INSTRUCTION MANUAL

Iceman Dual Circuit Portable Scroll Chiller System

Models covered AD and WD

2150 Elmwood Avenue - Buffalo, NY 14207
P# 716-876-9951 - F#716-874-8048 - www.mokon.com

MOK3003C 03/20

Table of Contents

Portable Chiller and Full Range Systems
Quick Start-Up Checklist

Please verify that the product received matches the product ordered and that the equipment is designed for the intended application. The following quick checklist is an abridged version - always refer to the Mokon Manual provided for additional data and requirements prior to the commissioning of the unit.

✓ Electrical Inspection

- ❑ Verify amp draws and voltage on serial tag match electrical service being supplied.
- ❑ All electrical termination points checked for tightness.
- ❑ Electrical wiring completed and disconnect sized and installed per code and compliance.
- ❑ Motor rotation verified, motor(s) and compressor(s) bumped.
- ❑ Verify any remote control wiring is complete.

✓Mechanical Inspection

- ❑ Mechanical fittings tight.
- ❑ Unions tight.
- ❑ Compression fittings tight.
- ❑ Insure Supply, Drain and Process connections are connected properly and operating pressure does not exceed ratings.

✓ Refrigeration Inspection

- ❑ Insure all refrigeration work has been completed by a certified refrigeration technician.

✓ Location and Good Standard Installation Practices

- ❑ Confirm safe access to equipment for maintenance, removal and lockout- tag out.
- ❑ Insure equipment is designed for the installed environment.
- ❑ Water-cooled condenser - Confirm water supply to condenser, if City water use 1.5 GPM/Ton, if Cooling Tower water use 3 GPM/Ton.
- ❑ Air-cooled condenser - Confirm there is no short-circuiting of exhaust air into intake of condenser.
- ❑ Allow a minimum of 4 feet (1.2 meters) on all four (4) sides to allow for proper ventilation of condenser.
- ❑ Unobstructed heights above systems vary from 5 feet (1.5 meters) to 20 feet (6 meters). See user's manual for recommendations. Please use extreme caution when dealing with hot surfaces.
- ❑ If systems are to be installed side by side where one system will be exhausting hot air on the next unit, they should be spaced apart a minimum of 15 feet (4.6 meters) for proper & efficient operation.
- ❑ Proper non-automotive glycol mixture is being used for selected temperature range under 50°F (10°C).

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Section 1 – Warnings and Cautions

Please read and understand this manual before operating the system!

1.1 Electrical Warning

The Mokon portable chiller system, as with all high voltage electrical equipment, should be connected according to all local and national codes. All installation, maintenance, service, repair, adjustment, and operation should be done only by qualified trained electrical personnel who have read and completely understood this instruction manual. To the upper right is a symbol for **ELECTRICAL DANGER**. When it is seen on the following pages of this manual as well as on the system, care should be taken to avoid possible electric shock. All maintenance and service should be performed with the power isolated and locked out except where noted.

1.2 Evaporator Freeze-Up Caution

Protect the evaporator on the Mokon portable chiller system from freeze-up. Evaporator temperatures are 10˚F - 15˚F (-2°C to -9˚C) lower than the coolant temperature shown on the thermostat or the temperature controller. **Standard systems are set to operate between 50˚F – 65˚F (10˚C - 18˚C), but are engineered to operate as low as 20°F (-7˚C). Unless your system was set to operate below 50°F (10˚C) at the time of purchase, do not attempt to operate your Mokon portable chiller system below 50˚F (10˚C) without first contacting the Mokon customer service department. It will be necessary to derate the capacity of the system, change the default settings, and add glycol to the Mokon portable chiller system.**

Do not use automotive antifreeze in the Mokon portable chiller system due to waxy deposits that will form on the internal components at lower temperatures, reducing efficiency. Using automotive antifreeze will void your warranty!

Only pure ethylene glycol/water mixture should be used. Mokon recommends that a food coloring die be added to signify that glycol is present in system. The glycol should have a corrosion inhibitor added to reduce the risks of metallic degradation.

Note: The automatic fill option should not be used when system operating temperatures are below 50◦F. The glycol in the reservoir tank will become diluted which will lead to system freezing.

1.3 Cold Weather Caution

If the Mokon portable chiller system will be moved from your plant and will be subjected to freezing temperatures, the water in the system must be completely drained and/or sufficient antifreeze (not automotive antifreeze) added to prevent serious water damage from freezing.

1.4 Overhead Piping Warning

When overhead piping is connected to a Mokon portable chiller system equipped with an open reservoir or non-pressurized expansion tank there is risk of overflow of the system's reservoir tank upon shutdown, this is due to the back flow of fluid volume from the overhead piping system.

To prevent reservoir tank overflow an overhead piping kit should be installed. This kit is available from Mokon as an option.

1.5 Reservoir Tank Overflow Connection

A reservoir tank overflow connection is supplied on all Mokon portable chiller systems with an automatic fill option. Should the automatic fill option malfunction the overflow connection will protect the system against an overflow condition. This connection is clearly labeled on the system and must be plumbed to a non-pressurized open drain connection.

1.6 Short Circuit Current Rating Caution

Equipment supplied with a safety door disconnect or power cord is design rated for a short circuit current rating (SCCR) of 10,000 amperes RMS if protected with a class "J" fuse.

1.7 Non-Potable Water

This system has been designed for use in non-potable water applications only. For applications requiring potable water use please contact Mokon directly to discuss a product offering.

Section 2 – Installation

2.1 Unpacking

Upon arrival inspection should be done to assure there was no damage during shipping. In addition, all electrical and mechanical connections should be inspected to ensure that they are secure and tight. This includes all electrical terminations, mechanical fitting union bulbs, compression fittings, etc.

Note: Refer to Section 4.1 Preventative Maintenance.

The **maximum** weights of the Mokon chiller systems when drained of water are:

10 tons - 1500 lbs (680 kg)

15 tons - 1750 lbs (794 kg)

20 tons - 1850 lbs (840 kg)

30 tons – 3800 lbs (1724 kg)

40 tons – 4100 lbs (1860 kg)

Properly rated equipment should be used to move this machinery.

When removing system from pallet, lift from bottom only. Care should be taken to ensure that the system will not tip. After removing from pallet, the system should only be placed on a level surface.

2.2 Location

Mokon systems should be located in an area that provides adequate space for pedestrian and vehicle traffic. If this is not feasible, owner should provide additional safeguards including safety signs.

For optimum system performance, allow adequate space and ventilation around entire system, as well as a means to direct vapors away from work area.

There should be a minimum of four (4) feet of clearance around the entire Mokon system (all sides) for adequate ventilation and operation of the system.

Recommended unobstructed heights above the system as follows:

- Up to 3 Ton Systems – 5’
- 5-10 Ton Systems – 10’
- 15 Ton and greater Systems – 20’

If multiple systems (air-cooled) are installed side by side a minimum of fifteen (15) feet of clearance is required between systems for proper operation.

If braking casters are included, they must be in the locked position when system is in the operating position. Prior to moving, unlock the casters.

Customer supplied and installed air vents (mechanical or electrical) should be placed at the highest point in the process for application where the process height is greater than eight (8) feet above Mokon system.

2.3 Warnings

Owner should ensure by adequate supervision that correct safety, installation, maintenance and operating procedures described in this manual, as well as recognized industry practice, are followed by all personnel.

All panels must be in place during normal operation.

The top of the machinery should not be used for storage.

Power sources or energy types referred to in this manual are water, glycol and electricity.

This machinery is not for use in hazardous or explosion proof environments.

Under normal operating conditions, the decibel level of the machinery is 80 db or lower from 5' away from the system. When operating the system, hearing protection is recommended.

Any alteration, additions or modifications to any part of the system must receive prior written approval from Mokon's Engineering or Customer Service Departments.

Refer to serial tag for motor and heater electrical information and schematic drawing number.

2.4 Electrical Connections

Warning: The Mokon portable chiller system, as with all high voltage electrical equipment, should be connected according to all applicable state and local codes. All installation, maintenance, service, repair, adjustment, and operation should be done only by qualified trained electrical personnel who have read and completely understood this instruction manual.

Before operating the Mokon portable chiller system, the grounding wire must be connected. The grounding wire is the green or green and yellow wire connected to the frame of the system.

Connect ground wire to the ground screw (labeled PE) located in the electrical box. Connect power lines L1, L2, L3, to disconnect switch or terminal blocks marked L1, L2, and L3 respectively, inside the electrical box. Overcurrent protection of the supply conductors should be sized according to The National Electrical Code (NEC) and any other state and local codes.

For Three Phase Systems: Connect the power cord leads inside the electrical box L1, L2, and L3 to terminals 2, 4, and 6 respectively on the safety disconnect switch located inside the electrical box. The customer supplied main electrical disconnect should be fused for the proper amp draw (see specifications on the serial tag).

For Single Phase Systems: Connect the power cord leads inside the electrical box L1 and L3 to terminals 2 and 6 respectively on the safety disconnect switch located inside the electrical box. The

customer supplied main electrical disconnect should be fused for the proper amp draw (see specifications on the serial tag).

Note: For systems without an optional power cord, there is an entry hole in the electrical box for the customer-supplied power cord. Depending on the size of your power cord it may be necessary to enlarge this hole.

2.5 Fluid Connections

Following are the fluid connections for the Mokon portable chiller system, both the water-cooled and the air-cooled version. **Connect each port with full size, unrestricted, insulated hose or pipe**. The hose or pipe should be equivalent in diameter to the port and rated for 100 PSI (689 kPa) and 100°F (38°C).

Fluid Connection/Port Sizes

Water Cooled Tonnage	Connection Size	
	Process	Condenser
WD-10	1.5″	1.5″
WD-15	1.5″	1.5″
WD-20	1.5″	1.5″
WD-30	2″	1.5″
WD-40	3″	1.5″

Air Cooled Tonnage	Process Connection Size
AD-10	1.5″
AD-15	1.5″
AD-20	1.5″
AD-30	2″
AD-40	3″

Process Fluid Connections (All Systems)

Note: If the Mokon portable chiller system will feed a pulsating system such as a temperature control system, a bypass valve must be installed to ensure flow.

There are two process fluid connections, "To Process" and "From Process" located on the back of the system.

To Process: Connect this port to the process inlet, through which chilled fluid will enter the process.

From Process: Connect this port to the process outlet, through which fluid will leave the process and return to the chiller. **The fluid returning from the process must have a temperature of lower than 80°F (27°C).**

Note: Mokon recommends that you install a strainer on the "from process" line to prevent contamination from the process to enter the chiller. These strainers are available from the Mokon factory.

Reservoir Tank Overflow Connection

A reservoir tank overflow connection is supplied on all systems with an automatic fill option. Should the automatic fill option malfunction the overflow connection will protect the system against an overflow condition. This connection clearly labeled on the system and must be plumbed to a non-pressurized open drain connection.

Condenser Cooling Water Connections (WD Systems Only)

Condenser cooling water may be obtained from city or tower water supplies. The water usage is dependent on the tonnage of the system and temperature of the water. Variation in the cooling water temperature will lead to variation in water usage. If city water is being used, it will need approximately 1.5 gpm (5.7 lpm) per ton of refrigeration. If tower water is being used, it will need approximately 3 gpm (11.3 lpm) per ton of refrigeration. Mokon recommends that you install a strainer on the condenser water supply line to eliminate any unnecessary fouling. The connections for the condenser cooling water are located in the back of the system, labeled "Supply Water" and "Drain Water".

Supply Water: Connect this port to an adequate source of cold, clean supply water. Do not restrict incoming water to the condenser.

Drain Water: Connect this port to drain. Do not restrict outgoing water from the condenser.

2.6 Filling Reservoir Tank

- Isolate and lock out all power sources.
- Remove the top panel of the Mokon portable chiller system.
- Remove the lid to the reservoir tank.
- Fill the reservoir tank to a minimum of 3/4 full of water or water/glycol mixture. Use of glycol **IS REQUIRED FOR OPERATION BELOW 45°F**. The table on the following page lists the correct glycol/water mixtures for operating at temperatures below 45°F.

  Warning: The use of "ultra" pure fluids (de-ionized, de-mineralized, etc.) in the standard Mokon systems is prohibited and will void the systems warranty.

  Please contact the Mokon factory for further recommendations.

  Warning: Use a pure ethylene glycol/water mixture with a corrosion inhibitor in the Mokon portable chiller system. Do not use automotive antifreeze! Automotive antifreeze will cause damage to the system, voiding your warranty and result in reduced efficiency.

- After the Mokon portable chiller system is operating and all lines to the process and within the chiller are full, maintain a minimum 3/4 full tank level. This will require the addition of more water or water/glycol to the tank after start up. The table below is for reference only.

Water/Glycol Mixture

Fluid Temperature From System	% Glycol	% Water
44°F to 32°F (7°C to 0°C)	10	90
31°F to 25°F (-6°C to -4°C)	15	85
24°F to 20°F (-4°C to -7°C)	20	80
20°F to 0°F (-7°C to -18°C)	40	60
0°F to -20°F (-18° to -29°C)	50	50

Note: Evaporator temperatures are 10°F – 12°F (-12°C to -11°C) lower than process fluid temperatures.

Note: Standard systems are set to operate between 50˚F – 65˚F (10˚C - 18˚C), but are engineered to operate as low as 20°F (-7˚C). Unless your system was set to operate <u>below</u> 50°F (10˚C) at the time of purchase, d<u>o not attempt to operate your Mokon portable chiller system below 50˚F (10˚C) without first contacting the Mokon customer service department as a low temperature seal assembly will need to be installed to the supply pumpak & various items re-set for low temperature operation</u>. It will be necessary to derate the capacity of the system, change the default settings, and add glycol to the Mokon portable chiller system.

Note: Do not operate your chiller below 50°F (10°C) if system is equipped with an automatic fill option. The glycol will become diluted and your system will freeze.

Section 3 – Operation

The Mokon portable chiller system is a circulating fluid temperature control system, which is capable of providing chilled water of a water/glycol mixture to a process at lower temperatures than available from conventional water supplies. The system is designed for normal operating temperatures of 20ºF to 65ºF (-7ºC to 18ºC) unless otherwise noted. The Mokon portable chiller system is a system consisting of a refrigeration loop and water or water/glycol loop.

The refrigerant loop circulates refrigerant through a variety of components, which causes the refrigerant to change phase from a gas to a liquid and then back to a gas. This produces a chilling action on the chilled water loop. The compressor takes the refrigerant from a low pressure, low temperature gas and compresses it to a high pressure, high temperature gas which flows to the condenser. The condenser changes the refrigerant from a gas to a liquid under high pressure. This flows through a filter dryer (to remove any dirt, debris, and moisture) then to a moisture indicator (to indicate any moisture problem) and then to a thermal expansion valve. The thermal expansion valve regulates the flow of high pressure liquid refrigerant into the evaporator, where the refrigerant changes from a high-pressure liquid to a low-pressure gas. The refrigerant absorbs heat from the water or water/glycol mixture in chilled fluid loop on the other side of the evaporator causing a phase change of the refrigerant, from a liquid to a gas. The refrigerant, as a low-pressure gas, returns to the compressor and the evaporator to dissipate it.

The circulating fluid is pumped through the evaporator via a supply pump. As mentioned above, the refrigerant on the refrigerant loop absorbs heat from the water or water/glycol mixture and chills it. The water then flows to the process where it again picks up heat and returns to the evaporator to dissipate it.

Due to the use of high-pressure refrigerant and to ensure proper operation of the system, several safety devices are standard on the Mokon portable chiller system. **Only a qualified refrigeration technician should be allowed to service the system.**

3.1 Initial Starting Procedure

After all connections are made and the reservoir tank is filled as described in Section 2.6, the Mokon portable chiller system is ready to be started.

Note: Regardless what type of heat-generating process your Mokon portable chiller system is used on, **it is important that the Mokon portable chiller system is the first piece of equipment started.** If you do not start the Mokon portable chiller system first, too much heat can accumulate and the system will not be able to catch up, appearing to be undersized for the application.

- For "initial start-up" it is recommended to turn on the main electrical disconnect **for at least 12 hours before starting the Mokon portable chiller system.** This will preheat the compressor oil and liquid refrigerant helping to protect the compressor.

  If the power has been disconnected more than 2 hours and less than 3 where the Mokon disconnect switch is in the "off" position, power to main electrical disconnect is recommended **for at least 4 hours before starting the Mokon portable chiller system.** This applies if the ambient air temperature is above 60°F (15.5°C), and the system is located indoors. If the system is not located indoors or the ambient air temperature is lower than 60°F (15.5°C), refer to the initial start-up instructions.

  If power disconnection to the compressor is longer than 3 hours refer back to initial start-up instructions above.

Ideally, it is recommended that power be applied to the system continuously except for service purposes.

It is recommended that the crankcase heater should be checked for proper operation on a regular basis.

Warning: During normal operation the compressor can get very hot which can cause burns. Do not touch the compressor or any of the refrigeration system piping during operation or if the system has been in operation.

- Remove both side panels for access to, and observation of, the system.

- For water-cooled condensing systems, turn on the water flow to "supply water" connections. (See Section 2.5 for Fluid Connections)

- Check the pump rotation using the following procedure:
  - Turning on the supply pump **momentarily**; turn the selector switch to the "ON" position (the controller will illuminate) then the "OFF" position (the controller will go off).
  - Check the rotation of the supply pump by viewing the motor armature through the louvers on the back of the motor as it slows down. The armature should be turning clockwise from the lead (rear) end.
  - If the rotation is incorrect, deactivate the power supply to the Mokon portable chiller system and switch any two power cord wires (L1, L2, L3) on the inlet of the disconnect switch.

- Restart the supply pump by turning the selector switch to the "ON" position (the controller will illuminate). The supply pump should provide 35 - 45 PSIG (241 - 310 kPa) of pressure to the process. Allow the fluid to circulate for a few minutes to eliminate air pockets from the lines. This will decrease the possibility of cavitations.

- The compressor if needed turns on 5 seconds after the pump starts.
  - <u>For Systems Equipped with a Scroll Compressor:</u> Check the rotation of the compressor using the following procedure.
    - Observe the high/low refrigeration gauges.
    - The high/low refrigeration gauges should rise/fall to proper levels (refer to the last step)

Note: Phasing of the compressor is verified at the Mokon factory and should not be tampered with in anyway. If compressor phase verification is required contact the Mokon customer service department for instructions. Failure to do so will void your system's warranty.

Warning: Do not run the scroll compressor in reverse direction.

- Check the refrigerant pressure for the proper reading. The high-pressure reading is 200 - 300 PSI (1379 - 2068 k Pa) for R-22/R-407C or 110 – 230 PSI (758 - 1586 k Pa) for R-134A dependent on load. The normal low-pressure readings are listed below in the table. If the pressures are other than these, **CONSULT THE MOKON FACTORY**.

Normal Low Pressure Gauge Readings

Chilled Fluid Temperature	Nominal Low Pressure Gauge Reading	
	R-22/R-407C	R-134A
60°F (16°C)	80 PSIG (552kPa)	45 PSIG (310kPa)
50°F (10°C)	65 PSIG (448kPa)	35 PSGI (241kPa)
45°F (7°C)	60 PSIG (414kPa)	30 PSIG (207kPa)
40°F (4°C)	55 PSIG (379kPa)	25 PSIG (172kPa)
30°F (-1°C)	30 PSIG (207kPa)	18 PSIG (124kPa)
20°F (-7°C)	30 PSIG (207kPa)	11 PSIG (76kPa)

- Set the controller or thermostat to the desired temperature. See Section 5 for complete controller directions for systems, which have a controller.

Note: Automatic air purge, during start-u removes air from lines (add an air-bleed and/or air separator at highest process loop point if needed to help expel air from process).

3.2 Shut Down Procedure

Note: The Mokon portable chiller system should be the last piece of equipment shut off to protect the system from overheating.

- Turn off the compressor and supply pump by turning the selector switch to "OFF" (the controller will go off).

- The main electrical power to the Mokon portable chiller system should remain connected.

  Note: When the power is turned off to the system, the compressor crank case heater is also turned off which will hamper the system's ability to burn off liquid in the compressor which will result in damage to the compressor.

- The main electrical power and the supply water (for WD systems) to the Mokon portable chiller system may be turned off if the system is being relocated or for prolonged shut down.

3.3 Restarting Procedure

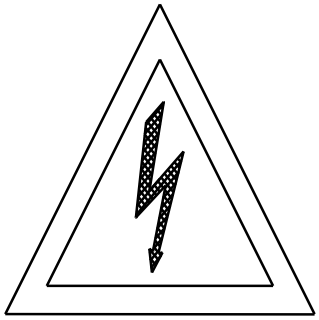
- If the water lines and main electrical power have not been disconnected, refer to Section 3.1.

- If the water lines and/or the main electrical power have been disconnected, refer to Section 2.4 for Electrical Connections, Section 2.5 for Fluid Connections, and Section 3.1 for Initial Start-Up Procedure.

Section 4 – Maintenance and Service

Warning: The maintenance and service procedures included in Sections 4.1 – 4.2 require that all power sources to the Mokon portable chiller system be shut off, isolated and locked out (exceptions noted). Follow all local and national codes and procedures for working on electrical equipment. Failure to do so could result in injury or death. Only qualified electrical personnel should install, maintain, repair, adjust, and operate Mokon portable chiller systems. The instruction manual furnished with the system should be completely read and understood before system maintenance.

The following hazard warning symbols will be used to denote a specific hazard associated with a procedure.



Electrical Danger

High Temperature
Surface May Be Hot

High Voltage &
Hot Surface

4.1 Preventative Maintenance

Mokon portable chiller systems are designed for a long, trouble free service life under a variety of conditions, with a minimum of maintenance. Performing the following preventative procedures will extend the life of your system. Refer to Section 4.1 - 4.2 in the instruction manual for specific adjustment or service procedures. Refer to the condensed parts list included in Section 8 of the instruction manual for proper replacement parts if required.

The Preventative Maintenance section is broken into weekly, monthly, and every three months checks. Associated with each check is a series of corrective procedures that may solve a problem detected in the check. If the corrective procedures do not resolve a problem detected in the check, see the trouble shooting guide in Section 7 for a complete list of corrective measures.

Electrical Preventative Maintenance

Weekly Checks	Corrective Procedures
Check electrical box interior components for any discoloration, or any burn marks	Correct component wiring
	Verify voltage and frequency stamped on system matches customer supply voltage and frequency
	Correct excessive system load (current draw)
Check voltage and current capacities	Verify customer supply voltage is balanced and fluctuations are within 15% of nominal
	Verify wire gauge for main power hookup is properly sized
	Replace components if needed
Slightly tug on each conductor to make sure it makes a solid contact to its attached component. Pay close attention to the green grounding wires.	Tighten with proper tooling
Every 3 Months Checks	**Corrective Procedures**
Check that the interior electrical and mechanical components are securely fastened to the back panel, and/or to the sides of the electrical box	Tighten with proper tooling
Check that the ratings of overload protection (such as fuses and circuit breakers) adequately protect the line's maximum current carrying capacity	Inspect/replace fuses
	Inspect/replace motor starter overloads

Pump/Motor and Mechanical Connections Preventative Maintenance

Weekly Checks	Corrective Procedures
Check for foreign materials obstructing airflow in the motor and pump area	Remove all dust, lint, grease or oil with a cloth and/or brush
Monthly Checks	**Corrective Procedures**
Check that all bolts and screws are securely tightened	Tighten with proper tooling
 Check for plumbing leaks	Repair solder joints
	Replace necessary parts if leaks persist
Check that the motor current draw matches the serial tag rating	Correct motor wiring
	Verify supply voltage is balanced and fluctuations are within 15% of nominal
Visually check all threaded fittings for signs of leakage. **Note:** If refrigeration oil has visibly leaked from the refrigeration loop plumbing, it must be repaired only by a qualified refrigeration technician.	Tighten with proper tooling
	Contact Mokon customer service or a qualified refrigeration technician
	Replace necessary parts if leaks persist
Semi Annual Check	**Corrective Procedures**
The system's internal and external hoses and clamps should be inspected	Tighten with proper tooling
Check that all threaded fittings within the fluid loop are securely tightened. **Note:** If refrigeration oil has visibly leaked from the refrigeration loop plumbing, it must be repaired only by a qualified refrigeration technician.	Tighten with proper tooling
	Contact Mokon customer service or a qualified refrigeration technician
	Replace necessary parts if leaks persist

Miscellaneous Preventative Maintenance

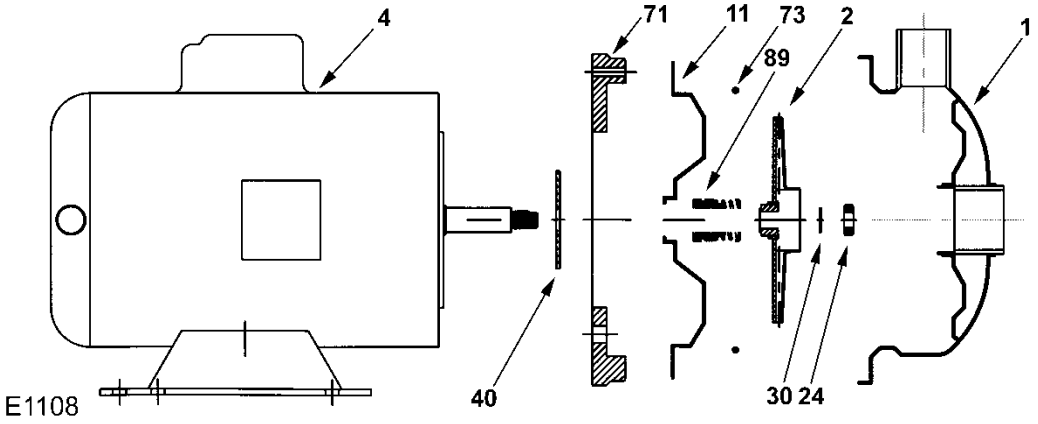
Monthly Checks	Corrective Procedures
 Check that all applicable lights, gauges, and indicators are functioning properly (Power On)	Replace necessary parts
Check that the "Warning," "High Voltage," "Caution," and lamicoid labeling are adhering to the correct locations	Replace torn, damaged or missing labels
Check the condenser coil (air-cooled systems) is free of dirt and debris	Vacuum, blow clean, or chemically clean

4.2 Pump Maintenance

Exploded View Drawing

REF NO.	QTY	5 HP	7.5 HP	DESCRIPTION	PART #
1	1		✓	CASE 1.25 x 1 NPT	018266
	1	✓		CASE 1.5 x 1.25 NPT	018267
2	1		✓	IMPELLER 6.3", STAINLESS	018277
	1	✓		IMPELLER 6.3", STAINLESS	018342
4	1	✓	✓	MOTOR 56J	CONSULT FACTORY
11	1	✓	✓	COVER, STAINLESS	018269
24*	1	✓	✓	NUT	018270
30*	1	✓	✓	D-WASHER	018271
40*	1	✓	✓	FLINGER	018272
71	1	✓	✓	DISC IRON	018273
73*	1	✓	✓	GASKET, CASE	018274
89*	1	✓	✓	SEAL, 5/8"	IN REPAIR KIT

*** - DENOTES COMPONENTS INCLUDED IN REPAIR KIT 018246 FOR 5 HP OR REPAIR KIT 018444 FOR 7.5 HP PUMP/MOTOR ASSEMBLY.**



Seal Replacement/Maintenance

Warning: Make certain that the system is disconnected from the power source in compliance with all local and national codes before attempting to service or remove any components. Never run the pump when dry.

Maintenance:

Inspection: Pump should be periodically checked for proper operation. If the system has changed or if the pump is operating noisily or erratically, then the pump should be removed and examined. It should be repaired and parts replaced as necessary.

Cleaning: Remove oil, dust, dirt, water, chemicals from exterior of pump and motor. Blow out interior of open motors with clean compressed air at low pressure. Regularly drain moisture from TEFC motors.

Draining: If the pump is located in an area subject to freezing temperatures, the pump must be drained when not in operation or add sufficient antifreeze.

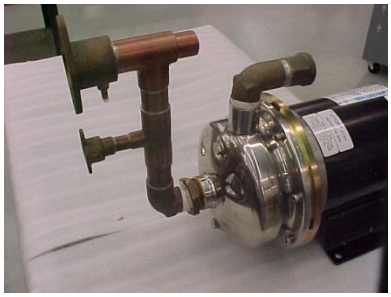
Seal Replacement:

Disassembly:

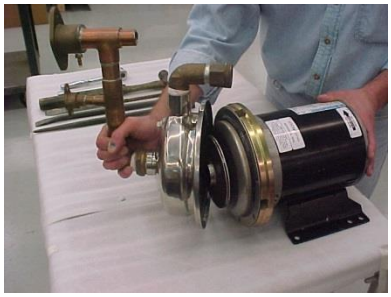
- Turn off power.
- Drain the Mokon portable chiller system. Flush if necessary.

Necessary Tools:

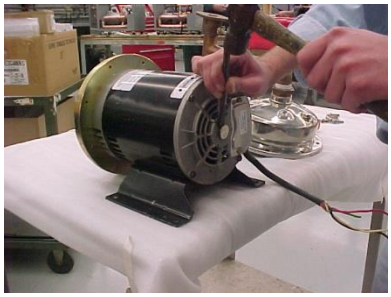
- 3/8" drive ratchet
- Pry bars (2)
- Flat blade screwdriver
- 6" socket extension 3/8"
- Gloves
- ¼" Hex Allen wrench/socket
- ½" Socket



- Remove pump/motor from cabinet.

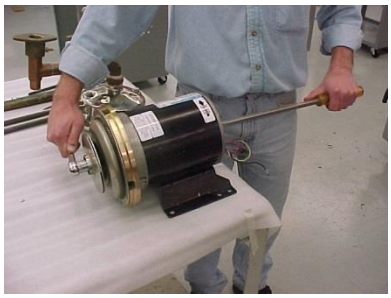


- Remove casing screws and remove case.
  Inspect o-ring for wear or damage.

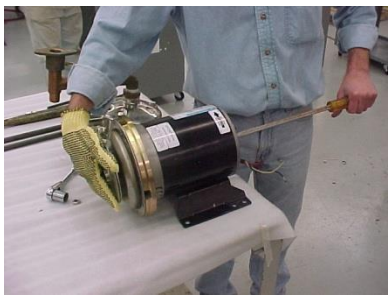


- Remove the cap at the lead end of the motor. A screwdriver slot will be exposed. Use a screwdriver to stop the shaft from turning.

Caution: Do not insert screwdriver between impeller vanes to prevent rotation. This can damage the impeller.

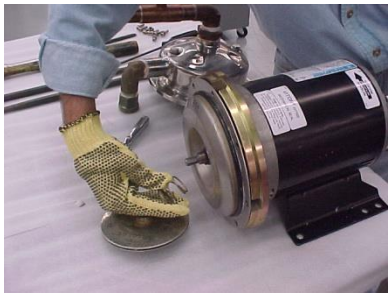


- Remove the impeller lock nut and washers by turning counter clockwise when looking at the front of the pump.



- Remove the impeller by turning counter clockwise. Protect the hand by wearing a glove.

Caution: Failure to remove the impeller in a counterclockwise direction may damage the threading on the impeller, the shaft or both.



- Remove the spring to the mechanical seal assembly.

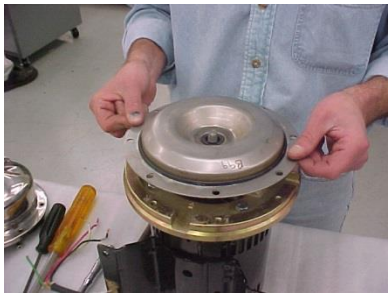
- With two pry bars 180° apart and inserted between the seal housing and the motor plate adapter and carefully separate the two parts. The mechanical seal assembly will come off of the shaft inside the seal housing. It is not necessary to remove the cast iron disc from the motor.

- Using a dowel, push the mechanical seal assembly out of the seal housing from the motor side.

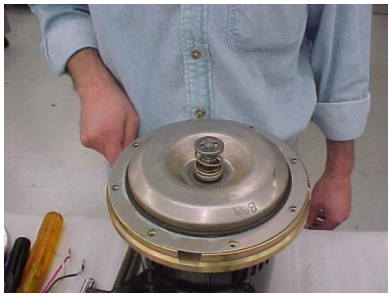
Reassembly:

Caution: The mechanical seal is a precision product and should be handled accordingly. Use care when handling lapped running surfaces of the mechanical seal to ensure they remain clean and are free of chips or scratches. Clean gasket and flange faces, seal seat cavity and shaft, in particular, shaft shoulder fitting against impeller.

- Lubricate the seal seat cavity of the cover and the rubber cup or O-ring of stationary seal seat with the lubricating fluid that comes with the mechanical seal or repair kit. Press the stationary seat in seal seat cavity in the cover squarely and evenly using an arbor press (if possible) and the cardboard disc supplied with the seal. Be certain that the lapped face (shiny side) is facing you.



- Place the seal assembly housing (with the seal assembly inserted) onto the shaft and replace the spring. Lubricating fluid can be applied to the motor shaft and the rubber bellows of the seal used to facilitate assembly. **Do not contaminate the mechanical face seals with lubricant**. **Do not use petroleum based lubricants.**



- Thread the impeller onto the shaft by turning clockwise. Protect the hand with a glove. Prevent shaft rotation by using a screwdriver on the shaft end screwdriver slot.

- Replace the impeller lock nut and washer by turning clockwise. Prevent shaft rotation by using a screwdriver on the shaft end screwdriver slot.

- Replace the casing and casing screws and tighten finger tight. Finish tightening the cap screws alternately and evenly to approximately 6 ft. lbs. torque.

  Note: It is imperative that screws be tightened alternately and evenly, as this action centers the cover in the casing, assuring proper alignment. Binding of the impeller in the case and adaptor may occur if the cap screws are not tightened as listed above.

- Check for free rotation then replace the cap at the rear of motor. Reinstall pump/motor into system.

4.3 Glossary of Indicators, Gauges, and Buttons

On/Off Selector Switch:	Turns controller on. Pump and compressor are automatically turned on by controller.
Process Pump Pressure Gauge:	Indicates fluid pressure for the "chilled water loop" going to the process.
Return Temperature Gauge:	Indicates the temperature of "chilled water loop' returning from the process.
High Refrigerant Pressure Gauge:	Indicates the pressure of the refrigerant, as it is being condensed in the condenser. This pressure is critical to the performance of the chiller and is generated by the compressor. The normal pressure is between 200-300 PSIG/ 1379-2068 kPa (R-22/R-407C) or 110-230 PSIG/ 758-1586 kPa (R-134A) (depending on load).
Low Refrigerant Pressure Gauge:	Indicates compressor suction pressure and is related to temperature setting and the adequacy of refrigerant charge.

Section 5 – Carel μC² Controller

Refer to the 4th character in the model code on the serial tag and then the model code in Section 10 to determine your controller type.

5.1 Operation

This section of the manual contains all essential information needed to operate the controller. Contact Mokon Customer Service with controller problems as well as warranty and repair issues.

The controller is configured by model number. Inputs, outputs and alarm types are preset. Final setup and configuration are done from the keypad. The controller has four basic parameters and they are divided into four different types, according to their level of access by user (password) and their function.

- Factory parameters: password protected contact Mokon Customer Service.
- Super user parameters: password protected contact Mokon Customer Service.
- User parameters: password protected contact Mokon Customer Service.
- Direct parameters: accessible without password, these are used to read the probe measurements and any data, by any user, without compromising the operation of the system.

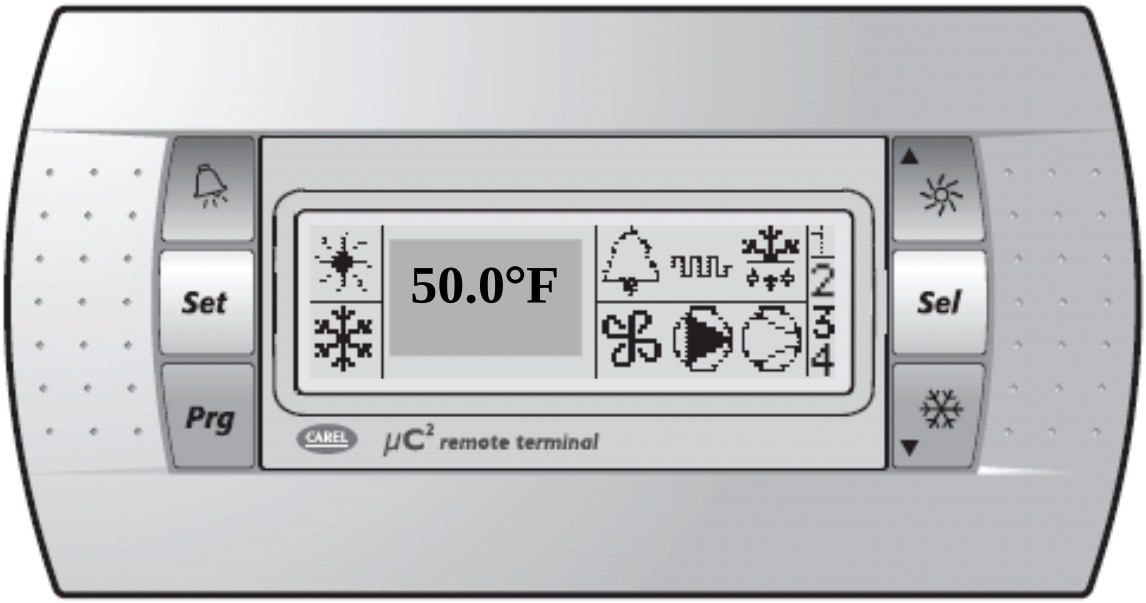
Direct Parameters

Display Indicator	Parameter and Description	Default Level	Min	Max
/23	Unit of measure: 0 = °C 1 = °F	D	0	1
B01	Value read by probe B1 evaporator in temperature	D	-	-
B02	Value read by probe B2 evaporator out temperature	D	-	-
C10	Compressor 1 hour meter	D	0	800.0
C11	Compressor 2 hour meter	D	0	800.0
C15	Process pump hour meter	D	0	800.0
R01	Cooling set point	D	50	65
R02	Cooling differential	D	0.3	50.0

To Set Parameters:

- Start at screen with process temperature displayed.
- Hold "Sel" button down for 5 seconds.
- Use arrow keys to go to desired variable.
- Push "Sel" to enter variable.
- Use arrow keys to go to desired variable and number.
- Push "Sel" to enter variable and number.
- Use arrow keys to change value.
- Push "Sel" to enter value.
- Push "Prg" repeatedly until back to main screen.

5.2 Controller Operation



Display 'Touch" Key Pad

Symbol	Meaning		Refrigerant Circuit Involved
	On	Flashing	
1,2	Compressor 1 and/or 2 ON	Start request	1
3,4	Compressor 3 and/or 4 ON	Start request	2
	At least 1 Compressor ON		1 and/or 2
	Pump air/outlet fan ON	Start request	1 and/or 2
	Condenser fan ON		1 and/or 2
	Defrost Active	NOTE: THIS FEATURE IS NOT APPLICABLE	
	Add Glycol	Start request	1 and/or 2
Alarm Button Red LED	Alarm active		1 and/or 2
	Alarm active	EEPROM Alarm	1 and/ or 2
	Warning relay activated (only with expansion board)		
	Relay alarm activated		
	Chiller mode P6 = 0	Season changeover request	1 and 2

Controller Display Push Buttons

Function Associated with the Buttons:

Button	Unit Status	Button Operation
	Switch off buzzer or alarm relay, if alarm active	Press once
	Manual reset of alarms that are no longer active	Press for 5 s
	Enter parameter programming model after entering password	Press for 5 s
	Return to higher subgroup inside the programming environment until exiting, saving to EEPROM	Press once
	Select higher item inside the programming environment	Press once or hold
	Increase value	
	Switch from standby to chiller model (P6 = 0) and vice versa	Press for 5 s
	Access direct parameters; selection (as for button on μC^2)	Press for 5 s
	Select item inside the programming environment and display direct parameter values/confirm the changes to the parameters	Press once
	Select lower item inside the programming environment	Press once or hold
	Decrease value	
	Switch from standby to heat pump mode (P6 = 0) and vice versa	Press for 5 s
	Immediately reset the hour counter (inside the programming environment0	Press for 5 s
	Display the terminal info screen	Press for 6 s

5.3 Troubleshooting

Diagnostic Alarms:

Alarm Display	Alarm Type	Resetting
HP1	High pressure	Manual
LP1	Low pressure	Manual
IC1	Circuit 1 overload	Manual
FL	Flow controller alarm	Manual
E1	Probe B1 alarm	Automatic
E2	Probe B2 alarm	Automatic
Hc1-4	Hour warning C1-4	Automatic
EPr	EEPROM error during operation	Automatic
EPb	EEPROM error at start up	Automatic
Ht	High temperature	Automatic
Lt	Low ambient temperature (freeze protection)	Manual
AHt	High temperature at start up	Automatic
ALt	Low temperature at the start up	Automatic
ELS	Low supply voltage	Automatic
EHS	High supply voltage	Automatic
HA1	High inlet temperature warning circ. 1	Automatic
L	Low load warning	Automatic
PH1	Low pressure circ. 1 warning	-

Section 6 – Options

6.1 "Z" Purge Instructions for Mokon Portable Chiller Systems

- A 3 inch diameter threaded pipe connection is provided to receive an air or nitrogen supply, a 90 cfm blower is recommended. This blower shall not be installed or placed in the hazardous environment where hazardous fumes will be drawn from for supply air to the electrical enclosure or internal cabinetry of the Mokon system. The optimum nitrogen or air supply range to the Mokon system should be .15 to .5 inches of water column.

  As an alternative to nitrogen, non-hazardous "clean" dry air can be supplied which can also include clean dry compressed shop air.
  The discharge pressure of the fan or blower needs to be, at least, 3.0 inches of water column for every 100 equivalent feet of 3" duct. For 4" duct, 1.0 inch of water column per 100 feet is adequate. A 3" exhaust connection is also provided.

  Note: Due to temperature considerations, the purge gas must flow (sweep) through the unit to insure adequate ventilation.

- Once the purge gas is introduced, the Dwyer model 1950-0-2F pressure switch will close, energizing a time delay relay. The relay prevents startup of the Mokon system until an adequate sweep inside the unit has taken place. The switch is set at its minimum setting of 0.15 inches of water. A green pilot light will illuminate once the relay has "timed out", indicating it is safe to operate the unit.

- The magnehelic gauge has a scale of 0 to .5 inches of water, and is clearly visible to allow the operator to monitor the unit.

- If the purge is lost, for any reason, the pressure switch will open, thus activating a customer supplied alarm through a set of auxiliary contacts. The Mokon system will also shut off.

- For systems that are classified and applied properly the applicable Class, Group and Division is listed on the bottom of the systems serial tag.

- Methods: There are typically two methods for the supply of purge gas to systems for "Z" purge applications, they are as follows:

  Method # 1 (recommended): Due to temperature considerations, the purge gas must flow (sweep) through the unit to insure adequate ventilation. This method would apply to water, oil, chiller, and full range heater/chiller systems.

  Method # 2: (not recommended): Pressurization of the cabinetry when temperature build up is not as much of a concern can be applied. Here the exhaust coupling on the cabinet would be plugged. This method would apply to water-cooled chiller systems or very low heating capacity systems.

Note: If the "Z" purge mechanism or any other system safety devices are modified or disable in any way Mokon considers them to be non-operational and the systems warranty could be void.

Section 7 – Troubleshooting Guide

7.1 Process Loop

Problem	Possible Cause	Corrective Measure
Supply pump will not start	System unplugged / power off	Plug system in / turn power on
	Improper power source wiring	Check wiring (electrical schematics) and correct
	Blown fuse at power supply	Isolate open fuse and replace
	Blown control circuit fuse	Replace and check for ground condition
	Low voltage	Measure incoming voltage, if too low correct
	Overload on pump/motor starter	Consult factory
	Inadequate flow of process fluid	Inspect process and process lines for blockage; if blocked correct
	Flow switch	Inspect/replace component
Supply pump shuts down during operation	Overload on pump/motor starter	Consult factory
	Blown fuse at power supply	Isolate open fuse and replace
	Blown control circuit fuse	Replace and check for ground condition
Pump seal leaks	Faulty seal	Replace seal (See Section 4.2 for Seal Replacement)
	Improperly aligned seal	
	Over-pressured seal	
Tank overflows or will not fill on systems with autofill option (water makeup valve)	Float switch	Inspect; if stuck, replace
	Solenoid diaphragm will not seat	Inspect/replace

7.2 Refrigeration Loop

Only a qualified refrigeration technician should attempt repairs in the refrigeration loop.

Problem	Possible Cause	Corrective Measure
Compressor will not start or shuts down with supply pump running	Process fluid temperature below set point	Change set point
	Scroll compressor rotating in the wrong direction	Consult Mokon factory
	Low or high refrigerant pressure	Consult a Qualified Refrigeration Technician
	Compressor shut down due to thermal protection	Let cool, restart, and verify amp draw
	Inadequate flow of process fluid	Inspect process and lines for blockage, clear blockage if necessary
	Controller or thermostat (controller optional on 1/2 and 1 ton systems)	Consult factory (**DO NOT attempt repairs, this will VOID your warranty!**)
	Freezestat	Inspect/replace
	Blown control circuit fuse	Replace and check for ground condition
System shuts down on high refrigerant pressure WD systems	Low water flow through the condenser	Verify condenser supply water flow rate is as stated in Section 2.5
	Water regulating valve	Inspect/clean or replace
	Condenser supply water lines too small	Replace lines with insulated hose or pipe of equal diameter as the port (See Table in Section 2.5 Fluid Connections)
	Insufficient water pressure drop across condenser due to plugged or fouled condenser tubes	Inspect/clean or replace
	Condenser supply water temperature too high (above 85°F / 29°C)	Find colder source of water
System shuts down on high refrigerant pressure AD systems	Dirty condenser coils	Inspect/clean
	Fan rotation	Verify fan is rotating (counterclockwise)
	Fan not rotating	Blown control fuse
		Fan limit switch – Consult Qualified Refrigeration Technician
	High ambient air temperature	Find a cooler source or force more air
	Refrigeration loop overcharged	Consult a Qualified Refrigeration Technician

Problem	Possible Cause	Corrective Measure
System shuts down on low refrigerant pressure	Low refrigerant charge	Consult a Qualified Refrigeration Technician
	Low head pressure	
	Restriction to refrigerant flow in refrigerant loop	
	Ambient air temperature too cold (air-cooled)	Find warmer source of air
	Condenser cooling water temperature too low (water-cooled)	Find warmer source of water
	Air in process loop	Purge – see start up procedure in Section 3.1
	Water/glycol solution foaming	Replace water/glycol mixture
System shuts down on freezestat	Attempting to operate below setting (45°F/7°C)	Consult Mokon factory
	Freezestat	Inspect/replace
Chiller does not keep up with load	Low water flow causing icing in condenser (water cooled)	Consult a Qualified Refrigeration Technician
	Hot gas bypass valve stuck open	
	Condenser tubes limed over/blocked (water cooled)	
	Poor condensing	
	Over condensing	
	Bad valves in compressor	
	Chiller not started correctly (before heat generating process)	See Section 3.1 for correct starting procedure
	Scroll compressor rotating in the wrong direction	Consult Mokon factory
	Chiller undersized for load	Consult Mokon engineering
System does not come down to set point temperature	Lack of refrigerant	Consult a Qualified Refrigeration Technician
	Dryer clogged	
	Too large process load	
	Evaporator freezing	
	Restrictive process or process connections	Remove restrictions
	Thermocouple or RTD	Inspect/replace component
	Controller calibration	See Controller Section 5

Section 8 – Condensed Parts List

All Models:

Part No.	Description
006256	Motor starter/24 amp contactor 110V coil
008021	0 – 160 PSI pressure gauge, suction, and discharge
023089	Thermometer
035256	Sensor

10 Ton Systems:

Part No.	Description
006366	1.0 – 5.0 amp overload
006367	3.2 – 16 amp overload
018246	Seal kit for pump/motor assembly

15 Ton Systems:

Part No.	Description
006257	40 amp contactor 110V coil
006367	3.2 – 16 amp overload
018246	Seal kit for pump/motor assembly

20 Ton Systems:

Part No.	Description
006257	40 amp contactor 110V coil
006298	50 amp contactor 120V
006368	5.4 – 27 amp overload
018246	Seal kit for pump/motor assembly

30 Ton Systems:

Part No.	Description
006298	50 amp contactor 120V
006367	3.2 – 16 amp overload
018444	Seal kit for pump/motor assembly

40 Ton Systems:

Part No.	Description
006306	65 amp contactor
006369	9 – 45 amp overload
018444	Seal kit for pump/motor assembly

For additional part numbers refer to the specific section in the instruction manual or consult the Mokon factory (716) 876-9951.

Section 9 – Model Codes

See following pages

Chiller Model Codes

Model #
AD4A05H1

Condensor	
A	Air-Cooled
W	Water Cooled

Compressor Style	
C	Standard
S	Scroll
D	Dual Circuit-***(Portable Chillers only)***

Voltage	
1	115 Volts / 1 Phase / 60 Hertz
2	230 Volts / 3 Phase / 60 Hertz
3	380 Volts / 3 Phase / 50 Hertz
4	460 Volts / 3 Phase / 60 Hertz
5	575 Volts / 3 Phase / 60 Hertz
6	415 Volts / 3 Phase / 50 Hertz
7	208 Volts / 3 Phase / 60 Hertz
9	Special Voltage, ***see option code***

Controller / Freon	
0	Thermostat / R-22 (HCFC)
A	***Eurotherm / R-22 (HCFC)
B	Special / R-22 (HCFC)
C	**Eurotherm / R-22 (HCFC)-*Do Not Use*
D	PLC / R-22 (Portables)
E	***Eurotherm / R-22 (HCFC) ***ZR Scroll Compressor***
F	***Special / R-22 (HCFC) ***ZR Scroll Compressor***
G	***Eurotherm / R-134A (no CFC) ***ZR Scroll Compressor***
H	***Special / R-134A (no CFC) ***ZR Scroll Compressor***
J	Eurotherm / 407C (no CFC) Scroll Compressor
K	Special / 407C (no CFC) Scroll Compressor
1	Thermostat / R-134A (no CFC)
2	*Eurotherm / R-134A (no CFC)
3	Special / R-134A (no CFC)
4	Eurotherm Single Circuit / R-22 Centrals
5	PLC Single Circuit / R-22 Centrals
6	PLC Dual Circuit / R-22 Centrals
7	PLC Single Circuit / 407C (No CFC) Centrals
8	PLC Dual Circuit / 407C (No CFC) Centrals

See Option Code

Tonnage	
.5	1/2 Ton
01	1 Ton
1H	1.5 Ton
02	2 Ton
2H	2.5 Ton
03	3 Ton
05	5 Ton
07	7.5 Ton
08	8 Ton
10	10 Ton
15	15 Ton
20	20 Ton
30	30 Ton
40	40 Ton
50	50 Ton
60	60 Ton
80	80 Ton

***Prior to 6/18/01, was Barber Colman**

**** Prior to 6/18/01, was Eurotherm, not used since Eurotherm has been standardized**

*****Effective 7/1/05-ZR compressor change *For AS & WS Scroll Units only***

Effective 8/21/06-UL labeled Electrical subpanel

Section 10 – Warranty

ICEMAN PORTABLE CHILLER WARRANTY

All new ICEMAN CHILLER systems manufactured by MOKON are guaranteed to be free from defective material or workmanship for one (1) year from the date of purchase. All Standard Microprocessor controllers carry a five (5) year warranty, Microprocessors with special features carry a three (3) year warranty and Solid State controllers carry a one (1) year warranty. MOKON'S obligation under the WARRANTY SHALL BE LIMITED, TO THE ORIGINAL CUSTOMER, TO REPAIR OR REPLACE DEFECTIVE PART(S) OF THE TEMPERATURE CONTROL SYSTEM, and UPON CUSTOMER COMPLIANCE WITH THE INSTRUCTIONS CONTAINED HEREIN. Upon discovery of any alleged defect, it is the responsibility of the customer to contact the MOKON Service Department with the complete model number, serial number and the date of purchase. MOKON'S obligation under this warranty is limited to make good, from or at its factory, any parts that are returned to the company (prepaid) and deemed to defective, within the time frame of the warranty. The customer also has the option of forwarding the system to MOKON (Buffalo, NY), prepaid by the customer and with a return authorization from MOKON for inspection and component replacement or repair. Repair or replacement in any manner provided above shall constitute a fulfillment of all liabilities of MOKON concerning the quality of the temperature control system. Freeze-ups of any kind are not covered under this warranty.

No allowances, credits or reimbursements will be made for any replacement or repair made or provided for by the customer unless authorized in advance, in writing, by MOKON.

Note: The use of automotive anti-freeze in a chiller system will void the above warranty!

The warranty set forth above is in lieu of any and all other warranties expressed or implied including warranties of merchantability and fitness for a particular purpose. Mokon shall in no event be liable for any consequential damages or for any breach of warranty in an amount exceeding the original price of the unit.

Mokon's products are not guaranteed against damage caused by corrosion.

End of Life Industrial Waste - Saving our Environment

In the interest of preserving our environment, please reclaim, reuse or dispose of any refrigerant, refrigerant oils, heat transfer fluid, glycol and/or water glycol mixtures contained in these systems in accordance with federal, state and local codes, prior to any equipment disposal. All metal and other materials should be repurposed and recycled where possible

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