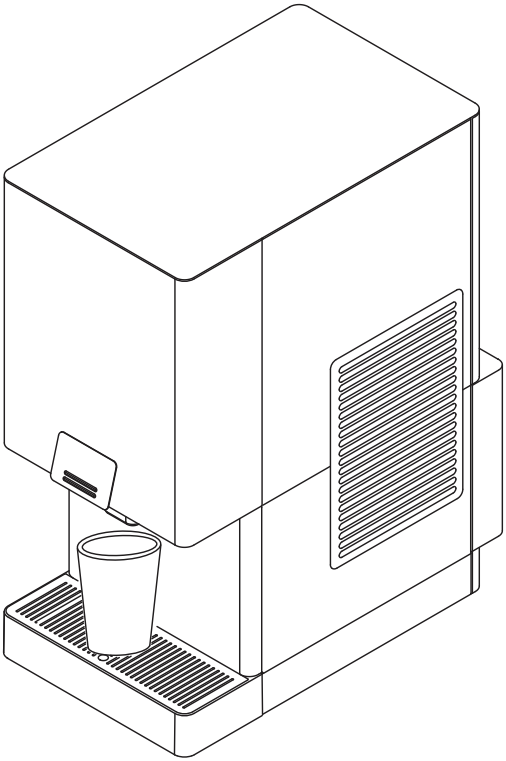
Manitowoc®

Countertop Nugget Ice Machine

CNP0200 - R290

Technician's Handbook



Part Number STH107 04/21

Safety Notices

Read these precautions to prevent personal injury:

- Read this manual thoroughly before operating, installing or performing maintenance on the equipment. Failure to follow instructions in this manual can cause property damage, injury or death.
- Routine adjustments and maintenance procedures outlined in this manual are not covered by the warranty.
- Proper installation, care and maintenance are essential for maximum performance and trouble-free operation of your equipment.
- This equipment contains high voltage electricity and refrigerant charge. Installation and repairs are to be performed by properly trained technicians aware of the dangers of dealing with high voltage electricity and refrigerant under pressure. The technician must also be certified in proper refrigerant handling and servicing procedures. All lockout and tag out procedures must be followed when working on this equipment.
- This equipment is intended for indoor use only. Do not install or operate this equipment in outdoor areas.

As you work on this equipment, be sure to pay close attention to the safety notices in this handbook. Disregarding the notices may lead to serious injury and/or damage to the equipment.

⚠ Warning

Follow these electrical requirements during installation of this equipment.

- All field wiring must conform to all applicable codes of the authority having jurisdiction. It is the responsibility of the end user to provide the disconnect means to satisfy local codes. Refer to rating plate for proper voltage.
- This appliance must be grounded.
- This equipment must be positioned so that the plug is accessible unless other means for disconnection from the power supply (e.g., circuit breaker or disconnect switch) is provided.
- Check all wiring connections, including factory terminals, before operation. Connections can become loose during shipment and installation.

⚠ Warning

Follow these precautions to prevent personal injury during installation of this equipment:

- Installation must comply with all applicable equipment fire and health codes with the authority having jurisdiction.
- To avoid instability the installation area must be capable of supporting the combined weight of the equipment and product. Additionally the equipment must be level side to side and front to back.
- Remove all removable panels before lifting and installing and use appropriate safety equipment during installation and servicing. Two or more people are required to lift or move this appliance to prevent tipping and/or injury.
- Do not damage the refrigeration circuit when installing, maintaining or servicing the unit.
- Connect to a potable water supply only.
- This equipment contains refrigerant charge.

⚠ Warning

Follow these precautions to prevent personal injury while operating or maintaining this equipment.

- Legs must be installed and the legs must be screwed in completely.
- Some 50 Hz models may contain up to 150 grams of R290 (propane) refrigerant. R290 (propane) is flammable in concentrations of air between approximately 2.1% and 9.5% by volume (LEL lower explosion limit and UEL upper explosion limit). An ignition source at a temperature higher than 470°C is needed for a combustion to occur.
- Refer to nameplate to identify the type of refrigerant in your equipment.
- Only trained and qualified personnel aware of the dangers are allowed to work on the equipment.
- Read this manual thoroughly before operating, installing or performing maintenance on the equipment. Failure to follow instructions in this manual can cause property damage, injury or death.
- Crush/Pinch Hazard. Keep hands clear of moving components. Components can move without warning unless power is disconnected and all potential energy is removed.
- Moisture collecting on the floor will create a slippery surface. Clean up any water on the floor immediately to prevent a slip hazard.
- When using cleaning fluids or chemicals, rubber gloves and eye protection (and/or face shield) must be worn.

DANGER

Do not operate equipment that has been misused, abused, neglected, damaged, or altered/modified from that of original manufactured specifications. This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision concerning use of the appliance by a person responsible for their safety. Do not allow children to play with, clean or maintain this appliance without proper supervision.

⚠Warning

When installing, using, or servicing this equipment, follow these flammable refrigeration system requirements.

- Refer to the nameplate - The ice machine contains up to 150 grams of R290 (propane) refrigerant. R290 (propane) is flammable in concentrations of air between approximately 2.1% and 9.5% by volume. R290 (propane) may burn if exposed to a heat source above 470 °C. Refer to nameplate to identify the type of refrigerant in your equipment.
- To reduce the risk of fire due to improper installation, replacement of parts, or improper use of procedure, only refrigeration technicians trained in flammable refrigerants who understand the dangers of high voltage electricity and refrigerants under pressure are allowed to work on this equipment.
- Only use parts recommended or provided by the manufacturer.

Warnings Continued On Next Page

⚠Warning

When installing, using, or servicing this equipment, follow these flammable refrigeration system requirements. (Continued)

- This equipment cannot be installed in a corridor or hallway of a public building.
- Equipment installation must comply with local sanitation and fire regulations.
- When servicing this equipment, be sure to lock the circuit breaker, and display an in-service notice.
- This device contains a high-voltage power supply and refrigerant charge. Shorting wires to the cooling system piping may cause an explosion. Before servicing the system, be sure to disconnect all power to the system. Refrigerant leakage can result in serious injury or death from explosion, fire, or contact with refrigerant or lubricant mist.
- Do not damage the refrigeration circuit when installing, maintaining or servicing the unit.

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Model Numbers

Self-Contained Air-Cooled

CNP200 - Air-cooled model

Legs

Optional 101 mm adjustable legs are available.

SEALING TO COUNTERTOP OR STAND

Ice machines installed without legs must be sealed to the countertop or stand. This prevent liquids or debris from infiltrating beneath the ice machine.

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Installation

⚠Warning

PERSONAL INJURY POTENTIAL

Remove all ice machine panels before lifting and installing.

These instructions are provided to assist the qualified installer. Check your local phone directory for the name of the nearest Manitowoc representative for information regarding start-up services.

Important

Failure to follow these installation guidelines may affect warranty coverage.

Location of Ice Machine

The location selected for the ice machine must meet the following criteria. If any of these criteria are not met, select another location.

- The ice machine can not be installed outdoors and the location must be free of airborne and other contaminants.
- The air temperature must be at least 10°C, but must not exceed 43°C.
- A potable water supply must be available.
- The location must not be near heat-generating equipment or in direct sunlight.
- The location must be capable of supporting the weight of the ice machine and a full bin of ice and allow the ice machine to be level front to back and side to side.

- The location must allow enough clearance for water and electrical connections in the **rear of the ice machine**. The drain can be routed out the rear or bottom of dispenser.
- The location must not obstruct airflow through or around the ice machine. Airflow is in the left side and out the top. Refer to chart for clearance requirements.

These ice machines are intended for use in household and similar applications such as:

- Staff kitchen areas in shops, offices and other work environments.
- Clients in hotels, motels, farmhouses, bed and breakfast and other residential type environments.
- Catering and similar non-retail applications.

⚠ Caution

To avoid instability the ice machine must be installed in an area capable of supporting the weight of the ice machine and a full bin of ice.

Ice Machine Clearance Requirements

Top	Sides	Back
50 mm	50 mm	200 mm

Notice

The ice machine must be protected if it will be subjected to temperatures below 0°C. Failure caused by exposure to freezing temperatures is not covered by the warranty. See “Removal from Service/ Winterization”.

SEALING TO COUNTER TOP OR STAND

Ice machines installed without legs must be sealed to the counter top or stand. This prevent liquids or debris from infiltrating beneath the ice machine.

Electrical Service

⚠Warning

All wiring must conform to local and national codes and the ice machine must be grounded.

VOLTAGE

The maximum allowable voltage variation is ±10% of the rated voltage on the ice machine model/serial number plate at start-up (when the electrical load is highest).

FUSE/CIRCUIT BREAKER

A separate fuse/circuit breaker must be provided for each ice machine.

Electrical Specifications

Refer to ice machine model serial plate for electrical specification.

Water Supply and Drain Requirements

⚠ Caution

Plumbing must conform to local and national codes.

- A shutoff valve and union must be installed in the potable water line before the ice machine.
- The water temperature must be at least 3°C, but must not exceed 25°C.
- A water filter is recommended for hard water areas.

Location	Water Temperature	Water Pressure
Ice Making Water Inlet	3°C Min. 25°C Max	0.1 Mpa Min. 0.6 Mpa Max.

⚠ Warning

PERSONAL INJURY POTENTIAL

For ice making, connect to a potable water supply only.

DRAIN CONNECTIONS

Follow these guidelines when installing drain lines:

- Drain lines must have a minimum 22 mm internal diameter and have a 2.5 cm per meter drop and must not create traps.
- The floor drain must be large enough to accommodate drainage from all drains.
- Drains must have a union or other suitable means to allow in-place disconnection from the ice machine when servicing is required.

Ice Making Sequence of Operation

Operation

NOTE: The water reservoir must be 2/3 full of water before starting the ice machine.

INITIAL START-UP

The ice machine does not have an on/off switch. With the water valve open, applying power will start ice making.

FREEZE CYCLE

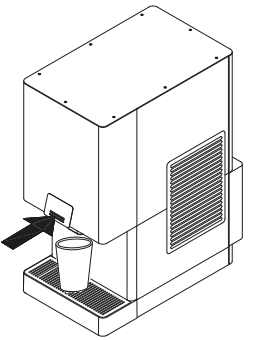
The float valve automatically maintains the water level in the reservoir. The ice machine will continue to make ice until the ice touches the thermostat in the bin.

AUTOMATIC SHUTOFF

After ice contacts the thermostat the ice machine stops. When ice is dispensed and no longer contacts the thermostat, the ice machine will start ice making until ice again contacts the bin thermostat.

ICE DISPENSE

Place a suitable container under the spout and press the dispense button until the desired quantity of ice is dispensed, then release the button.



SEQUENCE OF OPERATION

When the float switch is open at initial start-up, the ice machine will wait for the switch to close before starting.

During the freeze cycle, if the water float opens the ice machine will De-energize the compressor and gear motor. The following sequence describes the normal start-up procedure for the ice machine when line voltage is disconnected then reconnected to the ice machine.

1. Power is supplied.
2. The water reservoir is full and the float switch is closed.
3. The compressor and gear motor start.
4. The ice machine continues to make ice until ice touches the bin thermostat, at which time the compressor and gear motor de-energize.
5. When ice no longer contacts the bin thermostat the compressor and gearmotor restart.

Operational Checks

GENERAL

Normally, a newly installed ice machine does not require any adjustment.

To ensure proper operation, always follow the Operational Checks:

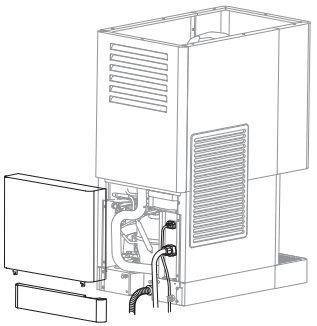
- when starting the ice machine for the first time
- after a prolonged out-of-service period
- after descaling and sanitizing

NOTE: Routine adjustments and maintenance procedures outlined in this manual are not covered by the warranty.

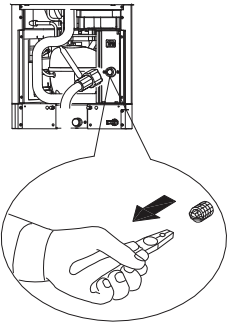
CLEANING THE WATER INLET SCREEN

Clean the water filter screen at least every 2 months.

1. Disconnect power to the ice machine and turn off the potable water supply.
2. Remove back panels to access potable water inlet .



3. Remove water inlet line from ice machine, then remove the water filter with a pliers for cleaning. Flush the filter clean with water or replace as needed.



4. Reassemble filter, water inlet line and replace panels. Restore water and electrical supply to the ice machine.

Interior Cleaning and Sanitizing

Maintenance procedures covered in this manual are not covered by the warranty.

> **⚠ Warning**
>
> Wear rubber gloves and safety goggles (and/or face shield) when handling descaling or sanitizing products.

DESCALING/SANITIZING PROCEDURE

This procedure must be performed once every six months.

- All ice must be removed from the bin.
- The ice machine and bin must be disassembled, descaled and sanitized.
- The ice machine produces ice with the descaler and sanitizer solutions.
- All ice produced during the descaling and sanitizing procedure must be discarded.

HEAVILY SCALED ICE MACHINES

Perform the descaling/sanitizing procedures if you have some or all of these symptoms.

- Grinding, popping or squealing noises from the evaporator.
- Grinding noise from gearbox.

Exterior Cleaning

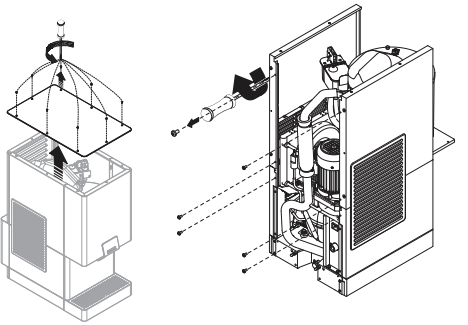
Remove dust and dirt off exterior surfaces with mild household dish washing detergent and warm water. Wipe dry with a clean, soft cloth.

Descaling/Sanitizing Procedure

Step 1 Dispense all ice from the bin.

Step 2 Disconnect power to the ice machine.

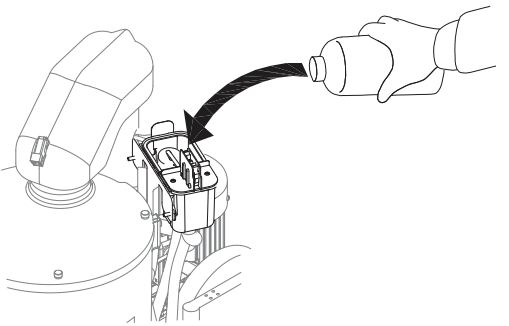
Step 3 Remove top, back and side panels.



Step 4 Turn off the ice making water supply and drain water from evaporator and reservoir.

Step 5 Make 2 liters of 25% descaler solution by mixing .5 liters of white vinegar and 1.5 liters water.

Step 6 Remove the top cover from the water reservoir and fill the evaporator and reservoir with cleaning solution.



Step 7 Reapply power and the ice machine will make ice with the descaling solution and deposit the ice in the bin. Add the remaining solution as the water level in the reservoir drops.

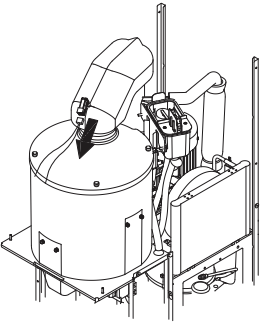
NOTE: Do not allow the solution level to drop below the minimum water level. The ice machine will discontinue the cleaning cycle if the water float switch opens.

Step 8 After all of the descaler/water solution has been added, turn on the ice making water supply. Continue the freeze cycle for 10 minutes to remove the cleaning solution from the water circuit.

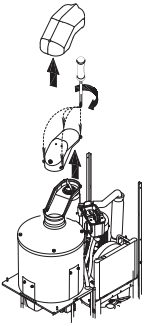
Step 9 Disconnect power to the ice machine.

Step 10 Disassemble parts for hand cleaning/sanitizing.

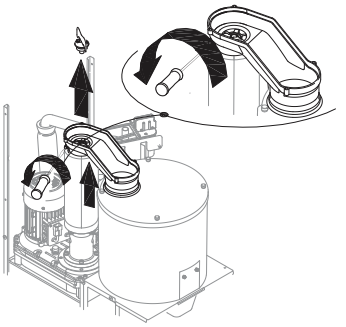
Disconnect ice chute wire



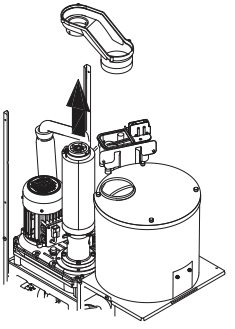
Remove ice chute top cover and fasteners



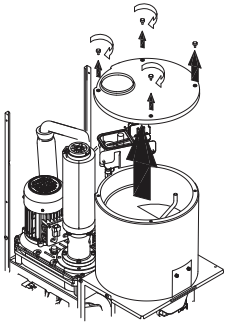
Remove ice wiper and loosen Ice chute fastener



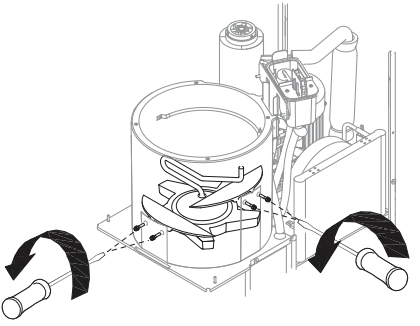
Remove ice chute



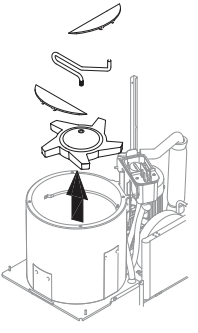
Remove bin cover fasteners and bin cover



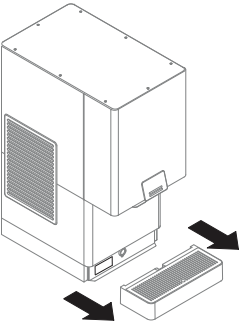
Remove ice deflector fasteners



Remove deflectors and dispenser wheel



Remove drain pan



Step 11 Hand descale and sanitize all parts using a sponge or soft bristle brush.

- Make 2 liters of 25% descaler solution by mixing .5 liters of white vinegar and 1.5 liters water. Descale all parts including interior bin surfaces, then rinse with clear potable water.
- Make 2 liters of a 25°C solution of 200 mg/l sodium hypochlorite and water. Sanitize all parts including interior bin surfaces, then rinse with clear potable water.
- Descale/rinse, sanitize/rinse the top of the evaporator.
- Descale/rinse, sanitize/rinse the drain pan.

Step 12 Reassemble all parts removed in step 10.

Step 13 Make 2 liters of a 25°C solution of 200 mg/l sodium hypochlorite and water.

Step 14 Drain all water from the evaporator and reservoir, then fill the evaporator and reservoir with sanitizer/water solution.

Step 15 Reapply power and the ice machine will make ice with the sanitizer/water solution and deposit the ice in the bin. Add the remaining solution when the water level in the reservoir drops.

NOTE: Do not allow the solution level to drop below the minimum water level. The ice machine will discontinue the cleaning cycle if the water float switch opens.

Step 16 After all of the solution has been added to the reservoir, turn on the ice making water supply.

Step 17 Continue the freeze cycle for 30 minutes and then discard all ice produced.

Air-Cooled Condenser Cleaning

⚠ Warning

Disconnect electric power to the ice machine and the remote condenser at the electric service switch before cleaning the condenser.

A dirty condenser restricts airflow, resulting in excessively high operating temperatures and reduced ice production. Clean the condenser at least every six months.

⚠ Caution

The condenser fins are sharp. Use care when cleaning them.

Clean the outside of the condenser with a soft brush or a vacuum with a brush attachment. Shine a flashlight through the condenser to check for dirt between the fins. If dirt remains, a method suitable to remove the contamination must be used to ensure air flow.

Removal from Service/Winterization

1. Descale and sanitize the ice machine.
2. Disconnect electrical power to turn off the ice machine.
3. Turn off the water supply, disconnect and drain the incoming ice-making water line at the rear of the ice machine and drain the water trough.
4. Blow compressed air in both the incoming water and the drain openings in the rear of the ice machine to remove all water.
5. Replace all panels.

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Operation

When the float switch is open at initial start-up, the ice machine will wait for the switch to close before starting.

During the freeze cycle, if the water float opens the ice machine will de-energize the compressor and gear motor. The following sequence describes the normal start-up procedure for the ice machine when line voltage is disconnected then reconnected to the ice machine.

1. Power is supplied.
2. The water reservoir is full and the float switch is closed.
3. The compressor and gear motor start.
4. The ice machine continues to make ice until ice touches the bin thermostat, at which time the compressor and gear motor de-energize.
5. When ice no longer contacts the bin thermostat the compressor and gearmotor restart.

Ice Machine Will Not Run Diagnostics

⚠Warning

High (line) voltage is applied to the ice machine at all times. Disconnect the main power supply before servicing the ice machine.

When line voltage is present and the power switch is on, the dispense motor will run when the delivery button is pushed.

1. Power supplied to the ice machine?
2. Power switch on? Refer to “Power Switch” on page 39. When dispense motor functions switch is ok.
3. Bin Thermostat closed? Refer to “Power Switch” on page 39.
4. Evaporator Safety Thermostat closed? Refer to “Compressor Electrical Diagnostics” on page 47
5. Ice Chute Safety Switch closed? Refer to “Ice Chute Safety Switch” on page 42.
6. Water Level Switch closed and Water Inlet Valve energized? Refer to “Float Switch” on page 43
7. Low water level switch closed and power is present on the compressor delay timer? “Compressor Delay Timer” on page 44.
8. Compressor time delay relay closes after 10 minute time delay? Refer to “Compressor Delay Timer” on page 44.
9. Compressor relay coil energizes and closes relay contacts.
10. Power on compressor terminals? Refer to “Compressor Electrical Diagnostics” on page 47.
11. Compressor start components functioning? Refer to “Diagnosing Start Components” on page 49.

Refrigeration Diagnostics

BEFORE BEGINNING SERVICE

Ice machines may experience operational problems only during certain times of the day or night. A machine may function properly while it is being serviced, but malfunctions later. Information provided by the user can help the technician start in the right direction, and may be a determining factor in the final diagnosis.

Ask these questions before beginning service:

- When does the ice machine malfunction? (night, day, all the time, only during the Freeze cycle, etc.)
- When do you notice low ice production? (one day a week, every day, on weekends, etc.)
- Can you describe exactly what the ice machine seems to be doing?
- Has anyone been working on the ice machine?
- During "store shutdown," is the circuit breaker, water supply or air temperature altered?
- Is there any reason why incoming water pressure might rise or drop substantially?

INSTALLATION/VISUAL INSPECTION CHECKLIST

Possible Problem List	Corrective Action List
Filter and/or condenser is dirty.	Clean the filter and condenser.
Water filtration is plugged (if used).	Install a new water filter.

WATER SYSTEM CHECKLIST

A water-related problem could cause component misdiagnosis.

Water system problems must be identified and eliminated prior to replacing other components.

Possible Problem List	Corrective Action List
Water area (evaporator) is dirty.	Descale as needed.
Water inlet pressure not between 0.1 Mpa and 0.6 Mpa.	Install a water regulator valve or increase the water pressure.
Incoming water temperature is not between 3°C and 25°C.	If too hot, check the hot water line check valves in other store equipment.
Water filtration is plugged (if used).	Install a new water filter.
Hoses, fittings, etc., are leaking water.	Repair/replace as needed.
Water float valve is stuck open or closed.	Clean/replace as needed.

ICE PRODUCTION/QUALITY CHECK

QUALITY CHECK

Ice quality will vary with ambient and water temperatures, and is measured by the amount of excess water in the ice. An easy test is to squeeze a handful of ice. High quality ice releases only a small amount of water. As ice quality drops, more water can be removed.

Generally speaking, higher incoming water temperature results in lower ice quality.

Lower water temperature results in higher ice quality.

ICE PRODUCTION CHECK

1. Run the ice machine a minimum of 10 minutes to allow the system to stabilize.
2. Catch the ice in a non-perforated container for 7 minutes and 12 seconds or for more accuracy 14 minutes and 24 seconds.
3. Weigh the container and ice, then deduct the weight of the container.
4. Determine the 24-hour ice production capacity.
    - 7 minutes 12 seconds: Multiply the total ice weight by 200.
    - 14 minutes 24 seconds: Multiply the total ice weight by 100.

Example:

1. Collected ice for 7 minutes 12 seconds.
2. Total weight (minus container) = 340 grams
3. 340 grams x 200 = 68000 grams (68kg) of ice every 24 hours.
4. Compare the capacity to the 24-hour ice production chart for the model being tested.
5. Ice production checks that are within 10% of the charted capacity are considered normal due to variances in air and water temperatures. Actual temperatures will seldom match the chart exactly.

ANALYZING DISCHARGE TEMPERATURE

1. Determine the ice machine operating conditions:
   - Air temperature entering condenser
   - Air temperature around ice machine
   - Water temperature entering water reservoir
2. Refer to 24-Hour Ice Production/Refrigeration Pressure Chart for ice machine being checked.

   Use the operating conditions determined in Step 1 to find the published normal discharge line temperatures and compare to actual discharge line temperature readings.
3. Measure the actual discharge line temperature.
4. Compare the actual discharge pressure (step 3) with the published discharge pressure (step 2).

   The discharge pressure is normal when the actual temperature falls within the published temperature range for the ice machine's operating conditions.

Discharge Temperature High Checklist

Problem	Cause
Improper installation	Refer to "Installation/Visual Inspection Checklist."
Restricted condenser air flow	Dirty air filter High inlet air temperature Condenser discharge air recirculation Dirty condenser fins Defective fan motor
Improper refrigerant charge	Overcharged Non-condensible in system Wrong type of refrigerant
Other	Non-OEM components in system High side refrigerant line/component restricted (before mid-condenser)

Discharge Pressure Low Checklist

Problem	Cause
Improper installation	Refer to “Installation/Visual Inspection Checklist.”
Improper refrigerant charge	Undercharged Wrong type of refrigerant
Other	Low ambient temperature Non-OEM components in system High side refrigerant lines/component restricted (before mid-condenser) Suction pressure is too low and affecting discharge pressure. No water or insufficient pressure Defective TXV. Defective compressor Moisture in refrigeration system

ANALYZING SUCTION TEMPERATURE

NOTE: Analyze discharge pressure before analyzing suction pressure.

High or low discharge pressure may be causing high or low suction pressure.

Suction Temperature High Checklist

Problem	Cause
Improper installation	Refer to “Installation/Visual Inspection Checklist.”
Discharge pressure	Discharge temperature is too high and is affecting suction temperature.
Improper refrigerant charge	Overcharged Wrong type of refrigerant Non condensible in system
Other	Water leaking down drain Non-OEM components in system Expansion valve defective Defective compressor

Suction Temperature Low Checklist

Problem	Cause
Improper installation	Refer to “Installation/Visual Inspection Checklist.”
Discharge pressure	Discharge temperature is too low and is affecting suction temperature.
Other	Non-OEM components in system No water or insufficient pressure

Component Check Procedures

Electrical Components

POWER SWITCH

FUNCTION

The switch is used to place the ice machine in ICE or OFF.

SPECIFICATIONS

Double-pole, double-throw switch. The switch is connected

it line voltage.

CHECK PROCEDURE

NOTE: When line voltage is present and the power switch is on, the dispense motor will run when the delivery button is pushed.

1. Inspect the toggle switch for correct wiring.
2. Verify line voltage is supplied to the switch.
3. Depress power button and measure for line voltage on the outlet of the switch.

BIN THERMOSTAT

FUNCTION

The bin thermostat stops the ice machine when the bin is full. The level of ice in the ice storage bin controls the ice machine shut-off. When the bin is full, ice cubes contact the bin thermostat bulb holder, which cools down and opens the bin thermostat to stop the ice machine. The ice machine remains off until enough ice has been removed from the bin. This causes the thermostat bulb holder to warm and closes the bin thermostat, restarting the ice machine.

CHECK PROCEDURE

1. Disconnect power to the ice machine.
2. Disconnect wires from the bin thermostat and check the resistance across the bin thermostat terminals

No Ice On Bulb	Ice On Bulb	Result
Contacts Closed	Contacts Open	Thermostatic is Good
Contacts Open	Contacts Closed	Replace Thermostat

NOTE: After covering/uncovering the bulb holder with ice, wait at least three minutes to allow the thermostat to react (Open/Close).

ADJUSTING

If the ice machine stops before the bin is full or runs after the bin is full, ambient temperatures are probably high or low and the bin thermostat will need to be adjusted.

Turn the thermostat to the left to decrease the level of ice before automatic shut-off. Turn to the right to increase the level of ice before automatic shut-off.

EVAPORATOR SAFETY THERMOSTAT

FUNCTION

Stops the ice machine if the evaporator temperature is too low. The thermostat is closed at temperatures above setpoint and opens at temperatures below setpoint.

Specifications	
Cut-In (Close)	**Cut-Out (Open)**
4°C ± 1	-19.5° C ± 1
At factory setting of 6	

CHECK PROCEDURE

1. Disconnect power to the ice machine.
2. Attach and insulate a temperature meter thermocouple next to the low temperature control thermocouple.
3. Disconnect wires from low temperature thermostat and connect ohm meter across temperature control terminals.

Replace the temperature control if it:

A. Is not closed at the specified setpoint.

B. Does not open at the specified setpoint.

ICE CHUTE SAFETY SWITCH

FUNCTION

Disconnects power if ice builds up in the dispense chute.

CHECK PROCEDURE

1. Disconnect power.
2. Isolate the switch by disconnecting all wires from the switch.
3. Check across the switch terminals with an ohm meter.

Activation Lever Position	Resistance Reading
Depressed	Closed
Released	Open

Replace the switch if ohm readings do not match.

FLOAT SWITCH

FUNCTION

The float switch prevents the ice machine from running when the water level is below the control setpoint.

The float switch must be closed (float in up position) before the ice machine will start, and must remained closed throughout the freeze cycle.

SPECIFICATIONS

A mechanical liquid level sensor, that magnetically operates a reed switch.

CHECK PROCEDURE

NOTE: The water float switch is connected to the water reservoir. The reservoir must be in place and water must be present in the reservoir to close the switch. Verify water is supplied to the float valve, the water inlet screen is clean, and the float and float arm are free moving.

1. Disconnect power to the ice machine.
2. Disconnect the float switch from the control board and connect an ohm meter to the switch wires.
3. Verify the switch is in the up position (reservoir full of water), then check continuity.

Step 3 Check for Continuity	
Reading	**Result**
Closed	The switch is working properly
Open	Replace the switch

4. Remove water from the reservoir and verify the switch opens as the float drops.

COMPRESSOR DELAY TIMER

FUNCTION

Delays power to the compressor relay to verify the auger clears any remaining ice from the evaporator before the freeze cycle begins.

OPERATION

1. At start up, the delay relay starts a 10 minute compressor time delay period.
2. After 10 minutes the delay relay energizes the compressor contactor.

CHECK PROCEDURE

1. Disconnect and reconnect power to the ice machine.
2. Test for line voltage on time delay terminals A1 & A2. If line voltage is not present refer to “Ice Machine Will Not Run Diagnostics” on page 32
3. Wait 10 minutes and test for line voltage on delay timer terminals 18 & 11. If line voltage is not present replace time delay.

NOTE: Initiating the compressor time delay bypass will allow ice machine to make ice.

DISPENSE SWITCH

FUNCTION

Supplies power to the product selector switch when activation lever is depressed.

CHECK

1. Inspect the selector switch for correct wiring.
2. Isolate the switch by disconnecting all wires from the switch.
3. Check across the switch terminals with an ohm meter.

Activation Lever Position	Resistance Reading
Depressed	Closed
Released	Open

Replace the selector switch if ohm readings do not match.

FAN CYCLE CONTROL

FUNCTION

Energizes and de-energizes the condenser fan motor.

The fan cycle control closes on an increase, and opens on a decrease in discharge pressure.

Specifications	
Cut-In (Close)	**Cut-Out (Open)**
12.8 ±34 bar	10.8 ±.34 bar

CHECK PROCEDURE

1. Verify fan motor windings are not open or grounded, and fan spins freely.
2. Connect manifold gauge set to ice machine.
3. Hook voltmeter in parallel across the fan cycle control, leaving wires attached.
4. Refer to chart below.

FCC Setpoint:	Reading Should Be:	Fan Should Be:
Above Cut-In	0 Volts	Running
Below Cut-Out	Line Voltage	Off

COMPRESSOR ELECTRICAL DIAGNOSTICS

The compressor does not start or will trip repeatedly on overload.

Check Resistance (Ohm) Values

NOTE: Compressor windings can have very low ohm values. Use a properly calibrated meter.

Perform the resistance test after the compressor cools. The compressor dome should be cool enough to touch (below 49°C) to assure that the overload is closed and the resistance readings will be accurate.

SINGLE PHASE COMPRESSORS

1. Disconnect power, then remove the wires from the compressor terminals.
2. The resistance values between C and S and between C and R, when added together, should equal the resistance value between S and R.
3. If the overload is open, there will be a resistance reading between S and R, and open readings between C and S and between C and R. Allow the compressor to cool, then check the readings again.

Check Motor Windings to Ground

Check continuity between all three terminals and the compressor shell or copper refrigeration line. Scrape metal surface to get good contact. If continuity is present, the compressor windings are grounded and the compressor should be replaced.

Compressor Drawing Locked Rotor

To determine if the compressor is seized, check the amp draw while the compressor is trying to start.

The two likely causes of this are a defective starting component and a mechanically seized compressor.

To determine which you have:

1. Install gauge on high and low side.
2. Try to start the compressor.
3. Watch the pressures closely.
    A. If the pressures do not move, the compressor is seized. Replace the compressor.
    B. If the pressures move, the compressor is turning slowly and is not seized. Check the capacitors and relay.

COMPRESSOR DRAWING HIGH AMPS

The continuous amperage draw on start-up should not be near the maximum fuse size indicated on the serial tag.

Diagnosing Capacitors

- If the compressor attempts to start, or hums and trips the overload protector, check the starting components before replacing the compressor.
- Visual evidence of capacitor failure can include a bulged terminal end or a ruptured membrane. Do not assume a capacitor is good if no visual evidence is present.
- A good test is to install a known good substitute capacitor.
- Use a capacitor tester when checking a suspect capacitor. Clip the bleed resistor off the capacitor terminals before testing.

DIAGNOSING START COMPONENTS

If the compressor attempts to start, or hums and trips the overload protector, check the start components before replacing the compressor.

Capacitor

Visual evidence of capacitor failure can include a bulged terminal end or a ruptured membrane. Do not assume a capacitor is good if no visual evidence is present. A good test is to install a known good substitute capacitor. Use a capacitor tester when checking a suspect capacitor. Clip the bleed resistor off the capacitor terminals before testing.

Relay

The relay has a set of contacts that connect and disconnect the start capacitor from the compressor start winding. The contacts on the relay are normally closed (start capacitor in series with the start winding). The relay senses the voltage generated by the start winding and opens the contacts as the compressor motor starts. The contacts remain open until the compressor is de-energized.

Relay Operation Check

> **⚠Warning**
>
> Disconnect electrical power to the ice machine before proceeding.

1. Disconnect wires from relay terminals.
2. Verify the contacts are closed.
   Measure the resistance between terminals 1 and 2. No continuity indicates open contacts. Replace the relay.
3. Check the relay coil.
   Measure the resistance between terminals 2 and 5. No resistance indicates an open coil. Replace the relay.
4. Connect power to the ice machine.
5. The compressor start winding should energize for less than 1 second. Continued high amperage draw could indicate:
   - Low incoming power supply.
     (Check voltage at compressor start-up when load is greatest.)
   - Defective relay.
   - Defective capacitor.
   - Defective compressor.
6. Verify voltage and replace all start components.
7. If all of the previous tests are satisfactory and the compressor will not operate or continue to operate, replace the compressor.

Refrigerant Recovery/Evacuation

NORMAL PROCEDURES

Do not purge refrigerant to the atmosphere. Capture refrigerant using recovery equipment. Follow the manufacturer's recommendations.

Important

Manitowoc Ice assumes no responsibility for the use of contaminated refrigerant. Damage resulting from the use of contaminated refrigerant is the sole responsibility of the servicing company.

Important

Replace the liquid line drier before evacuating and recharging. Use only a OEM liquid line filter-drier to prevent voiding the warranty.

CONNECTIONS

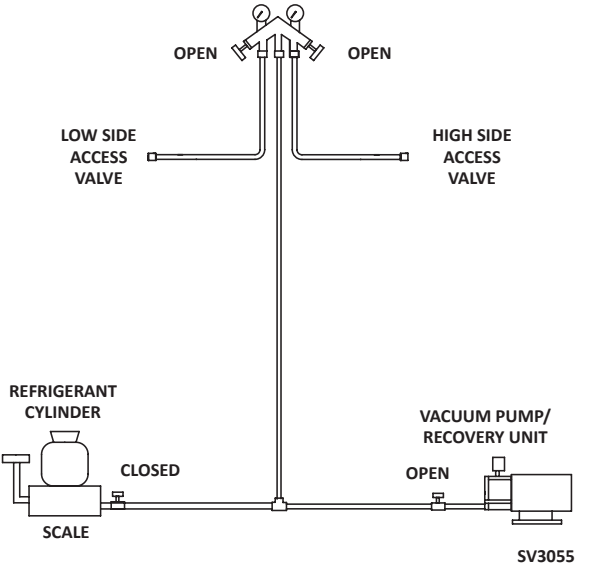
Manifold gauge sets must utilize low loss fittings.

Make these connections:

- Install piercing valves on the suction and discharge lines.
- Suction side of the compressor through the suction access valve.
- Discharge side of the compressor through the discharge access valve.

Recovery/Evacuation Procedures

1. Place the toggle switch in the OFF position.
2. Install manifold gauge set, scale, and recovery unit or two-stage vacuum pump.



RECOVERY/EVACUATION CONNECTIONS

3. Perform recovery or evacuation:
   A. Recovery: Operate the recovery unit as directed by the manufacturer's instructions.
   B. Evacuation prior to recharging: Pull the system down to 250 microns. Then allow the pump to run for an additional half hour. Turn off the pump and perform a standing vacuum leak check.

NOTE: Check for leaks using an electronic leak detector after charging the ice machine.

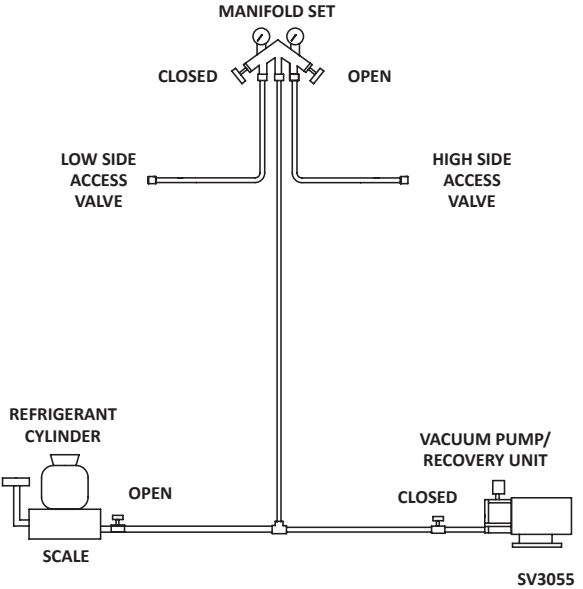
4. Follow the Charging Procedures on the next page.

Charging Procedures

Important

The charge is critical on all Manitowoc ice machines. Use a scale to ensure the proper charge is installed.

1. Be sure the toggle switch is in the OFF position.



CHARGING CONNECTIONS

2. Close the vacuum pump valve and the low side manifold gauge valve.
3. Open the high side manifold gauge valve.
4. Open the refrigerant cylinder and add the proper refrigerant charge (shown on nameplate) through the discharge access valve.
5. Let the system “settle” for 2 to 3 minutes.
6. Place the toggle switch in the ICE position.

7. Close the high side on the manifold gauge set. Add any remaining vapor charge through the suction access valve (if necessary).

NOTE: Manifold gauge set must be removed properly to ensure that no refrigerant contamination or loss occurs.

8. Make sure that all of the vapor in the charging hoses is drawn into the ice machine before disconnecting the charging hoses.
    A. Run the ice machine in the Freeze cycle.
    B. Remove the quick disconnect fitting from the high side access valve at the ice machine.
    C. Open the low side service valve at the ice machine.
    D. Open the high and low side valves on the manifold gauge set. Any refrigerant in the lines will be pulled into the low side of the system.
    E. Allow the pressures to equalize while the ice machine is in the Freeze cycle.
    F. Remove the quick disconnect fitting from the low side access valve at the ice machine and install both access valve caps.

System Contamination Clean-Up

General

This section describes the basic requirements for restoring contaminated systems to reliable service.

Important

Manitowoc Ice assumes no responsibility for the use of contaminated refrigerant. Damage resulting from the use of contaminated refrigerant is the sole responsibility of the servicing company.

DETERMINING SEVERITY OF CONTAMINATION

System contamination is generally caused by either moisture or residue from compressor burnout entering the refrigeration system.

Inspection of the refrigerant usually provides the first indication of system contamination. Obvious moisture or an acrid odor in the refrigerant indicates contamination.

If either condition is found, or if contamination is suspected, use a Total Test Kit from Totaline or a similar diagnostic tool. These devices sample refrigerant, eliminating the need to take an oil sample. Follow the manufacturer's directions.

If a refrigerant test kit indicates harmful levels of contamination, or if a test kit is not available, inspect the compressor oil.

1. Remove the refrigerant charge from the ice machine.
2. Remove the compressor from the system.
3. Check the odor and appearance of the oil.
4. Inspect open suction and discharge lines at the compressor for burnout deposits.
5. If no signs of contamination are present, perform an acid oil test.

Check the chart on the next page to determine the type of cleanup required.

Contamination/Cleanup Chart	
Symptoms/Findings	**Required Cleanup Procedure**
No symptoms or suspicion of contamination	Normal evacuation/ recharging procedure
Moisture/Air Contamination symptoms Refrigeration system open to atmosphere for longer than 15 minutes Refrigeration test kit and/or acid oil test shows contamination Leak in water cooled condenser No burnout deposits in open compressor lines	Mild contamination cleanup procedure
Mild Compressor Burnout symptoms Oil appears clean but smells acrid Refrigeration test kit or acid oil test shows harmful acid content No burnout deposits in open compressor lines	Mild contamination cleanup procedure
Severe Compressor Burnout symptoms Oil is discolored, acidic, and smells acrid Burnout deposits found in the compressor, lines, and other components	Severe contamination cleanup procedure

CLEANUP PROCEDURE

Mild System Contamination

1. Replace any failed components.
2. If the compressor is good, change the oil.
3. Replace the liquid line drier.

NOTE: If the contamination is from moisture, use heat lamps during evacuation. Position them at the compressor, condenser and evaporator prior to evacuation. Do not position heat lamps too close to plastic components, or they may melt or warp.

Important

Dry nitrogen is recommended for this procedure. This will prevent refrigeration release.

4. Follow the normal evacuation procedure, except replace the evacuation step with the following:
   A. Pull vacuum to 1000 microns. Break the vacuum with dry nitrogen and sweep the system. Pressurize to a minimum of .35 bar.
   B. Pull vacuum to 500 microns. Break the vacuum with dry nitrogen and sweep the system. Pressurize to a minimum of .35 bar.
   C. Change the vacuum pump oil.
   D. Pull vacuum to 500 microns. Run the vacuum pump for 1/2 hour on self-contained models, 1 hour on remotes.

NOTE: You may perform a standing vacuum test to make a preliminary leak check. You should use an electronic leak detector after system charging to be sure there are no leaks.

5. Charge the system with the proper refrigerant to the nameplate charge.
6. Operate the ice machine.

Severe System Contamination

1. Remove the refrigerant charge.
2. Remove the compressor.
3. Wipe away any burnout deposits from suction and discharge lines at compressor.
4. Sweep through the open system with dry nitrogen.
5. Install a new compressor and new start components.
6. Install a suction line filter-drier with acid and moisture removal capability. Place the filter drier as close to the compressor as possible.
7. Install an access valve at the inlet of the suction line drier.
8. Install a new liquid line drier.

Important

Dry nitrogen is recommended for this procedure. This will prevent refrigerant release.

9. Follow the normal evacuation procedure, except replace the evacuation step with the following:
    A. Pull vacuum to 1000 microns. Break the vacuum with dry nitrogen and sweep the system. Pressurize to a minimum of .35 bar.
    B. Change the vacuum pump oil.
    C. Pull vacuum to 500 microns. Break the vacuum with dry nitrogen and sweep the system. Pressurize to a minimum of .35 bar.
    D. Change the vacuum pump oil.
    E. Pull vacuum to 500 microns. Run the vacuum pump for 1/2 hour on self-contained models, 1 hour on remotes.

NOTE: You may perform a standing vacuum test to make a preliminary leak check. You should use an electronic leak detector after system charging to be sure there are no leaks.

10. Charge the system with the proper refrigerant to the nameplate charge.
11. Operate the ice machine for one hour. Then, check the pressure drop across the suction line filter-drier.
    A. If the pressure drop is less than .7 bar, the filter-drier should be adequate for complete cleanup.
    B. If the pressure drop exceeds .7 bar, change the suction line filter-drier and the liquid line drier. Repeat until the pressure drop is acceptable.
12. Operate the ice machine for 48-72 hours. Then remove the suction line drier and change the liquid line drier.
13. Follow normal evacuation procedures.

REPLACING PRESSURE CONTROLS WITHOUT REMOVING REFRIGERANT CHARGE

This procedure reduces repair time and cost. Use it when any of the following components require replacement, and the refrigeration system is operational and leak-free.

- Fan cycle control
- High pressure cut-out control
- Low pressure control

Important

This is a required in-warranty repair procedure.

1. Disconnect power to the ice machine.
2. Follow all manufacturer's instructions supplied with the pinch-off tool. Position the pinch-off tool around the tubing as far from the pressure control as feasible. Clamp down on the tubing until the pinch-off is complete.

⚠Warning

Do not unsolder a defective component. Cut it out of the system. Do not remove the pinch-off tool until the new component is securely in place.

3. Cut the tubing of the defective component with a small tubing cutter.
4. Solder the replacement component in place. Allow the solder joint to cool.
5. Remove the pinch-off tool.
6. Re-round the tubing.

NOTE: The pressure controls will operate normally once the tubing is re-rounded. Tubing may not re-round 100%.

Total System Refrigerant Charge

Important

This information is for reference only. Refer to the ice machine serial number tag to verify the system charge. Serial plate information overrides information listed on this page.

Model	Refrigerant Charge
CNP200 50Hz	90 g
Model/Serial plate information overrides the data in this chart.	

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Cycle Times/24-Hour Ice Production/ Refrigerant Pressure Charts

These charts are used as guidelines to verify correct ice machine operation.

Accurate collection of data is essential to obtain the correct diagnosis.

- Refer to “Refrigeration System Diagnostics” for the data that must be collected. This list includes: before beginning service, ice production check, installation/ visual inspection, water system checklist, safeguards, discharge and suction pressure analysis.
- Ice production checks that are within 10% of the chart are considered normal. This is due to variances in water and air temperature. Actual temperatures will seldom match the chart exactly.
- Zero out manifold gauge set before obtaining pressure readings to avoid misdiagnosis.
- Discharge and suction pressure are highest at the beginning of the cycle. Allow system to stabilize, then verify the pressures are within the range indicated.
- Water temperature will affect suction and discharge pressure - 10° water temperature will result in pressures on the lower end of the ranges specified. 32° water temperatures will result in pressures on the upper end of the ranges specified.

CNP0200

SELF-CONTAINED AIR-COOLED

NOTE: These characteristics will vary depending on operating conditions.

24-Hour Ice Production

Air/Water Temperature	24 Hour Ice Production
10°/10°	100 kg
21°/10°	88 kg
32°/21°	77 kgs
38°/32°	64 kgs
43°/32°	57 kgs

Operating Pressures (PSIG)

Air Temperature Entering Condenser °C	Freeze Cycle	
	Discharge Pressure Bar	Suction Pressure Bar
10°	9.99- 10.68	3.44-3.79
21°	10.34-11.03	3.86-3.99
27°	11.72-12.06	4.41-4.55
32°	12.06-12.41	4.68-4.82
38°	13.10-13.44	5.10-5.24
43°	13.78-14.47	5.37-5.51

Diagrams

Wiring Diagrams

The following pages contain electrical wiring diagrams. Be sure you are referring to the correct diagram for the ice machine you are servicing.

⚠Warning

Always disconnect power before working on electrical circuitry.

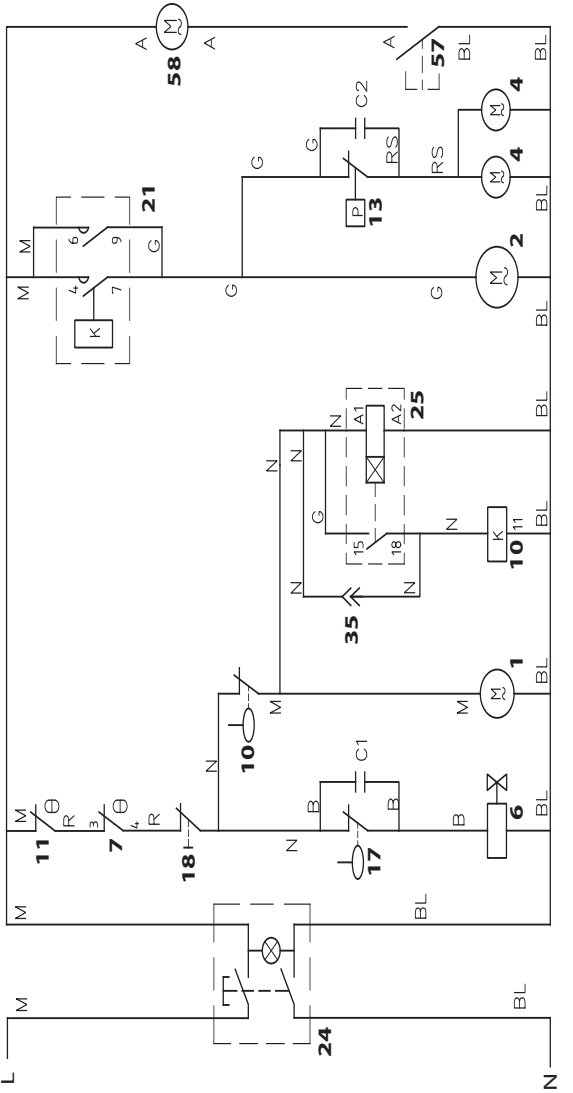
Wiring Diagram Legend

The following symbols are used on all of the wiring diagrams:

*	Internal Compressor Overload (Some models have external compressor overloads)
**	Fan Motor Run Capacitor (Some models do not incorporate fan motor run capacitor)
( )	Wire Number Designation (The number is marked at each end of the wire)
—>>—	Multi-pin Connection (Electrical Box Side) —>>— (Compressor Compartment Side)

CNP0200 - 230/50/1

Refer to Nameplate for Voltage Rating



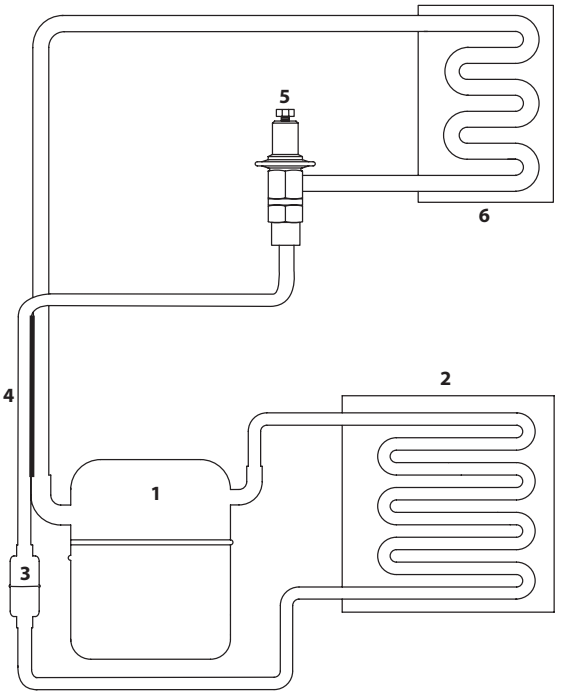
Wiring Diagram Legend

CNP0200 Air-cooled

1	Gear motor
2	Compressor
4	Fan motor
6	Water inlet valve
7	Evaporator safety thermostat
10	Low water level switch
11	Bin thermostat
13	Fan cycle control
17	Water level switch
18	Chute safety switch
21	Compressor relay
24	On/Off switch
25	Time delay bypass
35	Compressor time delay by-pass
57	Ice delivery pushbutton
Wire Color Designation	
A	Arancia / Orange / Naranja
B	Bianco / White / Blanco
BL	Blu / Blue / Azul
G	Grigio / Grey / Gris
M	Marrone / Brown / Marron
N	Nero / Black / Negro
R	Rosso / Red / Rojo
RS	Rosa / Pink / Rosa

Refrigeration Tubing Schematic

CNP0200



Number	Component
1	Compressor
2	Condenser
3	Liquid Line Filter Drier
4	Heat Exchanger
5	TXV - Thermostatic Expansion Valve
6	Evaporator

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