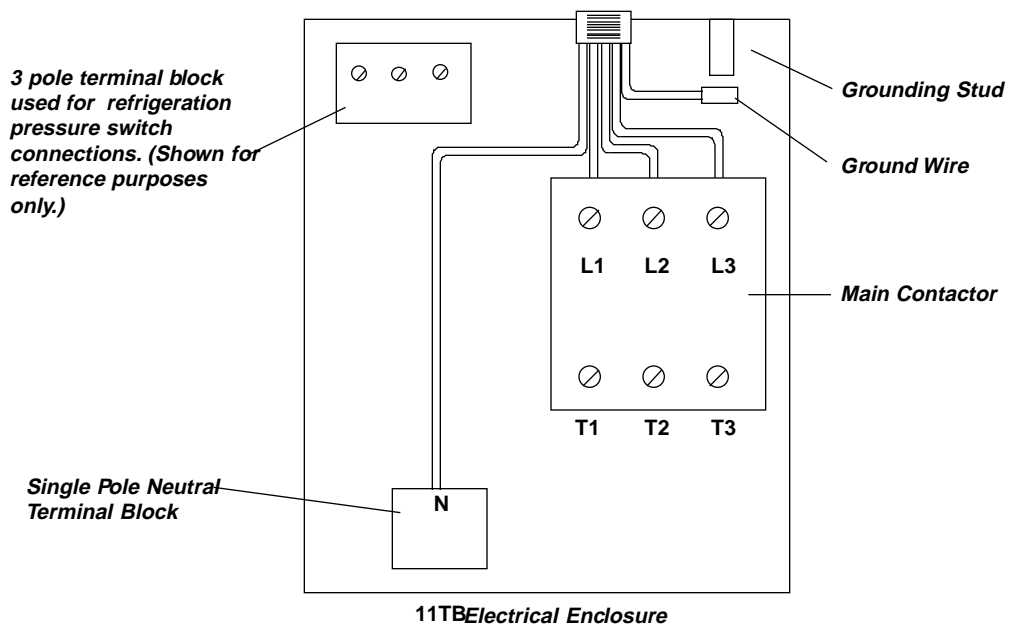


For personal safety and equipment reliability, the following procedure should only be performed by a qualified service technician familiar with the safety precautions required for working inside an energized disconnect box.

Electrical connections are made in the electrical enclosure at the rear of the unit. Remove one of the “knock-outs” from the wall of the enclosure and install a conduit connector. Connect the line cord to the main contactor terminals labelled L1, L2, and L3. Connect the neutral wire (N) to the single pole terminal block labelled N. Connect the ground wire (G) to the grounding stud.

NOTE: Not all units require a neutral connector. Refer to the unit's serial number label on the rear of the unit and to your facility power source availability. Units not requiring a neutral connector use the same connection procedures except there will be no neutral wire or single pole terminal block.

NOTE: The HX-750 380/480V model contains a three phase condenser fan motor. It is possible to misconnect the main power and have the motor turn in the wrong direction resulting in incorrect airflow over the condenser. Proper airflow is achieved by exchanging any two main power connectors.



WARRANTY

NESLAB Instruments, Inc. warrants for 12 months from date of shipment any NESLAB unit according to the following terms.

Any part of the unit manufactured or supplied by NESLAB and found in the reasonable judgment of NESLAB to be defective in material or workmanship will be repaired at an authorized NESLAB Repair Depot without charge for parts or labor. The unit, including any defective part must be returned to an authorized NESLAB Repair Depot within the warranty period. The expense of returning the unit to the authorized NESLAB Repair Depot for warranty service will be paid for by the buyer. NESLAB's responsibility in respect to warranty claims is limited to performing the required repairs or replacements, and no claim of breach of warranty shall be cause for cancellation or rescission of the contract of sales of any unit.

With respect to units that qualify for field service repairs, NESLAB's responsibility is limited to the component parts necessary for the repair and the labor that is required on site to perform the repair. Any travel labor or mileage charges are the financial responsibility of the buyer.

The buyer shall be responsible for any evaluation or warranty service call (including labor charges) if no defects are found with the NESLAB product.

This warranty does not cover any unit that has been subject to misuse, neglect, or accident. This warranty does not apply to any damage to the unit that is the result of improper installation or maintenance, or to any unit that has been operated or maintained in any way contrary to the operating or maintenance instructions specified in NESLAB's Instruction and Operation Manual. This warranty does not cover any unit that has been altered or modified so as to change its intended use.

In addition, this warranty does not extend to repairs made by the use of parts, accessories, or fluids which are either incompatible with the unit or adversely affect its operation, performance, or durability.

NESLAB reserves the right to change or improve the design of any unit without assuming any obligation to modify any unit previously manufactured.

THE FOREGOING EXPRESS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

NESLAB'S OBLIGATION UNDER THIS WARRANTY IS STRICTLY AND EXCLUSIVELY LIMITED TO THE REPAIR OR REPLACEMENT OF DEFECTIVE COMPONENT PARTS AND NESLAB DOES NOT ASSUME OR AUTHORIZE ANYONE TO ASSUME FOR IT ANY OTHER OBLIGATION.

NESLAB ASSUMES NO RESPONSIBILITY FOR INCIDENTAL, CONSEQUENTIAL, OR OTHER DAMAGES INCLUDING, BUT NOT LIMITED TO LOSS OR DAMAGE TO PROPERTY, LOSS OF PROFITS OR REVENUE, LOSS OF THE UNIT, LOSS OF TIME, OR INCONVENIENCE.

This warranty applies to units sold in the United States. Any units sold elsewhere are warranted by the affiliated marketing company of NESLAB Instruments, Inc. This warranty and all matters arising pursuant to it shall be governed by the law of the State of New Hampshire, United States. All legal actions brought in relation hereto shall be filed in the appropriate state or federal courts in New Hampshire, unless waived by NESLAB.