

NESLAB

CFT Series Recirculating Chiller

NESLAB Manual P/N 000532

Rev. 01/30/97

Instruction and Operation Manual

NESLAB online

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

(603)427-2490

Set modem to 8-N-1 protocol, 1200 - 14400 baud

Voice Info: (800) 4-NESLAB

Comments on this manual can be sent to:

NESLAB@lifesciences.com

or visit our Web page at:

<http://www.neslabinc.com>



**Constant Temperature Bath/Circulators
Immersion Coolers
Recirculating Chillers**

CFT Series Recirculating Chiller

PREFACE	
	Compliance 3
	Unpacking 3
	Warranty 3
	After-sale Support 3
SECTION I	
Safety	
	Warnings 4
	Additional Warnings 5
SECTION II	
General Information	
	Description 6
	Specifications 6
	Cooling Capacity 8
	Pump Capacity 8
SECTION III	
Installation	
	Site 9
	Electrical Requirements 10
	Plumbing Requirements 10
	Fluids 11
	Filling Requirements 12
SECTION IV	
Operation	
	Start Up 13
	Analog Temperature Controller 13
	Digital Temperature Controller 14
	Pressure Relief Valve 14
	High Temperature Cutout (Optional) 15
	CFT-300 High/Low Pressure Cutouts 15
	CFT-150 High Pressure Cutout
	External Pressure Regulator (Optional) 16
SECTION V	
Maintenance	
	Service Contracts 17
	Draining the Reservoir 17
	Cleaning 17
	Algae 18
SECTION VI	
Service	
	Pump Strainer 19
	Pump Lubrication 19
	Suction Discharge Pressure/Speed Check 19
SECTION VII	
Troubleshooting	
	Checklist 20
	Service Assistance 20
	Pump Flow Diagram 21
WARRANTY	

CFT Series Quick Reference Operating Procedures

Installation

The unit has an air-cooled refrigeration system. Air is drawn in the front of the unit and discharged through rear and side. 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.

Excessively dusty areas should be avoided and a periodic cleaning schedule should be instituted. 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.

Make sure 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 either SUPPLY and RETURN or OUTLET and INLET. These connections are ½ inch FPT, ¾ inch FPT for CFT-300s. Remove the plastic protective plugs from both plumbing connections. Connect the OUTLET/SUPPLY fitting to the inlet of the instrument being cooled. Connect the INLET/RETURN fitting to the outlet of the instrument being cooled.

To fill the reservoir remove the reservoir access panel by unscrewing the thumbscrews. Locate the reservoir plug (square nut). Remove the plug and fill the reservoir with clean cooling fluid.

Tap water is the recommended fluid for operation from +8°C to +30°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 circulating system has been filled with cooling fluid.

To start the unit, place the Power Switch to the on position. The Power Switch illuminates (except for the CFT-150) to indicate the system is operating. To turn the unit off, place the Power Switch to the off position.

The Cool LED indicates the status of the refrigeration system. It illuminates to indicate the refrigeration system is removing heat from the cooling fluid. As the operating temperature approaches the setpoint, the LED will extinguish.

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 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.

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.

Before changing the cooling fluid, raise the unit's operating temperature to de-ice the cooling coils.

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 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, disconnect the power cord from the power source and drain the reservoir.

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. 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.

If this product has been modified to operate at 0°C or lower, it has been tested with a non-freezing fluid. Although the system has been drained, some residual fluid may remain. This will not hinder your unit's performance.

Warranty

Units have a warranty against defective parts and workmanship for one full year from date of shipment. See back page for more details.

After-sale Support

NESLAB is committed to customer service both during and after the sale. If you have questions concerning the unit operation, 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 labels on the rear of the unit to obtain the following information:

- unit BOM number _____
- unit serial number _____
- pump type _____

Section I Safety

Warnings



Warnings are posted throughout the manual. These warnings are designated by an exclamation mark inside an equilateral triangle and 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.

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, please contact our Sales Department (see After-sale Support).

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

The unit construction provides extra protection against the risk of electrical 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.

Never connect the OUTLET/SUPPLY or INLET/RETURN fitting to your building water supply or any water pressure source.

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.

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.

Do not replace reservoir plug with a non-vented type or damage to the tank may occur.

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

Additional Warnings

In addition to the specific warnings listed on the previous page the following general warnings apply to you unit:

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.

Observe all warning labels.

Never remove warning labels.

Never operate damaged or leaking equipment.

Never operate the unit without cooling fluid in the reservoir.

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 reservoir before moving the unit.

Never operate equipment with damaged power cords.

Refer service and repairs to a qualified technician.

Section II General Information

Description

The CFT Recirculating Chiller is designed to provide a continuous supply of cooling fluid at a constant temperature and volume.

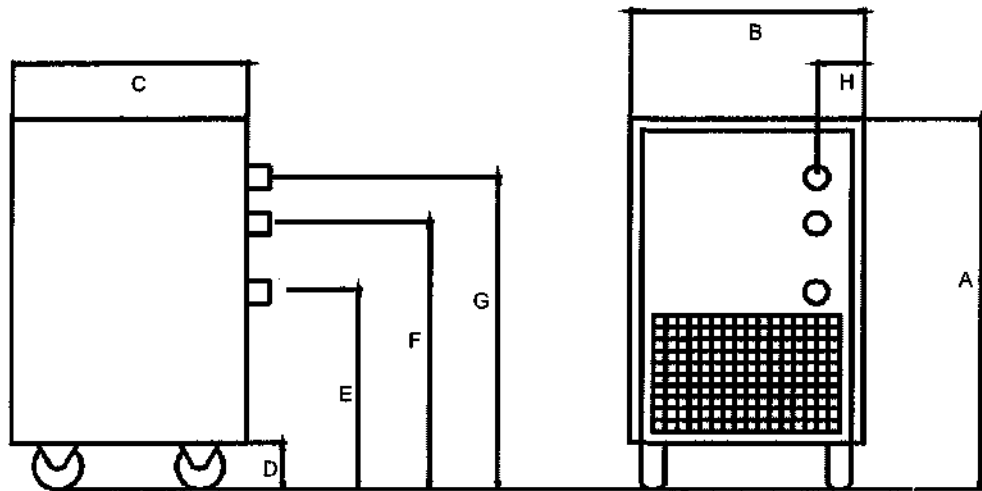
The unit consists of an air-cooled refrigeration system, a sealable reservoir, recirculating pump, and a temperature controller.

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

Specifications

	CFT-25	CFT-33	CFT-75	CFT-150	CFT-300
Cooling Capacity¹	580 Watts	950 Watts	2100 Watts	4500Watts	10650 Watts
	475 Watts	1000 Watts	1900 Watts	3735 Watts	9000 Watts
Temperature Range	+5°C to +30°C			+5°C to +35°C	
Temperature Stability^{2,3}	±1.0°C				
<i>Analog Temperature Controller</i>					
<i>Digital Temperature Controller</i>	±0.5°				±1.0°
Reservoir Volume					
	Gallons	0.5	1.1	1.8	5.6
Liters	1.9	4.1	6.8	21.3	
Refrigerant	R134a			R22	

1. Circulating water at 20°C, at 20°C ambient. Cooling capacity will vary depending on fluid temperature, ambient temperature, and cooling fluid. A PD-1 pump was used in the CFT-25, a PD-2 in the other units.
2. Stability determined for CFT-150 analog unit with 75% heat load @ 20°C circulating temperature.
3. CFT-300 stability determined with 86% heat load.

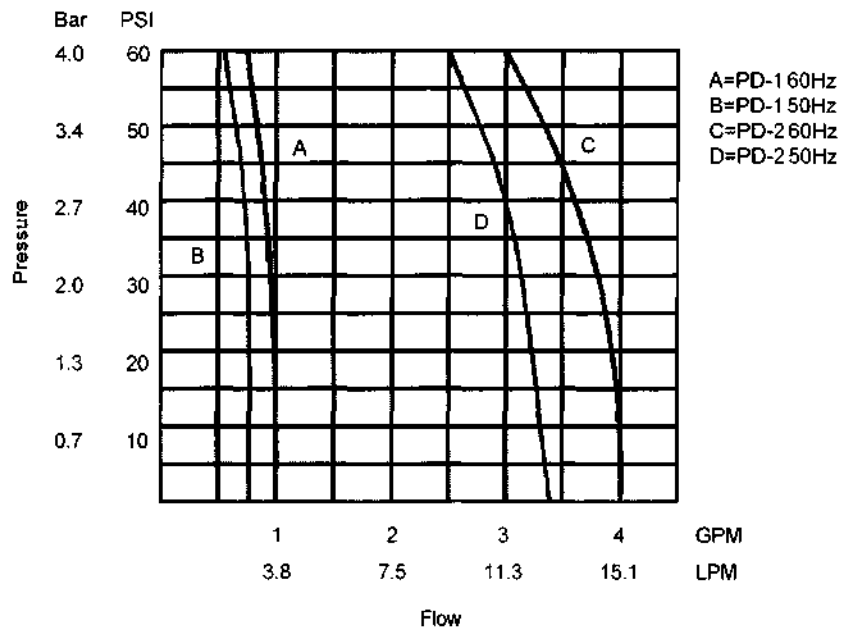
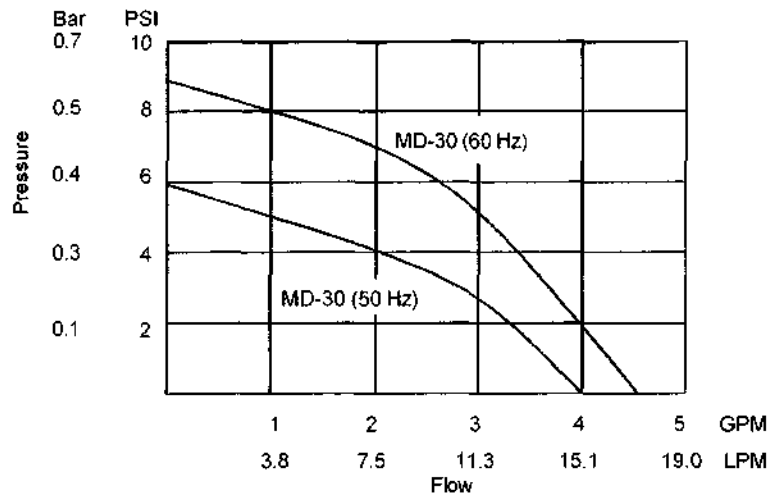


	CFT25	CFT33	CFT75	CFT150	CFT300
Unit Dimensions					
<i>Dimension A</i>	22	24½	26½	36¾	43
<i>Dimension B</i>	12½	14¾	14 7/8	21½	25½
<i>Dimension C</i>	21	22	24½	27¾	28½
<i>Dimension D</i>	2¾	2½	2½	3½	2¾
<i>Dimension E</i>	NA	NA	NA	NA	29
<i>Dimension F</i>	17 1/16	18½	22	32¾	38¾
<i>Dimension G</i>	20 1/16	21½	25	35¾	41¼
<i>Dimension H</i>	1½	1	1 1/8	1 1/8	1
Crate Dimensions (H x W x D)	31x23x28	31x23x32	32x23x40	33x29x42	35x33x56
Shipping Weight	110	161	181	320	450
Air Intake	280	375	800	1050	2500
Electrical Requirements					
<i>Volts</i>	115V	115V	208/230V	208/230V	208/230V
<i>Hertz</i>	60Hz	60Hz	60Hz	60Hz	60Hz
<i>Phase</i>	1	1	1	1	3
<i>Plug</i>	NEMA5-15P	NEMA5-20P	NEMA6-15P	NEMA6-20P	NA

1. Dimension A is the height of the unit. The unit width and depth (dimensions B and C) are the case dimensions. Add approximately 2 inches to include the plumbing connections.
2. Dimension D is the distance from the floor to the bottom of the unit case (height of the castors).
3. Dimension E is the distance from the floor to the center of the DRAIN connection (CFT-300 only).
4. Dimension F is the distance from the floor to the center of the OUTLET connection.
5. Dimension G is the distance from the floor to the center of the INLET connection.
6. Dimension H is the distance from the unit's left side to the center of the INLET, OUTLET and DRAIN connections.
7. Weights are given in pounds
8. Air intake is given in cubic feet per minute.

Rev 01/30/97

Pump Capacity¹



1. To determine which pump is installed, refer to the label on the rear of your unit.

Section III Installation

Site

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

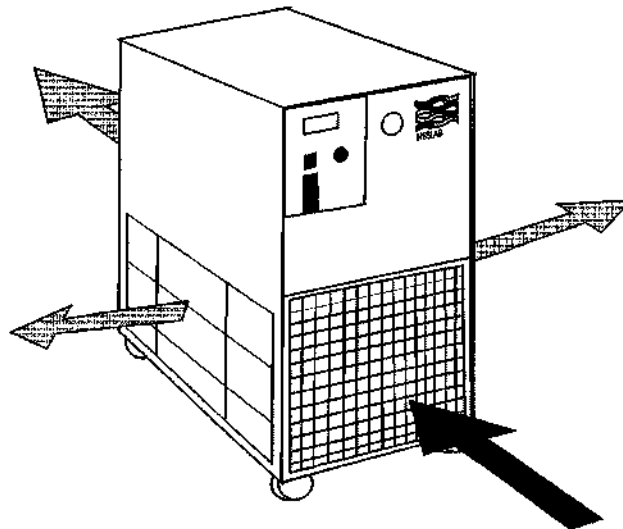
Never place the unit in a location where excessive heat, moisture, or corrosive materials are present.



The unit has an air-cooled refrigeration system. Air is drawn through the front of the unit and discharged through rear and side panels. The unit must be positioned so the intake and discharge are not impeded. A minimum clearance of 18 inches (45 centimeters) on all vented sides is necessary for adequate ventilation. 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 V, Cleaning).

The unit will retain its full rated capacity in ambient temperatures up to approximately +24°C. Above +24°C, derate the cooling capacity 1% for every 0.5°C above +24°C, up to a maximum ambient temperature of +35°C.



Direction of Air Flow

Electrical Requirements



The unit construction provides extra protection against the risk of electrical 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.

Refer to Section II, Specifications, and to the serial number label on the rear of the unit for the specific electrical requirements of your unit.

The CFT-300 is supplied with a disconnect box. Wire the power connections in accordance to local, state and federal electrical codes. For 5-wire units refer to Appendix B for additional information. Double check all wiring to make sure it is properly connected and protected from the elements.

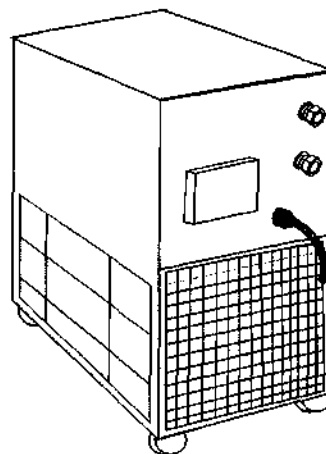
The CFT-300 is also equipped with a compressor crankcase heater. The crankcase heater warms the oil in the compressor and prevents refrigerant from mixing with the oil. Before start up, the unit must be connected to its power source for at least 12 hours. This allows time for the oil to be heated and separate from the refrigerant.

For 50 Hertz units which are not supplied with line cords we recommend a harmonized (HAR) grounded 3-conductor cord, type H05V V - F with conductors of nominal 1.0mm² cross section, rated 10 amps or a 5-conductor cord, type H07RN-F rated 20 amps, for the 5-wire units. A suitable cord end is required for connecting to the equipment (IEC 320/C13) and should terminate with an IEC approved plug for proper connection to branch circuit. Customer provided circuit protection is suggested. Make sure the voltage of the power source meets the specified voltage, $\pm 10\%$.

Plumbing Requirements

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. The manufacturer of the instrument should be able to recommend a cleaning fluid for their equipment.

The plumbing connections are located on the rear of the unit and are labelled OUTLET/SUPPLY and INLET/RETURN. CFT-25 to CFT-150 connections are 1/2 inch FPT, CFT-300 connections are 3/4 inch FPT.



Plumbing Connections
(Typical)

Remove the plastic protective plugs from both plumbing connections.

Connect the OUTLET/SUPPLY fitting to the inlet of the instrument being cooled. Connect the INLET/RETURN fitting to the outlet of the instrument being cooled.



Never connect the fittings to your building water supply or any water pressure source.

Two sets of plumbing adapters are included with CFT-25 to CFT-150 units. One set of adapters will accept $\frac{3}{8}$ inch ID tubing. The other set will accept $\frac{1}{2}$ inch ID tubing. If the unit is being plumbed using flexible tubing, install one set of adapters in the plumbing ports. To prevent leaking, be sure to wrap the threads of the adapters with Teflon® sealing tape before installing them in the plumbing ports.

Flexible tubing, if used, should be of heavy wall or reinforced construction. All tubing should be rated to withstand 80 psig at +30°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 CFT.

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

Fluids

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



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 +30°C.

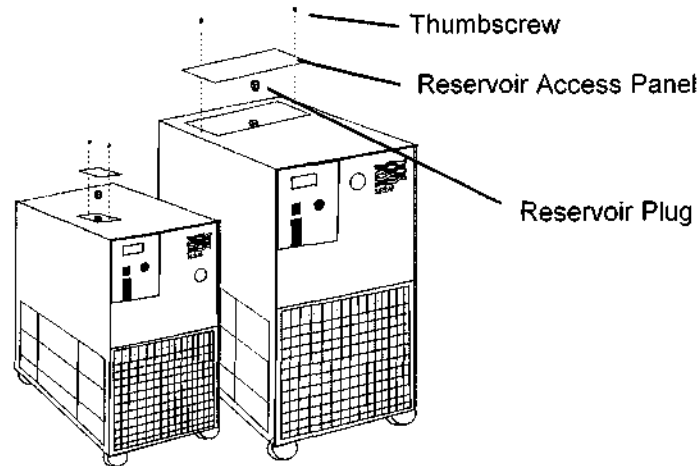
Below +8°C, a non-freezing fluid must be used. A mixture of tap water and laboratory grade ethylene glycol is suggested.



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.

Filling Requirements

Remove the reservoir access panel by unscrewing the thumbscrews. Locate the reservoir plug (square nut). Remove the plug and fill the reservoir with clean cooling fluid, following the special considerations outlined in the following paragraphs.



Reservoir filling locations (Typical)

NOTE: The CFT-300 has a FILL lamp which illuminates whenever the reservoir level is below normal operating level.

Circulating to a closed system (closed to the atmosphere)

Fill the reservoir to the bottom of the fill hole threads. Since the reservoir capacity is small compared to many instruments being cooled, have extra cooling fluid on hand to keep the system topped off when external circulation is started.

NOTE: The tank in your unit has a vent which relieves pressure built up from thermal expansion of water. The vent is located on the reservoir plug. It activates when tank pressure reaches 3 - 5 psi.



Do not replace reservoir plug with a non-vented type or damage to the tank may occur.

Circulating to an open system (open to the atmosphere)

Fill the reservoir so 3/4 of the fill hole threads are covered. Wrap the tank plug with Teflon® sealing tape. Replace the tank plug and tighten securely to prevent air entry.

When circulating cooling fluid to an open vessel or tank, connect the OUTLET/SUPPLY and INLET/RETURN lines to the open tank. Secure the INLET/RETURN (suction) line below the fluid surface. The INLET/RETURN line should be submerged deep enough to avoid sucking air. Make sure the INLET/RETURN line is free of particles and debris that can block the flow of fluid. A baffle or screen may be required.

Section IV Operation

Start Up

Before starting the unit, double check all electrical and plumbing connections and make sure the circulating system (the CFT, the instrument being cooled, and the tubing that connects them) has been properly filled with cooling fluid. To start the unit, place the POWER Switch to the on (1) position. The refrigeration system and the recirculation pump will start. The POWER Switch illuminates (except for the CFT-150) to indicate the system is operating. Units with PD pumps display the pump operating pressure on the RECIRCULATING PRESSURE gauge.

To turn the unit off, place the POWER Switch to the off (0) position.

The Cool LED on the front panel indicate the status of the refrigeration system. It illuminates to indicate the refrigeration system is removing heat from the cooling fluid. As the operating temperature approaches the temperature setpoint, the LED will extinguish.

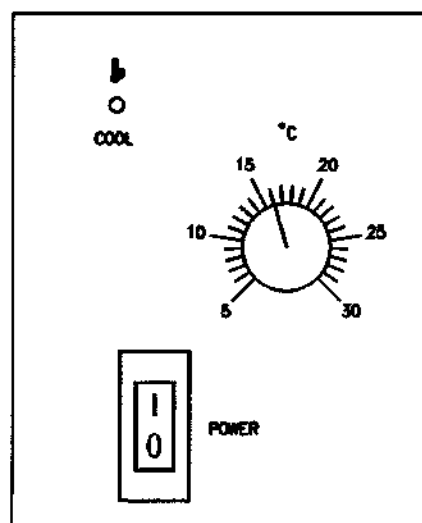
The Idle LED on the front panel of CFT-150 units indicates the unit is in a hot-gas-bypass mode of operation. As the operating temperature approaches the temperature setpoint, the Cool and Idle LEDs cycle to indicate the approximate duty cycle of the unit.

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.

Analog Temperature Controller

Temperature Adjustment

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



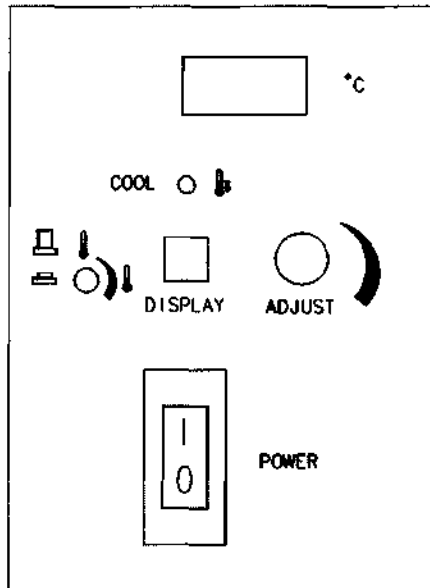
Analog Temperature Controller (Typical)

Digital Temperature 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.

NOTE: Inadvertent movement of the ADJUST knob, regardless of the position of the DISPLAY switch, will result in a change in the setpoint. This change will not be immediately reflected on the digital display, unless the DISPLAY switch is pressed. The digital display will eventually change as the unit reacts to the new setpoint.



Digital Temperature Controller (Typical)

Pressure Relief Valve

Units with PD pumps have a pressure relief valve which 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 relief valve does not determine the actual operating pressure; the operating pressure is determined by the back pressure of the system.

If an adjustment is necessary, contact our Customer Service Department.

High Temperature Cutout (Optional)

The High Temperature Cutout (HTC) is designed to shut down the unit in the event the temperature of the fluid in the reservoir exceeds the HTC setting. The HTC is normally located on the rear of the unit.

NOTE: The HTC temperature scale is in °F.

CFT-300 High/Low Pressure Cutout

CFT-300 units are equipped with high and low refrigeration pressure cutouts. Should either cutout activate the unit will shut down.

The High Pressure Cutout (HPC) activates if there is a blockage in the refrigeration lines or if the refrigerant temperature becomes too hot. The HPC is factory preset at 400psi.

The Low Pressure Cutout (LPC) activates if there is a leak in the refrigeration lines. THE LPC is factory preset at 4psi.

Both cutouts are located inside the case behind the rear panel. Once the cause of the shut down has been determined and corrected, manually depress the white button on the applicable cutout. If a "click" is not heard when depressing the button, the cutout was not activated and the unit shut down for another reason.

CFT-150 High Pressure Cutout

Some CFT-150 units are equipped with High Pressure Cutouts (HPC). Should the HPC activate the unit will shut down.

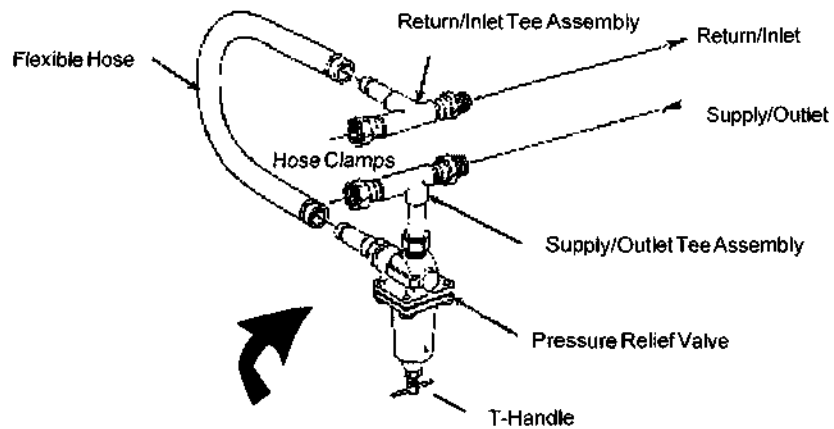
The HPC activates if there is a blockage in the refrigeration lines or if the refrigerant temperature becomes too hot. The HPC is factory preset at 400psi.

The cutout is located inside the case behind the rear panel. Once the cause of the shut down has been determined and corrected, manually depress the white button on the applicable cutout. If a "click" is not heard when depressing the button, the cutout was not activated and the unit shut down for another reason.

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 the instrument being cooled.

Connect the EPR assembly as shown. Tighten the hose clamps 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 the instrument being cooled. Connect the inlet tee assembly to the outlet of the instrument being cooled.

The "T" adjustment handle is equipped with a locknut. To adjust the relief pressure setting loosen the locknut and turn the "T" handle to the minimum pressure setting (direction of arrow).

To simulate blockage, close (or pinch off) the hose between the EPR outlet tee assembly and the instrument being cooled. Monitor the operating pressure of the unit. Turn the "T" handle until the desired relief pressure is set. (The EPR valve cannot be set lower than the total back pressure of the instrument being cooled or the instrument will not receive any flow.)

Tighten the locknut to secure the position of the "T" handle. Open the hose between the EPR outlet tee assembly and the instrument being cooled.

Section V Maintenance and Service



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

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).

Draining the Reservoir

The CFT-300 is equipped with a ½ inch FPT DRAIN fitting located on the rear of the unit.

To drain the CFT-25 to CFT-150 reservoirs we recommend the use of a wet/dry vacuum. Remove the reservoir plug and carefully insert the wet/dry vacuum so as not to damage the cooling coils. **NOTE:** Tilting the unit more than 45° may allow compressor oil to seep into the suction line.

Cleaning

Reservoir

Periodically inspect the fluid inside the reservoir. 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.

Before changing the cooling fluid, raise the operating temperature of the unit to de-ice the cooling coils. Refer to Section III, Filling Requirements for instructions on replacing the cooling fluid.

Condenser

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 lower front of the unit has a one-piece grille assembly. Gently pry the assembly off with a flathead screwdriver. Use care not to scratch the paint.

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 frequency of cleaning will be established.

Algae

To restrict the growth of algae in the reservoir, it is recommended that the reservoir cover be kept in place and that all circulation 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.

Pump Strainer

Units with PD pumps have a strainer. Refer to the pump label on the rear of the unit to identify the type of pump in your unit.

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 with debris and scale. Therefore, 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.

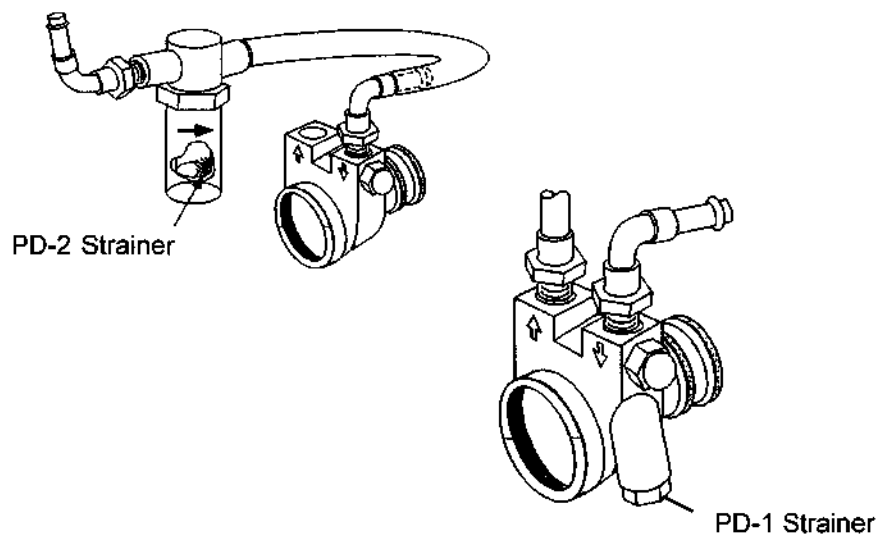
Before cleaning the strainer, disconnect the power cord from the power source and drain the reservoir.

PD-1 pumps have a wire mesh strainer located in the pump head. PD-2 pumps have the strainer located in the pump suction line.

Remove the wrapper from the unit. Unscrew the larger of the two acorn nuts on the pump head and remove the screen.

Clean the screen by rinsing it with water.

When the screen is clean, replace it in the strainer, tighten the acorn nut and replace the wrapper. Refer to Section III, Filling Requirements for instructions on replacing the cooling fluid.



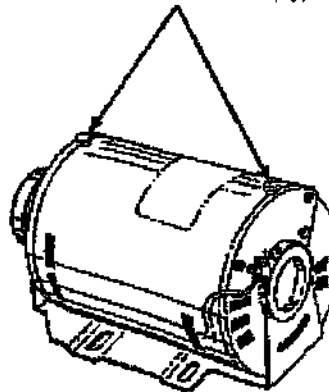
Pump Motor Lubrication

PD pump motors require periodic lubrication. Refer to the pump label on the rear of the unit to identify the type of pump in your unit.

PD pumps use sleeve type bearings with large 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 to each bearing 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

Fill Holes (Typical)



Suction Discharge Pressure Speed Check

Unit	Pump	Refrigerant	Suction PSIG	Discharge PSIG	Speed °C/Min
CFT-25	PD-1	R134a	36 - 38	160 - 170	4.8
CFT-25	MD-30	R134a	25 - 28	145 - 160	4.0
CFT-33	PD1/2	R134a	42 - 45	180 - 200	3.0
CFT-75	PD1/2	R134a	37 - 41	170 - 185	4.6
CFT-150	PD2	R22	70	270	2.8
CFT-300	PD2	R22	88 - 94	265 - 280	6.8
CFT-300	CP-55	R22	85 - 90	268 - 280	6.8

Standard temperature 60 Hertz units, derate 17% for 50 Hertz Units. +20°C fluid temperature, unit in the COOL mode, +20°C ambient. 100% water in the reservoir. Wrapper removed.

Section VI Troubleshooting

Checklist

Unit will not start

Check the line cord, make sure it is plugged in.

Check the voltage of the power source. Make sure it is within the rated voltage of the unit, $\pm 10\%$.

Check that the Power Switch/Circuit Breaker has not tripped.

Check the setting on the optional High Temperature Cutout.

CFT-300 units are equipped with high and low pressure switches. If either switch activates the unit will shut down. Once the cause has been determined you have to manually reset the switch. The switches are located behind the rear panel. (See Section IV, Operation on page 13.)

Unit will not circulate fluid

Check the reservoir level. Fill, if necessary.

Make sure the pump has been purged.

Check the pressure gauge (units with PD pumps). If the reading is 60 psig, check the instrument being cooled for restrictions in the cooling line.

Check the pump strainer (units with PD pumps). A clogged strainer can starve the pump.

Inadequate temperature control

If the temperature continues to rise, make sure the heat load of the instrument being cooled does not exceed the rated specification. (See Section II, Specifications on page 5).

Make sure the air intake and discharge are not impeded and the ambient temperature does not exceed $+35^{\circ}\text{C}$.

Make sure the condenser is free of dust and debris. (See Section VI, Cleaning on page 14.)

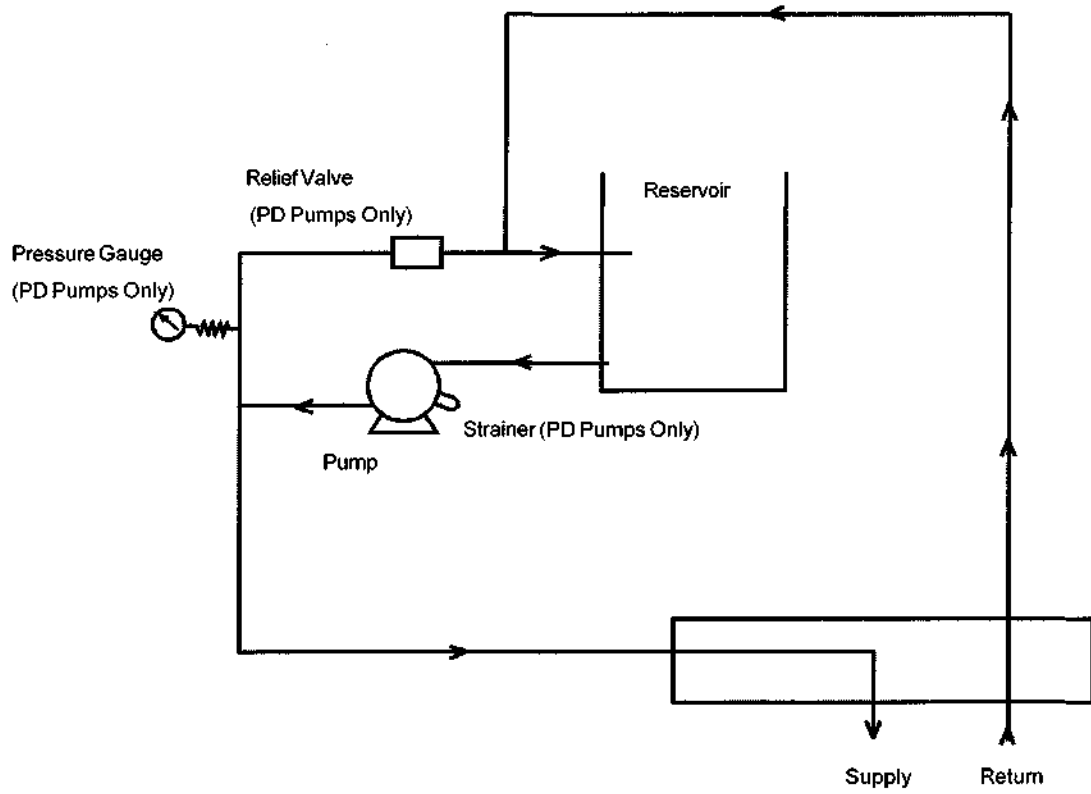
If the compressor short-cycles (a clicking sound), check the line voltage. It should be within the 10% of the specified voltage. Wait 5 minutes before restarting the unit.

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 refer to the serial number label on the rear of the unit to obtain the following information:

- unit BOM number
- unit serial number
- voltage of unit
- voltage of power source

Pump Flow Diagram



CFT - Umlaufkühler Kurzbedienungsanleitung

Installation

Das Gerät verfügt über ein luftgekühltes Kühlsystem. Die Luft wird an der Vorderseite angesaugt und strömt an den Seitenwänden und an der Rückseite aus. Das Gerät muß so plaziert werden, daß weder die Ansaug- noch die Ausströmungsöffnungen blockiert sind. 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 (1/2 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, entfernen Sie den Reservoir-Schutzdeckel, indem Sie die Flügelschrauben lösen. Entfernen Sie den Reservoirverschluß (viereckige Mutter) und füllen Sie das Reservoir mit sauberer Kühlflüssigkeit.

Für den Betrieb im Arbeits-Temperaturbereich von +8°C bis +30°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.

Um das Gerät einzuschalten, müssen Sie den Hauptschalter auf „ON“ stellen. Der Schalter leuchtet auf, wenn das Gerät in Betrieb ist. Um das Gerät abzuschalten, muß der Hauptschalter auf „OFF“ gestellt werden.

Die „Cool“ LED-Anzeige an der Anzeigetafel auf der Vorderseite des Gerätes leuchtet auf, so lange das Kühlsystem der Kühlflüssigkeit Wärme entzieht. Ist die gewünschte Temperatur erreicht (setpoint), erlischt die LED-Anzeige.

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.

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.

Vor Ersetzen der Kühlfüssigkeit erhöhen Sie bitte die Betriebstemperatur des Gerätes so weit, daß die Kühlspulen eisfrei sind.

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-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.

CFT Serie Kvik Reference

Installation:

CFT Serien er luftkølet. Luft trækkes ind fra fronten og ledes ud på bagsiden. Systemet skal placeres således, at der frit kan indsuges og udledes luft. Såfremt systemet ikke har tilgang til fri luftcirkulation, ind og ud, nedsættes kølekapaciteten og i ekstreme tilfælde fejler kompressoren.

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.

Operationstemperatur ved 100% udnyttelse er fra stuetemperatur til +24° C under forudsætning af, at netspændingen er den nominelle 240V +/- 10%.

Slangetilgang er på bagsiden mærket „SUPPLY“ (ind) og „RETURN“ (ud). Skruegangen er ½“ FPT-gevind. Inden tilslutning af fittings fjernes plaststøvkappen fra rørstudsene. „RETURN“ tilsluttes det emne, som skal køles.

Fyldning af reservoiret foregår ved at fjerne panelet, som er forsynet med fingerskruer, og påfyld egnet rent kølevæske. Ionbyttet eller dobbeltdestilleret vand kan anvendes i området +8-30° C, under intervallet skal anvendes antifrysevæske, f. eks. etylenglycol.

Betjening:

Før opstart checkes elektriske forbindelser, slangeforbindelser og kølevæske stand.

Systemet startes ved tryk på kontakten på forsiden, hvorefter denne vil lyse og systemet gå igang. Skal systemet standses trykkes på knappen igen.

Køledioden på frontpanelet angiver status på kølesystemet, den lyser ved køling og slukker, når den indstillede temperatur er nået.

Hvis systemet slukkes, skal der ventes minimum 5 min., før der tændes igen, ellers virker kompressoren ikke optimalt.

Analog temperatur kontrol:

Drej °C tasten til den ønskede temperatur og lad systemet stabilisere sig.

Digital temperatur kontrol:

Tryk på „DISPLAY“ tasten for at se den indstillede temperatur. Indstilling af ny temperatur, tryk på „DISPLAY“ og drej på „ADJUST“ indtil den rigtige temperatur vises, slip derefter „DISPLAY“ tasten. Skærmen vil nu vise den aktuelle temperatur i badet.

Periodisk vedligeholdelse:

Check standen af kølevæske periodisk, før skift af væske indstilles temperaturen på „de-ice“. Check med mellemrum vakuummet på pumpesiden, rens systemet og check for aflejringer, vækst, utætheder og evt. filtre. Husk åben aldrig instrumentet uden strømmen er afbrudt, og strømkablet er taget ud!

CFT-Series, Handleiding snelle installatieprocedures

Installatie

Het apparaat heeft een luchtgekoeld koelsysteem. Lucht wordt aangezogen aan de voorkant van het apparaat en weer vrijgegeven via de achterkant van het apparaat. Plaats het apparaat op een zodanige manier, dat de luchttoevoer en afvoer niet worden 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 dient het apparaat een voldoende hoeveelheid lucht aan te zuigen door middel van de condensor. Een opeenhoping van stof of vuil op de condensor kan leiden tot een verlies van koelcapaciteit.

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

Let erop dat de netspanning gelijk is aan het aangegeven voltage, +/- 10%.

De slangaansluitingen zijn bevestigd aan de achterkant van het apparaat en zijn voorzien van het label SUPPLY en RETURN. Deze aansluitingen zijn een 1/2 inch FPT. Verwijder de plastic beschermingspluggen van beide slangaansluitingen.

Bevestig de SUPPLY plug met de ingang van het apparaat dat gekoeld wordt.

Bevestig de RETURN plug aan de uitgang van het apparaat dat gekoeld wordt.

Om het reservoir te vullen, gelieve het toegangspaneel te verwijderen door middel van het losdraaien van de duimschroeven. Zoek de reservoirplug. Verwijder de plug en vul het reservoir met koelvloeistof.

Kraanwater wordt in het algemeen aanbevolen wanneer u bij temperaturen werkt van +8 Gr.C. tot +30 Gr.C. Beneden de +8 Gr.C. dient een non-freezing vloeistof gebruikt te worden. Een combinatie van kraanwater en ethylene glycol wordt tevens aanbevolen.

Operationeel gebruik.

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

Om het apparaat te starten, gelieve de schakelaar op "ON" te zetten. De schakelaar zal oplichten als teken dat het systeem in werking is gesteld. Om het apparaat uit te schakelen, gelieve de schakelaar op "OFF" te zetten.

De "Cool LED" aan de voorkant duidt de status aan van het koelsysteem. Het zal oplichten indien het koelsysteem warmte verwijderd van de koelvloeistof. Als de aangegeven temperatuur de set-point bereikt, zal de LED verdwijnen.

Wanneer het apparaat uitgeschakeld is, gelieve ongeveer 5 minuten te wachten alvorens u het apparaat weer in werking stelt. Deze tijd is nodig om de koeldruk gelijk te stellen.

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 af te kunnen lezen, 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 weer loslaten. De display zal nu de temperatuur weergeven van het koelvloeistof in het reservoir.

Periodiek Onderhoud

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 koelsysteem en het koelvloeistof.

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

Alvorens u de koelvloeistof vervangt, dient u de operationele temperatuur van het apparaat te verhogen om de koelspiralen vrij te maken van ijs.

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 wordt gebruikt. Wij raden een algemene maandelijkse inspectie van de condensor aan na de installatie. Na enkele maanden zal duidelijk zijn hoe vaak men het apparaat moet reinigen.

Apparaten met PD-pompen hebben een filter. Indien vuil in het systeem aanwezig is, zal de filter ervoor zorgdragen dat het materiaal niet in de pomp terecht komt en daardoor de pomp niet wordt beschadigd.

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

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

Kortfattad Bruksanvisning för CFT Serie

Installation

Maskinen har ett luft kylt kylnings system. Luft tas in på framsidan av maskinen och släpps ut på sidan och baksidan av maskinen. Ställ maskinen så att intaget och uttaget inte är blockerade. Otillräcklig ventilation leder till minskad kylningskapacitet och i vissa fall kan kompressorn gå sönder.

Undvik dammiga områden och rengör maskinen periodiskt. 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).

Röranslutning finns på baksidan av maskinen och har följande beskrivning: SUPPLY och RETURN. Anslutningarna är 1/2 inch FPT. Ta bort de skyddande plast bitarna från röranslutningarna. Anslut SUPPLY kopplingen till intaget av din anordning och RETURN kopplingen till uttaget.

Lösgör skruvarna och ta bort luckan för att fylla tanken. Ta bort tank pluggen och fyll tanken med ren kylnings vätska.

Vanligt kran vatten är den rekommenderade vätskan vid en temperatur mellan +8°C och +80°C. Under +8°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 cirkulations systemen har fyllts med vätska.

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. 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.

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 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 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.

All annan information inklusive felsökning finns beskriven i instruktions manualen.

NOTICE D'UTILISATION

REFROIDISSEURS TYPE CFT

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.

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 0.5 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 tpe 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.

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 ".

Le voyant LED " Cool " allumé indique le mode de fonctionnement du système de réfrigération. Lorsque la température requise est atteinte, ce voyant 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.

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 serpentin,

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 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 CFT

INSTALACION

La unidad tiene un sistema de refrigeración por aire. El aire es dirigido hacia el frontal de la unidad y se descarga por la parte trasera y lateral. 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 24 °C.

Asegúrese de que el voltaje de la fuente de energía sea igual que el voltaje especificado, +/- 10%.

Las conexiones de tuberías están situadas en la parte trasera de la unidad y están marcadas como SUPPLY y RETURN. Estas conexiones son 1/2" FPT. Saque los protectores de plástico de ambas conexiones de tuberías. Conecte el adaptador SUPPLY en la entrada del instrumento que se quiere enfriar. Conecte el adaptador RETURN a la salida del instrumento que se quiere enfriar.

Para llenar el reservorio, saque el panel de acceso al reservorio desatornillando los tornillos. Localice el conector del reservorio (tuerca cuadrada). Saque el conector y llene el reservorio con fluido refrigerante limpio.

Se recomienda el agua corriente como fluido para operar desde +8 °C hasta +30 °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.

Para poner en marcha la unidad, ponga el interruptor de encendido en posición ON. El interruptor de encendido se iluminará para indicar que el sistema está funcionando. Para apagarlo, ponga el interruptor de encendido en posición OFF.

El LED Cool del panel frontal indica la situación del sistema de refrigeración. Se ilumina para indicar que el sistema de refrigeración está eliminando calor del fluido refrigerante. A medida que la temperatura de funcionamiento se aproxima al punto fijado, el LED se extinguirá.

Cuando se apaga la unidad, espere aproximadamente cinco minutos antes de volver a ponerla en marcha. Esto da tiempo para 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.

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.

Antes de cambiar el fluido refrigerante, suba la temperatura de operación de la unidad para descongelar los serpentines de refrigeración.

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 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.

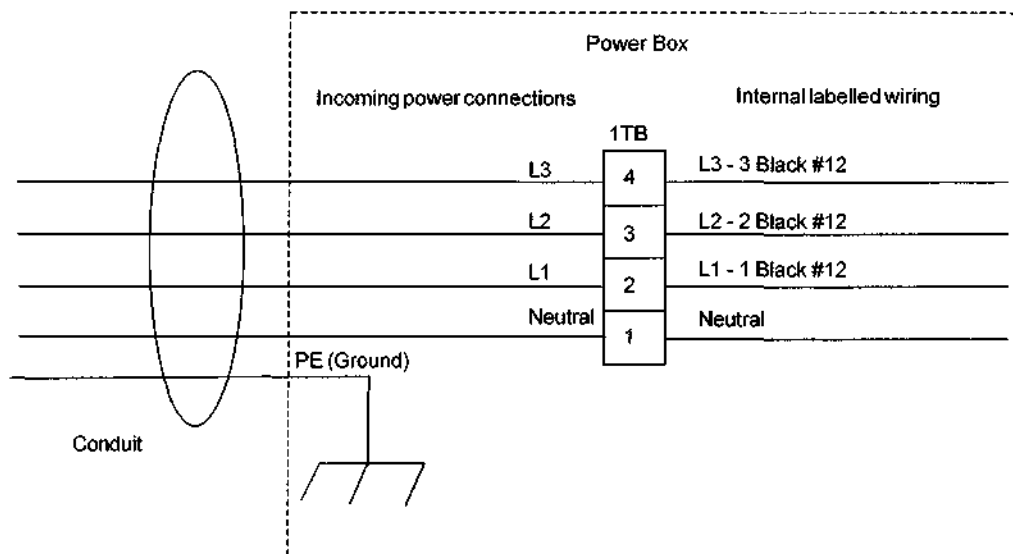
Appendix B

380-415V 3 Phase 5 Wire Units

The unit is not equipped with a line cord. You are responsible for providing the proper electrical connections.

Run all power connections through the conduit located in the rear of the unit to the unit's power box.

Attach wires to power box as shown below.



Main Power 4-Position Terminal Block

Section VII Warranty

NESLAB Instruments, Inc. warrants for one (1) year 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 judgement of NESLAB to be defective in material or workmanship will be repaired by an authorized NESLAB Service Center without charge for parts or labor. The unit including any defective part must be returned to an authorized NESLAB Service Center within the warranty period. The expense of returning the unit to the authorized NESLAB Service Center for warranty service will be paid for by the buyer. NESLAB's responsibility in respect to warranty claims is limited to making the required repairs or replacements, and no claim of breach of warranty shall be cause for cancellation or rescission of the contract of sale of any unit.

This warranty does not cover any unit that has been subject to misuse, neglect, negligence, or accident. The 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 as specified in NESLAB's Operation and Maintenance Manual. This warranty does not cover any unit that has been altered or modified so as to change its intended use.

In addition, the warranty does not extend to repairs made by the use of parts, accessories, or fluids which are either incompatible with the unit or adversely effect 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 warranties or 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 parts, and NESLAB does not assume or authorize anyone to assume for them 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 revenue, loss of use of the unit, loss of time, or convenience.

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 of it shall be governed by law of the State of New Hampshire, United States.

**US Headquarters**

NESLAB Instruments, Inc.
P.O. Box 1178
Portsmouth, NH 03802-1178
(800) 258-0830
(603) 436-9444
Fax: (603) 436-8411

Main Service Center

The NESLAB Main Service Center is open 8:00 am to 5:00 pm (Eastern Time), Monday through Friday.
NESLAB Instruments, Inc.
P.O. Box 1178
Portsmouth, NH 03802-1178
Phone: (800) 258-0830 or (603) 436-9444
Fax: (603) 436-8411

West Coast

32970 Alvarado/Niles Road
Suite 708
Union City, CA 94587
(800) 423-7831
(510) 429-1890
Fax: (510) 429-1898

Rocky Mountain States

4525 Kingston Street
Denver, CO 80239
(303) 371-6588
Fax (303) 371-6554

MidWest States

2246 North Palmer Drive
Suite 100
Schaumburg, IL 60173
(847) 925-9985
Fax: (847) 925-0056

MidAtlantic States

11 Ilene Court
Suite 10
Belle Mead, NJ 08502
(908) 281-0527
Fax: (908) 281-0627

Texas and South Central States

8711 Burnet Road
Suite F69
Austin, TX 78757-7065
(512) 459-2167
Fax: (512) 459-1731

Canada

11 Hamilton Crescent
Georgetown, Ontario L7G 5J4
(905) 702-0656
Fax: (905) 702-0629

European Headquarters**The Netherlands**

De Run 6501/Postbus 326
5504 DR Veldhoven/5500 AH Veldhoven
31 (0)40-2300456
Fax: 31(0)40-2549485

Germany

Ben-Gurion-Ring 21b
60437 Frankfurt
49 (69) 50919050
Fax: 49 (69) 5077172

United Kingdom

93-96 Chadwick Road
Astmoor, Runcorn, Cheshire
WA71PR UK
(01928) 562655
Fax: (01928) 562656

France

Immeuble le Minesota
Ave. du Gros Chêne
95612 Cergy-Pointoise
(1) 34325131
Fax: (1) 34325105