

OPERATOR'S MANUAL





www.technicold.com

Technicold by Northern Lights 1419 W. Newport Center Drive Deerfield Beach, FL 33442 Tel: (954) 421-1717 Fax: (954) 421-1712

Copyright ©2020, Northern Lights, Inc. All rights reserved. Northern Lights, Technicold, the Northern Lights logo, and the Technicold logo are trademarks of Northern Lights, Inc.

Printed in U.S.A. PART NO.: OM-NI 2/20



OPERATOR'S MANUAL

for Northern Ice

brand Ice Machine

Read this operator's manual thoroughly before starting to operate your equipment. This manual contains information you will need to run and service your new unit.

Table of Contents

SHIPPING & PACKAGING	3
INTRODUCTION	4-5
SAFETY RULES	7-8
INSTALLATION	9-13
PRE-COMMISSIONING CHECKS	
COMMISSIONING	
DISPLAY SCREEN	
TROUBLESHOOTING	
MAINTENANCE	
MAINTENANCE LOG	
WIRING DIAGRAMS	21
WARRANTY	

Proprietary Information

This publication is the property of Northern Lights, Inc. It may not be reproduced in whole or in part without the written permission of Northern Lights, Inc. © Northern Lights, Inc. All rights reserved. Litho U.S.A. Publication number OM-NI 2/2020

Shipping & Packaging

After uncrating and removing all packing material, inspect the equipment for concealed shipping damage. Inspect all freight upon delivery. If visible signs of damage exist, refuse delivery or sign your delivery receipt "Damaged". Notify Northern-Lights, Inc immediately that the shipment is damaged. Take detailed photos of the damage with the original packaging for the freight claim. Check your paperwork to ensure you have the correct model unit and that the power supply is correct. Inventory all items on the pack-slip and notify Northern-Lights, Inc of any discrepancies.

Introduction

Equipment Overview

Your ice machine consists of several main components. The compressor, condenser coil, evaporator, auger, auger motor, expansion valve, solenoid, water reservoir and electrical control. Additionally you require a bin sensor, insulated transport tube, fresh water filtration system, seawater pump, sea strainer, piping and fittings.

Environmental Conditions

Ambient and water temperatures can affect system performance. Only operate the machine within the design parameters. Failure to do so can cause damage to the system and void the warranty. See the Specifications section for more details

How It Operates

The ship's fresh water supply connects to the filtration system (Mandatory Item). Flex tubing or soft drawn copper pipe is routed and connected between the filtration system and fresh water inlet on the unit. A 45° SAE flare connection is standard on the unit. There is a special adapter for a compression fitting if needed. The tubing must be new and clean; do not use old tubing or water filters.

Fresh water from the filter feeds the water reservoir and has a control solenoid on the inlet of the reservoir. This solenoid closes when the ice machine is not in operation. The fresh water is regulated into the evaporator where it freezes on the walls. The Auger motor rotates the auger to scrape the ice build-up off the walls. The harvested ice is compacted and pushed towards the auger outlet.

A 0.75" reinforced hose connects the auger outlet to the ice bin. Insulate the hose and route it in a direct route toward the bin, avoiding dips, bends and high spots along its path. Support the hose at designated intervals and must be one continuous hose. Do not connect two pieces of hose together. The bin level sensor shuts off the ice machine when the bin is full. The system automatically restarts when the ice level drops and the sensor opens.

The condenser coil cools the refrigerant circuit and requires adequate seawater flow. A centrifugal pump draws the raw water through a sea strainer to the inlet of the condenser coil. The water passes through the coil and draws heat out of the refrigerant circuit; the heated water is then discharged overboard. A TE250 pump will suffice for most applications. It is recommended that the ice machine has a dedicated raw water circuit with its own pump. If a shared pump is used the flow rate to the ice machine must be verified.

The ice machine control operates and monitors the system. If a fault condition occurs the control will shut the system down to protect the components. See the Commissioning and Troubleshooting sections for more details.

Introduction

Specifications

Power Supply

- 230/1/60 Minimum Wire Size 16 AWG Max. Breaker Size 10A
- 220/1/50 Minimum Wire Size 16 AWG Max. Breaker Size 10A
- 115/1/60 Minimum Wire Size 16 AWG Max. Breaker Size 15A

Electrical

- Each ice machine requires its own dedicated power supply connected to a breaker.
- Equipment grounding is required.
- Electrical installation must conform to ABYC standards or higher regulations.

Temperatures/Pressures

- Air temperature.
- Max 100F (37.8C). Min 50F (10.0C). Water temperature. Max 90F (32.2C). Min 45F (7.2C).
- Water pressure. Max 70psi (482kPA). Min 10psi (68kPA).
- Condenser water temperature.
- Max 90F (32.2C). Min 45F (7.2C).
- Max 125psi (861kPA). Min 10psi (69kPA). Condenser water pressure.

Operating the equipment outside of its limits can cause tripping of the safety devices; loss of performance can also be expected. Damage to the equipment by operating it outside these limits is not warrantable.

Plumbing

- 1/4" SAE flare. Potable water connection (standard). Optional compression adapter available.
- 2 x ³/₄" FPT. Drain pan condensate connections.
- 1/2" OD. Condenser coil inlet.
- ¹/₂" OD. Condenser coil outlet.

Weights

- Unit. 124 lbs (56.25 kg).
- Pump. 115V 5.10 lbs (2.31 kg).
- Pump. 230V 5.20 lbs (2.35 kg).

Dimensions & Clearances

Unit size. 16"L x 16"W x 16"H (406.4mm x 406.4mm x 406.4mm).





Fig. 1- dimensions top and front



• Provide a minimum of 12" (30.5cm) clearance around and above the machine for installation and service.

Safety Rules

IMPORTANT SAFETY INSTRUCTIONS.

READ AND FOLLOW ALL SAFETY INSTRUCTIONS IN THIS MANUAL, PRIOR TO THE INSTALLATION OF ANY GENERATOR SET OR ACCESSORY. KEEP THESE INSTRUCTIONS FOR FUTURE REFERENCE.



Recognize Safety Symbols and Instructions

In addition to the information found in this section, this operator's manual uses three different signal words to outline potential dangers of a specific nature.

ADANGER DANGER indicates a hazardous situation which, if **WARNING** WARNING indicates a hazardous situation which, not avoided, could result in death or serious injury.

not avoided, will result in death or serious injury. WARNING indicates a hazardous situation which, if

CAUTION indicates a hazardous situation which, **A** CAUTION if not avoided, could result in minor or moderate iniurv.

Follow All Safety Instructions

Carefully read and understand all safety messages in this manual and on your machine's safety signs. Keep signs in good and clean condition. Replace missing or damaged signs. Be sure new equipment components and repair parts include the current safety signs. For replacement signs, proper placement of safety signs or clarification on any safety issue, consult your the Technicold factory .

There may be additional safety information contained on parts and components from outside suppliers that is not reproduced in this manual. Consult the suppliers for additional safety information.

Learn how to operate the machine and how to use the controls properly. Only trained personnel should operate machines, or work on or around them.

Keep you machine in proper working condition. UNAUTHORIZED MODIFICATIONS TO THE MACHINERY MAY IMPAIR ITS FUNCTION AND SAFETY PARAMETERS.

SAFETY AND HAZARD WARNINGS



IMPORTANT

DO NOT REMOVE THE FRONT COVER WITHOUT FIRST DISCONNECTING THE 3 CABLES/CONNEC-TORS ON THE REAR OF THE DISPLAY. For ease of access to the cables, remove the top cover and left side panel.

WARNING

Sharp Edges

Equipment may have sharp edges. Wear gloves and use safe handling practices when installing and servicing the equipment.

1 WARNING

Lifting

Equipment is heavy. To prevent personal injury, do not lift equipment if beyond your physical ability. Use safety equipment when moving and installing the unit.

WARNING

Pinch Hazard

Use caution when handling equipment. Use protective gloves and do not place hands under the equipment when setting it down.

Electric Shock

High voltages present. Do not power up unless all electrical connections are made, and covers closed. To reduce the risk of shock, remove power before servicing.

ADANGER

Ignition Protection/Explosion Hazard

The equipment is not ignition protected per 33 CFR 183.410. Do not install in an area that can be exposed to flammable gas.

A CAUTION

Burn Hazard

Hot Parts! Do not operate with the covers removed.

Safety Rules

High Pressure Refrigerant

The system contains high-pressure refrigerant R404a. The refrigerant circuit can only be serviced by EPA 608 certified technicians or equivalent. Refrigerants should be handled using safe handling practices and in accordance with Government regulations.

A CAUTION

No Salt Water

The unit can only produce fresh water ice and must be connected to a filtered potable water source. It MUST NOT be connected to a seawater source. To do so will void the manufacturer's warranty and damage the equipment.

A CAUTION

Filtration

The unit MUST NOT be operated without a filter on the fresh water supply. Failure to install a fresh water filter can damage the equipment and will void the warranty.

A WARNING

Non-Potable Ice

The ice produced is non-potable and not for human consumption. Do not use in drinks, eat or use in fresh food display cases.



Glycol

When winterizing the sea water system, use propylene glycol. Follow the manufacturer's instructions for the dilution levels required for freeze protection.

WARNING

Chemical Burn

Most ice machine cleaners contain citric or phosphoric acid, which can cause skin irritation. Read the caution labels on products and follow the instructions carefully.

When handling the unit use gloves and any other safety equipment deemed necessary to prevent bodily injury.

Protect surfaces to prevent damage when transporting equipment onboard and during installation.

The frame on for unit is capable of supporting the weight of the unit. To aid installation and carrying the unit, the top cover can be removed and the unit carried by the top of the frame. To remove the top cover, use a flat-head screwdriver to turn the latches 180 degrees counter-clockwise.

Check that you have all the parts needed for the installation.

Mount the unit on a flat surface to prevent vibration.

Locate the unit as far aft as possible and low in the boat. Do not mount it further forward than amidships

The unit has two drains. For best drainage mount the unit so that the drains are fore & aft.

Connect both drain lines on an incline downward to a sump pump. If you decide to connect only one drain connection, cap the other.

There are four mounting clips provided to secure to machine to its mounting surface. (Figure 3) Install the clips once the installation is complete and the panels are in place. Use all four clips to secure the unit properly. For the most secure application, mount the clips opposite each other. This can be two on either side or one on each of the four sides.

ومومهز

You only need to remove two panels for installation, the top cover and the left-hand side panel.

Removing the top cover provides access to the electrical box and for connection of the ice delivery hose. To remove the top cover turn the captive locks 180 degrees counter-clockwise.



Fig. 3: Ice machine showing location of mounts (left), mount details (right)

Fig. 5: Condenser coil access

The left-side panel provides access to the condenser coil connections. If for some reason you need to remove the front panel, access to the display connections are through this panel (Figure 5, below).





Fig. 7: Raw water pump installation

The pump and strainer should accessible for maintenance and service, not in a location where they can be stepped on or damaged.

Install isolation valves so that the pump and strainer can be maintained or serviced.

There are only two mounting positions for the pump installation. Position "A" is the preferred mounting (Figure 8, below).

POSITION (A)



Fig. 8: Pump installation



When connecting fittings to the pump inlet and outlet use Teflon tape or other type of pipe sealant.

Hand tight is sufficient, DO NOT OVER-TIGHTEN. Using excessive force can split or break off the pump head. The weight of the water in the pump outlet hose, combined with the weight of the hose, can stress the pump outlet connection. Any type of impact on the hose can also stress the connection. Support the hose within 18" (46cm) of the pump outlet.

Insulate the ice delivery hose with a minimum of ¹/₂" thick insulation. Secure the hose on the auger outlet with a constant torque hose clamp. Connect the outlet of the hose to the ice bin using a bulkhead fitting to prevent restriction at the outlet. Secure the hose at the bulkhead fitting to prevent it from pulling out.

If you have difficulty getting the ice delivery hose onto the auger outlet, heat the hose and stretch it out using sliplock pliers. To heat the hose immerse in hot water or use a heat-shrink gun. Burn hazard use caution and wear safety gear. Additionally, spraying the auger outlet and inside of the hose with 409[®] cleaner to lubricate it.

1.

Fig. 9: Hose stretching



Support the ice delivery hose every 12" (31cm).

For best performance, install the ice delivery hose on a steady incline from the unit to the ice bin. Limit the amount of bends and dips in the hose. If a bend is unavoidable then the bend radius should be greater than 12" (30cm). The more dips in the hose produces a lower quality of ice upon initial start-up.

Install the end of the outlet delivery hose as high as possible in the ice bin.



Mount the bin full sensor within 3" (7.6 cm) of the outlet of the hose at the 4 o'clock or 8 o'clock position (Figure 11, below) Do not mount directly under the hose outlet. The sensor has two threaded nuts to secure it to the ice bin. To make it a watertight penetration use a sealant. Use a type that will allow the sensor to be removed if needed. A special cable is provided for the sensor.

Fig. 11: Sensor location



Connect the fresh water supply to an approved filter. Failure to install a filter voids the warranty. Then connect the filter to the unit (Figure 12, below).

There are two penetrations in the panel at the rear of the unit. The power supply, raw water pump and ice bin sensor can be routed through these penetrations. For ease of installation, we provide a wiring harness with heatshrink butt connectors for the pump. Always use heatshrink or heat-shrink butt connectors when making any field wiring connections. The power and sensor wires connect to the terminal blocks inside of the electrical enclosure, and to the circuit board. Remove all power to the machine and make sure it is locked-out when working on the electrical wiring. Insert the field wiring into the Cage Clamp® connections on the terminal blocks and circuit board. To do so insert a 3/32" (2.5mm) flat head screwdriver into the square hole behind the round wire receptacle. Push firmly and you will feel the cage clamp release. Strip the wire end between 0.31" – 0.40" (8mm-10mm) and insert into the screwdriver to engage the clamp on the wire.

Commissioning

PRE-COMMISSIONING CHECKS

- Check that all electrical connections are on the correct terminals before applying power.
- Verify the correct voltage into the circuit breaker prior to turning on.
- All fresh water connections are tight and not leaking. Fresh water filter must be installed.
- Ice transport hose installed and secured at both ends. Hose is insulated with not cuts or tears.
- Ice transport hose is supported at required intervals.
- Raw water hose connections have double-reversed hose clamps.
- Raw water pump and strainer are below the waterline.
- Raw water hose from the outlet of the pump supported.
- All isolation valves are open.
- Both drains are connected and ran to a sump pump.

COMMISSIONING

Start-Up Procedure

Turn on the circuit breaker in the ship's panel.

Turn on the on/off breaker on the outside of the ice machine's electrical box.

Allow time for the digital display to power up. Once powered up and the main screen is shown, press the start button.

The waiting indication will flash as the time delay counts down for the compressor to start. During this waiting period the fresh water solenoid is open and the float assembly and auger are filling with water. The auger and raw water pump are on then the compressor starts. The running indicator will now be on. Ice is produced and pushed through the transport hose to the ice bin.

Monitor the system operation and ice production. Check for any leaks of the fresh water and raw water connection. Verify that the raw water is discharging overboard.

When the ice bin is full, the sensor will shut down the unit. After the compressor stops the auger motor and raw water pump continue to operate for 1 minute.

Display Screen

TOUCH SCREEN DISPLAY

The MAIN screen appears after power is applied and boot-up. The center button turns the system on or off. It also resets any fault codes once the fault has cleared.

When the system is turned on the Waiting indicator to the will illuminate as the system times out. After time-out the Running indicator will illuminate. If a fault condition exists, the system shuts down and the Alarm indicator illuminates. A fault description is displayed at the bottom of the screen.

Pressing the Status button to the left will take you to the Status screen.

The Factory button is reserved for factory personnel and trained service technicians.

Running Waiting	0
Alarm	\bigcirc
	State

On the Status screen there are indicators for sensor status, system operation and fault conditions. To the right of the Compressor, Auger and Raw Water Pump is a readout of the amperage draw for each of those loads. Return to the Main screen by pressing the button to the bottom left.

	-				
Status					
Compressor	○ #.##A				
Auger					
Raw Water Pump	() #.##A				
Water Valve	\bigcirc				
Compressor Overload	\bigcirc				
Auger Overload	\bigcirc				
Pump Overload	\bigcirc				
	Status Compressor Auger Raw Water Pump Water Valve Compressor Overload Auger Overload Pump Overload				

Troubleshooting

FAULT	REMEDY
Compressor Overload	Compressor amperage high. Check raw water circuit for restriction.
Auger Overload	Auger amperage high. Check ice delivery hose for blockage.
Raw Water Pump Overload	Pump amperage high. Check raw water circuit for restriction.
Discharge Pressure	Discharge pressure high. Check raw water circuit for restriction.
Suction Pressure	Suction pressure low. Check ice delivery hose for blockage.
INDICATIONS	DESCRIPTION
Compressor	Compressor running
Auger	Auger running
Raw Water Pump	Pump running
Water Valve Solenoid	Water valve solenoid energized
Discharge Pressure OK	High pressure switch closed
Suction Pressure OK	Suction pressure switch closed
Water Level Low	Water reservoir filling with water. If indication stays on for more than a minute check fresh water feed.
Start/Stop/Reset	Indicates status of switch
Bin Full	On when bin is full, off when bin level drops

Maintenance

DAILY

Raw Water Strainer

Raw water strainers are mandatory for all systems. Check the raw water strainer daily. A visual inspection through the sight-glass housing is usually sufficient for daily inspections. Open the strainer and inspect at least once a week or if debris build up is noted. Make sure you close the thru-hull valve prior to opening the strainer for service.

WEEKLY

Raw Water Strainer

Open the strainer and inspect at least once a week or if debris build up is noted. Make sure you close the thru-hull valve prior to opening the strainer for service.

Remove any debris from the strainer sight-glass housing and strainer basket. Flush the strainer basket and clean/ vacuum out the housing prior to inserting the basket back into it. Some strainer sight-glass housings incorporate a drain plug to help with cleaning.

Some applications use a 'Sea Chest' for the raw water supply. The strainer for the Sea Chest may have a large mesh that does not filter small particulate. Install a strainer between the Sea Chest and the raw water pump inlet to filter out this small particulate.

Replace the strainer basket immediately if it is showing signs of decay or damage. Do not operate the system with the strainer basket removed. Inspect the housing and tie rods for cracks or signs of deterioration. Replace defective parts immediately to prevent the risk of flooding.

Gaskets or O-Rings are used to seal the strainer and can easily fall into the bilge when the lid is removed. Always check that the seals are in place prior to closing-up the strainer. Prior to tightening the retaining bolts or clips, check the seating of the seals. Replace loose or damaged seals. Use caution, over-tightening of retaining bolts and clips can crack the housing or strip threads.

Cracks in the sight-glass housing or a poor seal can cause a suction leak. This can allow air to enter the inlet of the pump when it is in operation. Air bubbles in the pump head can cause cavitations that erode the impeller and pump head on metal pumps. It can also damage the shaft seal. It causes binding of the impeller on plastic head pumps.

Check bonding lugs for corrosion and tightness on metal strainers. Clean and replace connections as necessary.

QUARTERLY

Condensate Drains

Pour a quart of water into the condensate pans. If it does not drain quickly then check the drain pan and lines for blockages.

Electrical Connections

Inspect electrical connections and tightened as needed. Heat and vibration can cause connections to loosen causing poor contact and voltage drops. This can lead to arcing, burnt wires and nuisance tripping of the breaker.

Remove electrical power and lockout prior to performing electrical checks.

Hose Clamps

Check the hose connections on the condenser coil, auger outlet, pump, sea strainer and thru-hull fittings. In most situations, a nut-driver or screwdriver will provide sufficient torque to tighten a clamp. Use caution when using a socket set, it is easy to over tighten the clamp and cause damage to its threads.

Do not use power tools to tighten hose clamps!

Insulation

Inspect insulation for tears or open seams. Replace or repair damaged sections as necessary.

• Thru-Hull Fittings

Debris such as plastic bags can be sucked onto thru-hull fittings causing a restriction of water flow. Marine growth build up can also be a problem. Inspect thru-hulls and clean before the restriction becomes severe. Severe water restrictions diminish the capacity of the system and can cause pump failures.

Fresh Water Filter

When the ice machine is in constant use, replace the water filter cartridge every three months. For occasional or weekend use replace every six months. To remove the filter turn off the fresh water supply. Place a container under the filter housing to catch any water that spills out when removing it. To release, turn the housing in the direction of the arrow until it stops, then pull down. Some filter housings can be turned by hand and some require a wrench. To prevent damage to the housing use the wrench provided by the manufacturer.

Maintenance

YEARLY

Condenser Coils

Back flush condenser coils annually, or more frequently depending on water quality. Periodically chemical cleaners are needed to remove marine growth or scale. Consult the condenser coil cleaning section for instructions on chemically cleaning the coils. We recommend that certified technicians perform this service.

Condenser Coil & Raw Water System Cleaning

Prior to cleaning the condenser coil or raw water piping take baseline readings such as refrigerant pressures, amperages and the temperature of each condenser coil wrap.

Turn off the unit and raw water pump. Close the thru-hull valve.

The entire raw water system can be flushed at the same time. However, the most effective way to clean the system is to isolate each section (condenser, manifold, piping) and clean individually.

Before using chemicals to clean the system it should be back-flushed with fresh water into a container. The pressure generated from the dockside water connection or the onboard fresh water pump is usually greater than what is generated by the system's raw water pump. This pressure can usually flush out a significant amount of debris and contaminants from inside the system.

After the back-flushing; the system should be checked again to see if there was a change in the baseline readings. If within the normal range then no further cleaning is needed.

Back-flushing with fresh water should be part of your maintenance schedule. The frequency is dependent on the usage of the system and water conditions in the areas where the boat operates. It may only require it once a year or every 3 months. In harsh conditions it may be required more frequently.

If the back-flushing has minimal impact on the system cleanliness then chemical cleaning is needed.

There are numerous chemicals available for cleaning raw water systems onboard vessels. Some are environmentally friendly and some are more aggressive. Any chemical or mix used for the cleaning of the system must be captured and disposed of in accordance with Federal, State and/or Local Regulations. Follow all directions and warnings provided by the manufacturer of the chemical. Safety equipment and clothing must be used to protect personnel and prevent damage to the surrounding area or equipment.

Chemical cleaners are available at local Marine Wholesalers, Online or at Commercial Supply Houses. When selecting a cleaner make sure it is compatible with the materials in the raw water circuit. Some cleaners are made to clean a specific contamination such as Algae or Crustaceans and Calcification, some clean a broad spectrum of contaminants.

Some chemical manufacturers have a cleaning kit available for purchase. It usually includes a chemical container with hose connections, hose, chemical pump, filter, and other miscellaneous items. You could also make up your own kit. A Technicold TE500 pump is a good quality, chemical resistant, submersible pump that can be used for this purpose. When using any pump for cleaning, a strainer/filter/screen must be installed on the inlet of the pump to prevent debris from damaging the impeller.

The container should be of sufficient volume for the chemical/water mix required. The chemical pump can be placed outside of the container. A bulkhead fitting would be installed in the side of the container and a hose connected from it to a strainer, then to the inlet of the pump. Connect a hose from the discharge of the pump to the inlet of the coil/manifold/piping to be cleaned. Another hose goes from the outlet of the coil/manifold/piping back into the bucket. If using a submersible pump a bulkhead fitting is not needed. The pump can be placed directly in the container with a strainer/filter/screen attached to the inlet. Check the filtration on the inlet of the pump regularly and clean as needed.

Make sure that any materials used (container, hoses, fittings, pump, etc.) to flush the system are compatible with the chemical used.

Use caution when mixing the chemical and water that you do not splash it on yourself or the surrounding area.

Once you have set up your cleaning kit it should be operated with fresh water to check for leaks prior to adding the chemical mix. Protect the area where you are working to prevent damage from splashing or spilled chemical.

Maintenance

Condenser Coil & Raw Water System Cleaning (continued)

There are two methods used for cleaning a system. The "Immersion Method" and the "Open Loop Recirculation Method". Immersion cleaning requires the system to be filled with the water/chemical mix and left to dissolve the internal growth/contamination for an extended period of time. It is the least effective of the two methods and should be considered only if there is a blockage in the system that stops the flow of liquid. Open loop recirculation method pumps the mix through the system. It is captured back into the container where the mix is drawn from by the recirculation pump. This continuous flow through the system is the most effective method of cleaning.

When the system is chemically cleaned a forward-flush and back-flush procedure should be performed. To forward-flush the water/chemical mix is pumped into the bottom connection and discharges from the top connection back into the container. This will be the same flow direction as the normal raw water flow. It will fill the coil/manifold/piping with the mix so that all surfaces are wetted. After the cleaning procedure is done the flow should be reversed and the system back-flushed with the mix. Pump pressure in addition to gravity will remove any larger debris that may be left in the system back into the container.

It is very important that whenever a system is chemically cleaned that it must be flushed with fresh water for a minimum of 10 minutes to remove residual chemical. Every chemical manufacturer provides dilution ratios and gallons of chemical required for the size system that you have. They also have recommended cleaning times for average or heavy fouling of the system. Some chemicals have color indication or test strips to monitor strength of the solution so that you know when to add more or replace as needed. A visual inspection inside the chemical container will also give and indication if the system is clean. If no more debris is seen entering the container then it is probably clean.

Upon completion of the cleaning routine and flushing with fresh water the system should be put back online. The pressures, amperages and temperatures should be taken again. If they are still operating high then additional cleaning may be needed.

It should be noted that on smaller systems the raw water pumps may have a magnetic drive impeller. This stationary impeller may be restrictive to the flow of the solution during cleaning and it is recommended that it be removed until the cleaning process is complete. Don't forget to re-install it prior to doing the post-cleaning system check. Make sure there is no debris inside the impeller housing prior to installing the impeller.

When you have a situation where the condenser coil needs cleaning, do not assume that it is the only part of the system that is fouled up. Even if the raw water strainer looks clean the piping and manifold can also be dirty. A visual inspection of the inside of the piping and manifold should be done at the time of the cleaning or fresh water back-flushing.

	Maintenance Log			
Date		TASK		NOTES
Date		IAGN		NOTES

Warranty

TECHNICOLD Air Conditioning and Refrigeration Products

Technicold manufacturerer NORTHERN LIGHTS, INC. (herein "NLI") extends to the purchaser and user (herein "Owner") of the product the following limited warranty (herein "Warranty"). Please read it carefully.

For Warranty Service contact Northern Lights 1 (800) 843-6140

Technicold Air Conditioning and Refrigeration Products Warranty Period

		_
Product	12 months	
Parts + Labor	12 months	
Parts	24 months	

NLI'S WARRANTY AND RESPONSIBILITIES

Subject to the terms and conditions set out below, NLI warrants the product and its factory installed parts to be free from defects in material and workmanship under normal use and service.

If the product is purchased for and used primarily in a commercial endeavor, the Warranty period shall extend from the date of delivery to the original end user for a period of twelve (12) months with no limit on hours of use. If the product is purchased for and used primarily in personal, family or household use, the warranty period shall extend from the date of delivery to the original end user for a period of twelve (12) months with no limit on hours of use. Original parts shall be warrantied for a period of twenty-four (24) months from date of delivery.

The obligation of this Warranty shall be limited to repairing or replacing any part of the product which NLI agrees is defective in materials or workmanship under normal use and service during the warranty period. If during the warranty period the product or any of its parts are found to be defective because of workmanship or materials, it will be repaired or replaced without charge if the Owner prepays the transportation charges and returns the item to NLI's authorized warranty dealer. To find the location of the nearest NLI authorized warranty dealer, contact NLI at the address, e-mail address, or telephone or fax numbers on the following page.

Upon request by the Owner and agreement by NLI, repair of product or replacement of parts under this Warranty may be completed at a place other than at an NLI authorized warranty dealer. See "Owner's Responsibilities" below.

NLI'S WARRANTY AND RESPONSIBILITIES

Within thirty (30) days of purchase, Owner or authorized agent of Owner must complete, sign and deliver to NLI the Warranty Registration Card in order to validate this warranty. Owner must break in unit as described in the "Operating Procedures" section of the Operator's Manual.

At the time of presentation of product for service under this Warranty, the Owner or authorized agent must present evidence of the date of original purchase of the product.

If pre-approved repair of product or replacement of parts under this Warranty is completed at a place other than an NLI authorized warranty dealer, Owner shall pay NLI's or its authorized dealer's reasonable travel expenses.

Owner shall pay costs of any labor required to remove and reinstall the product and/or parts thereof, any premium for overtime labor requested by the Owner and costs for transporting the product and/or parts thereof to and from the place where warranty work is performed.

1419 West Newport Center Drive Deerfield Beach, FL 33441

www.technicold.com

WARRANTY LIMITATIONS

This warranty will not apply to equipment put into service more than twenty-four (24) months from date of shipment from factory, and will not apply in any country with which trade is restricted or banned by the U.S. Department of State, at or after the time of sale or claim.

If the product is used primarily in a commercial endeavor, neither NLI nor any company affiliated with NLI will be liable for general damages, including bodily injuries, except as set forth above, or for incidental consequential damages, including, but not limited to, loss of use, loss of profits, loss of production, expense of substitute equipment or other commercial loss or for damage to property in which equipment is installed. The same limitations shall apply to a product used for personal purposes with respect to all non-personal injuries, general, incidental and consequential damages.

Some countries or states do not fully allow the above exclusions or limitations of general, incidental or consequential damages, so the above exclusions or limitations may not apply to you.

This Warranty extends only to the original parts, accessories and products.

This Warranty is transferrable to a new Owner during the warranty period. No transfer forms or fees are required.

This Warranty does not extend to failure resulting from an accident or disaster or from Owner or operator abuse or neglect (such as operating without proper maintenance of equipment, including pumps, filters and electrical connections.)

Service parts worn out by usage and not due to defects in workmanship or material are not covered by this Warranty.

NLI is not responsible for failure resulting from improper repair or use of defective parts or parts not approved by NLI.

NLI is not responsible for failure of product or parts resulting from improper installation or unauthorized modifications.

NLI is not responsible for failure caused by negligent handling or abuse in installation or storage in improper environment which results in corrosion or freezing damage to equipment.

NLI is not responsible for failure caused by any third party's transportation damage to NLI's product.

NLI is not responsible for damage if any warning alarm system is ignored.

NO REPRESENTATIONS AND LIMITATIONS OF IMPLIED WARRANTY

This written Warranty is in lieu of all other express warranties, obligations or limitations. If this equipment is used primarily in a commercial endeavor, no implied warranty, including that of merchantability and fitness for a particular purpose is extended. If the product is used primarily in personal, family or household use, any implied warranty, including that of merchantability and fitness for a particular purpose, shall be limited to twelve (12) months.

Some countries or states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you.

No person is authorized to make any representations or promised on behalf of NLI or to modify the terms or limitations of this Warranty in any way except in writing and signed by an authorized employee of NLI.

This warranty gives you specific legal rights, and you may have additional statutory rights which vary from one country or state to another.

	Notes	
Date		

Technicold by Northern Lights 1419 W. Newport Center Drive • Deerfield Beach, FL 33442 Tel: (954) 421-1717 • www.technicold.com Northern Lights and Technicold are registered trademarks of Northern Lights, Inc. © 2020 All rights reserved. Litho USA.