INSTRUCTION MANUAL

Blown Film Coolers

Models covered
BFC600
BFC1000
BFC1500
BFC2000
BFC3500
BFC5000
BFC7500
BFC9000

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

MOK6000

Table of Contents

Section 1 – Warnings and Cautions

Please read and understand this section before operating the system!

1.1 Electrical warning

The Mokon 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 Cold weather caution

If the Mokon 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 added to prevent serious water damage from freezing.

1.3 Short circuit current rating caution

Equipment supplied with a fused disconnect is design rated for a short circuit current rating (SCCR) of 100,000 amperes RMS if protected with a class "J" fuse.

Section 2 – Installation

2.1 Unpacking

Upon arrival inspection should be done to assure there was no damage during shipping.

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

Series	CFM	Static pressure	lbs	kg	With blower	
					lbs	kg
BFC06	600	16	400	182	690	313
		35			790	358
BFC10	1000	16	450	204	725	329
		35			850	385
BFC15	1500	16	575	261	915	415
		35			1145	519
BFC20	2000	16	600	272	950	431
		35			1225	556
BFC35	3500	16	950	431	1430	649
		35			1885	855
BFC50	5000	16	1610	658	2225	1009
		35			2425	1100
BFC75	7500	16	1550	703	2425	1100
		35			3650	1656
BFC90	9000	16	1550	703	2625	1191
		35			3300	1497

Properly rated equipment should be used to move this machinery. Machinery should only be moved when drained of all fluid.

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.

There should be a minimum of 48” (1.3m) of clearance around the entire Mokon system (all sides) for adequate ventilation, operation of the system, and removal of the filters.

Systems must be bolted to the floor before operation. Properly align the blower and air handling piping. The blower may need to be shimmed to achieve the centerline of the cooler. The height may vary based on the height of the adjustable legs on the cooler.

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 and electricity.

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

Under normal operating conditions, the decibel level of the machinery (with blower option) is 101.9 dBA or lower at 60" (1.5m). When operating the machine, 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.

NOTE: If your unit was purchased with an option, refer to the appropriate section.

2.4 Electrical connections

WARNING: The Mokon 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 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 GND or PE) located in the electrical box. Connect power lines L1, L2, L3, to disconnect inside the electrical box. Overcurrent protection of the supply conductors should be sized according to The National Electrical Code (NEC) and any other applicable state and local codes.

2.5 Priming the condensate trap

Install the trap to the ¾" port on the bottom of the cabinet. The port is located in the center of the cabinet, under the coil, on the air outlet side of the cabinet. The condensate trap must be primed before startup. Remove the screw on the top of the trap, fill the port to the top with water, reinstall the screw and tighten. Connect the trap to the nearest drain. The connection size of the trap is ¾" FNPT.

2.6 Fluid connections

There are four (4) convenient and clearly marked connections, "Supply Water", "Drain Water", "Air Purge", and "System Drain". They are located on the side of the unit.
(Note: Quick disconnects should not be used on any of the connections, they will restrict the flow.)

Use full size unrestricted pipe for each connection

Supply Water: Connect the port to an adequate source of cold, clean supply water.

Drain Water: Connect the port to drain (or return line in an in plant closed recirculation system).

Air Purge: Open the ball valve to vent air out of the coil.

System Drain: Open the ball valve to drain the coil.

CAUTION: Do not use ferrous metals in process plumbing that will come in contact with the coil water. Ferrous metals will cause rust and the particles will collect in the coil tubes, restricting flow and ultimately performance of the system.

NOTE: Mokon recommends that you install a strainer on the "Supply Water" connection to remove particles that may be present in the cooling water. These strainers are available from the Mokon factory.

BFC series technical specifications

Model number	Air flow rated hp/kW		Nominal cooling required		Water capacity		Pipe size		2-way/3-way valve	
	cfm	cmh	tons	Kcal/hr	gpm	lpm	in NPT	mm	in NPT	mm
BFC600	600	1,019	5.4	16,330	13	49.2	1	25.4	¾	19.0
BFC1000	1000	1,699	8.8	26,611	27	102.2	1 ½	38.1	1	25.4
BFC1500	1500	2,548	13.2	39,917	40	151.4	2	50.8	1 ¼	31.7
BFC2000	2000	3,398	17.6	53,222	59	223.3	2	50.8	1 ½	38.1
BFC3500	3500	5,496	30.9	93,442	81	306.6	2 ½	63.5	2	50.8
BFC5000	5000	8,495	44.3	133,963	112	424.0	2 ½	63.5	2 ½	63.5
BFC7500	7500	12,742	66.1	199,866	126	477.0	3	76.2	2 ½	63.5
BFC9000	9000	15,291	80.0	242,100	175	662.4	3	76.2	2 ½	63.5

Entering air at 100°F (38°C) dry bulb, 80°F (27°C) wet bulb, 40°F (4°C) chilled water=49°F (9°C) leaving air temperature.

Section 3 – Operation

NOTE: Prior to starting the Mokon system it may be necessary to tighten the mechanical fittings on the piping. Vibration caused during transport can loosen the fittings. Before proceeding, check and tighten all of the mechanical fittings.

3.1 Initial starting procedure

- Check the air handling piping alignment. (See section 2.2)
- If your unit is supplied with the blower option, make sure the flexible connection is attached properly and securely. Check for any loose items or debris that could be drawn into the fan or dislodged by the fan discharge.
- Connect the water supply to the cooler and turn on the water supply. (See section 2.6)
- If your unit is supplied with the blower option, check the motor rotation by turning the system on and then off. As the blower slows down, check the motor rotation. If the motor is not rotating in the direction of the arrow label located on the motor housing (clockwise from the lead end), reverse any two power leads (see section 2.4) to change the direction of the motor rotation.
- Open the air purge ball valve for approximately 5 to 10 minutes to purge the air from the system.

NOTE: The air purge ball valve may be used to eliminate air in the system at any time during operation.

NOTE: Shut the blower off immediately if there is any sudden increase in fan vibration.

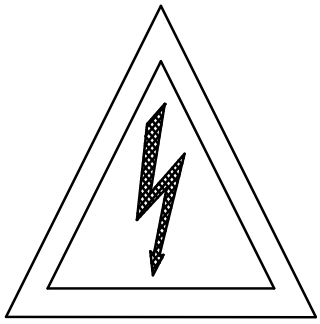
3.2 Restarting procedure

- 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 2.6 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 require that all power sources to the Mokon system be shut off, isolated and locked out (exceptions noted) and that the system be completely cooled. 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 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 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 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.

4.1 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).
	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 solid contact to its attached component. Pay close attention to the ground wires.	Tighten with proper tooling. (Torque to component specs)
Monthly Checks	**Corrective Procedures**
Tighten all high voltage terminal connections.	Tighten with proper tooling. (Torque to component specs)
Every 3 Months Checks	**Corrective Procedures**
Check that the interior electrical and mechanical components are securely fastened to the back panel.	Tighten with proper tooling.
Check that the ratings of overload protection (fuses, circuit breakers, and overloads) are adequately sized to protect the line's maximum current carrying capacity.	Inspect/replace fuses.
	Inspect/replace components.

4.1 Blower preventative maintenance

Weekly Checks	Corrective Procedures
Check for foreign materials obstructing airflow in the air handling piping, coil, and blower area.	Remove all debris, 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 motor alignment	See section 5.2 to correct alignment.
Check that the air handling piping is secure. Pay close attention to the piping on the air inlet and the inlet of the blower, since any debris drawn in may reduce capacity.	Tighten with proper tooling
	Replace crack or burned conduit.
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.
Check the motor bearings for lubrication.	Add grease to the bearing while running the fan or rotating the shaft by hand. Be sure all guards are in place if lubricating with the fan in operation.

4.1 Miscellaneous preventative maintenance

Weekly Checks	Corrective Procedures
Clean washable air filter.	Remove from cabinet, spray with all-purpose cleaner, let sit, rinse with hot water from opposite side.
Monthly Checks	**Corrective Procedures**
 Check that pressure gauges are functioning properly. (Power On)	Replace necessary components.
 Check the temperature control valve operation. (Power On)	2-way valve option: Monitor as the system requires more cooling that the valve opens.
	3-way valve option: Monitor as the system requires more cooling that the valve directs the flow to the chiller.
	Replace control valve, if needed.
 Check the system for leaks at operating temperatures. As the system reaches the set point temperature, visually check for leakage. (Power On)	Repair leaks and/or tighten fittings.
Check that the "Warning", "High Voltage", and "Caution" labeling are adhering to their correct locations.	Replace torn or damaged labels.
Every 3 Months Checks	**Corrective Procedures**
Check that the trap is functioning properly and free of debris.	Remove and clean.

Section 5 – Blower Instructions

All installers, operators, and maintenance personnel should study AMCA Publication 410, "Recommended Safety Practices for Air Moving Devices", which is included as part of every shipment. Additional copies can be obtained by writing to:
Mokon
2150 Elmwood Avenue
Buffalo, NY 14207

All moving parts must have guards to protect personnel. Safety requirements vary, so the number and type of guards needed to meet company, local, and OSHA standards must be determined and specified by the user. Never start a fan without having all safety guards installed. Check regularly for damaged or missing guards and do not operate and fan with guards removed. Fans can also become dangerous because of potential "windmilling", even though all electrical power is disconnected. Always block the rotating assembly before working on any moving parts

The decibel level of the blowers can range from 63.4–101.9dBA at 60" (1.5m) when both inlet and outlet are ducted.

The cleanout door and access doors to the duct system should never be opened while the fan is in operation. Serious injury could result from the effects of air pressure or suction. Bolted doors must have the door nuts or fasteners securely tightened to prevent accidental or unauthorized opening.

Receiving:
The fan and accessories should be inspected on receipt for any shipping damage. Turn the wheel by hand to see that it rotates freely and does not bind.

Handling and storage:
Fans should be lifted by the base, mounting supports, or lifting eyes only. Never lift a fan by the wheel, shaft, motor, motor bracket, housing inlet, outlet, or any fan part not designed for lifting. A spreader should always be used to avoid damage.

Whenever possible, fans and accessories should be stored in a clean, dry location to prevent rust and corrosion of steel components. If outdoor storage is necessary, protection should be provided. Cover the inlet and outlet to prevent the accumulation of dirt and moisture in the housing. Cover motors with water-proof material. Mounted bearings should be regreased and wrapped with plastic for protection. **Rotate the fan wheel by hand at least every two weeks to redistribute grease on internal bearing parts.** Each month the bearings should be purged with new grease to remove condensation, since even a filled bearing can accumulate moisture. Use caution when purging, as excessive pressure can damage the seals. Rotate the shaft while slowly adding grease.

5.1 Installation

Ductwork or stacks should be independently supported as excess weight may distort the fan housing and cause contact between moving parts.

Slab-Mounted Units:
A correctly designed and level concrete foundation provides the best means of installing floor-mounted fans. The mass of the base must maintain the fan/driver alignment, absorb normal vibration, and resist lateral loads. The overall dimensions of the concrete base should extend at least six inches beyond the base of the fan. The weight of the slab should be two to three times the weight of the rotating assembly, including the motor. The foundation requires anchored fasteners.
Move the fan to the mounting location and lower it over the anchor bolts, leveling the fan with shims around the bolts. Fasten the fan securely. When grout is used, shim the fan at least ¾" from the concrete base. When isolation is used, consult the Mokon factory for installation instructions.

Elevated Units:
When an elevated or suspended structural steel platform is used, it must have sufficient bracing to support the unit load and prevent side sway. The platform should be of welded construction to maintain permanent alignment of all members.

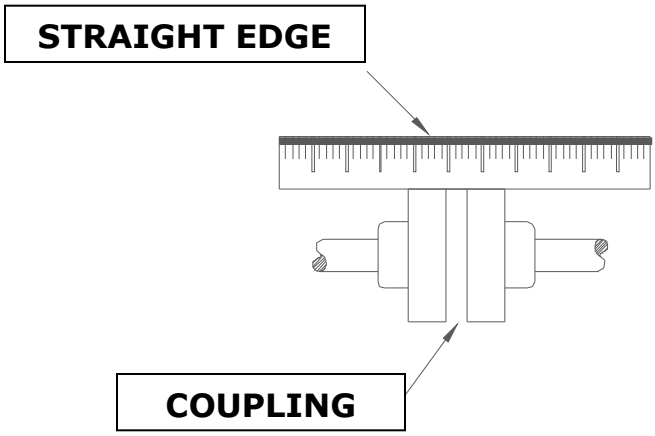
- Align the centerline of the blower with the centerline of the blown film cooler. Bolt the blower to the floor.
- Fit the flexible connection over the air inlet. Attach using a worm screw gear. Tighten until connection is secure.

5.2 Alignment

- Align the coupling to within the manufacturer's limits for parallel and angular misalignment. Adjustments should be made by moving the motor to change shaft angle, and by the use of foot shims to change motor shaft height. Do not move the fan shaft or bearing.

- When correctly aligned, install the flexible element and tighten the fasteners in the coupling and motor base. Lubricate the coupling if necessary.

- Recheck alignment and gap after a short period of operation, and recheck the tightness of all fasteners in the coupling assembly



5.3 Operation

Safe operating speed is a function of system temperature and wheel design. Do not under and circumstances exceed the maximum safe fan speed published in an engineering supplement, which is available from the Mokon factory.

Since bearings are completely filled with grease at the factory, they may run at an elevated temperature during initial operation. Surface temperatures may reach 180*F and grease may bleed from the bearing seals. This is normal and no attempt should be made to replace lost grease. Bearing surface temperatures will decrease when the internal grease quantity reaches a normal operating level. Relubrication should follow the recommended schedule.

5.4 Lubrication

Bearings should be lubricated with a premium quality lithium-based grease conforming to NLGI Grade 2. Examples are:

Mobil - Mobilith AW2	Chevron - Amolith #2
Texaco - Premium RB	Shell - Alvania #2

These greases are for bearing surface temperatures of 40^{o}F to 180^{o}F. For surface temperatures of 181^{o}F to 230^{o}F use Mobilith SHC220.

Do not use "high temperature" greases, as many are not formulated to be compatible with fan bearings.

- Pillowblock Bearings:
  Add just enough grease to cause a slight purging at the seals. Completely filled bearings will run hotter until a sufficient amount of grease is purged out of the seals.

- Split Pillowblock Bearings:
  Should be cleaned and repacked at approximately every eighth lubrication interval. This requires removal of the bearing cap. Clean out old grease and repack the bearing with fresh grease. Pack the bearing fully and fill the housing reservoir to the bottom of the shaft on both sides of the bearing. Replace the bearing cap, being careful not to mix caps as they are not interchangeable from one bearing to another. **Do not over lubricate.**

Section 6 – Options

6.1 Blower

The blower will provide the air supply for the unit. It has a screen on the air inlet to prevent large items from being drawn into the machine. It also has a flexible connection on the air outlet to reduce the transfer of vibration to the blown film cooler.

See section 5 for the installation and operation instructions.

6.2 Electric blower starters for field mounting

An electrical box with controls to run the fan motor will be mounted on the blower. See drawing packet for the electrical schematic.

6.3 2-Way control valve

The valve will control the flow rate of cooling water in response to changes in the air temperature. The valve opens as the air temperature increases and closes as the air temperature decreases.

To adjust temperature, turn the adjustment screw on the top of the spring housing. Turn to the right to raise the opening point and to the left to lower. The direction to turn the adjustment screw to raise the temperature is marked on the spring housing by an arrow and the word "Raise". Before raising the temperature, it is advised that the screw should be backed off (turn to the left) ¼ turn in order to relieve the side load on the push/rod guide.

CAUTION: When using this valve with a dedicated chiller the valve may close completely, stopping the flow of the fluid in the chiller. Please consult the Mokon factory for system operation.

6.4 3-Way control valve

The valve will control the flow rate of cooling water in response to changes in the air temperature. As the air temperature increases the valve directs the flow to the coil. As the air temperature decreases the valve directs the flow back to the return water connection.

Section 7 – Troubleshooting Guide

Problem	Possible Cause	Corrective Measure
System 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
System runs momentarily	Motor starter thermal overloads tripped due to motor overload	Consult factory
Pressure will not build up	Fan rotating in wrong direction or installed backwards	Consult factory
Extreme pressure build up	Plugged flow paths, inadequate circulation through process and connecting lines	Inspect; if plugged, dislodge
	Clogged filters	Remove filters and clean
Loss of pressure and volume output	Blower needs adjusting	See section 5
	Pressure gauges	Inspect/replace valve
	Plugged flow paths, inadequate circulation through process and connecting lines	Inspect; if plugged, dislodge
	Clogged filters	Remove filters and clean
System does not reach and/or hold temperature	Temperature controlling valve	Inspect/replace valve Consult factory
	Loose electrical connections	Tighten connection or replace broken
	Not enough fluid in coil	Inspect water connections Purge air out of the coil
Noisy motor	Motor needs alignment	See section 5.2
	Worn bearings	Inspect/replace component
Excessive vibration	Loose mounting bolts, setscrews, or bearings	Tighten bolts
	Accumulation of foreign material on fan wheel	Clean fan wheel
	Excessive wear or erosion of fan wheel	Replace fan wheel
	Inadequate structural support, mounting procedures or materials	Remount blower. Attach securely to base.

Section 8 – Condensed parts list

Part No	Description
006256	Contactor 24A 110 Volt Coil
006257	Contactor 40A 110 Volt Coil
006298	Contactor 50A 110 Volt Coil
006306	Contactor 65A 110 Volt Coil
006308	Contactor 120A 110 Volt Coil
006382	Contactor 110A 110 Volt Coil
006383	Contactor 210A 110 Volt Coil
006384	Contactor 180A 110 Volt Coil
006385	Contactor 95A 110 Volt Coil
006386	Contactor 250A 110 Volt Coil
006366	Overload 1.0 – 5.0A
006367	Overload 3.2 – 16.0A
006368	Overload 5.4 – 27.0A
006369	Overload 9.0 – 45.0A
006370	Overload 18.0 – 90.0A
006387	Overload 5.4 – 27.0A
006388	Overload 30.0 – 150.0A
006389	Overload 40.0 – 200.0A
006390	Overload 60.0 – 300.0A
009169	Filter
009187	Filter
009170	Coil BFC-600
009171	Coil BFC-1000
009172	Coil BFC-1500
009173	Coil BFC-2000
009174	Coil BFC-3500
009175	Coil BFC-5000
009176	Coil BFC-7500/9000
022038	Start/Stop Button
023102	Temperature Gauge
024001	Transformer 230-460V
024004	Transformer 575V
024005	Transformer 380V
024018	Transformer 208V
025065	Gate Valve 1″
025319	Gate Valve 1 ½″
025201	Gate Valve 2″
025497	Gate Valve 2 ½″
025505	Gate Valve 3″
025269	Ball Valve ¼″

Condensed parts list (cont)

Part No	Description
025500	2 – Way Temperature Control Valve ¾″
025501	2 – Way Temperature Control Valve 1″
025502	2 – Way Temperature Control Valve 1 ¼″
025503	2 – Way Temperature Control Valve 1 ½″
025496	2 –Way Temperature Control Valve 2″
025504	2 – Way Temperature Control Valve 2 ½″
025498	Condensate Trap
026042	Fuse 1A Secondary
045006	Fuse 6/10A Primary
045051	Fuse 1A Primary

When ordering blower parts, specify rotation as viewed from the drive side (side that the motor is on).

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

Section 11 – Model Codes

See following pages

Blown Film Cooler Model Codes

Model #

BFC060000

CFM	
0600	600 CFM
1000	1000 CFM
1500	1500 CFM
2000	2000 CFM
3500	3500 CFM
5000	5000 CFM
7500	7500 CFM
9000	9000 CFM

See Option Code

Section 12 – Warranty

BLOWN FILM COOLER SYSTEM WARRANTY

All new temperature control systems manufactured by MOKON are guaranteed to be free from defective material or workmanship for a period of one (1) year from the date of purchase. Cabinetry is covered by a lifetime warranty. The coil is covered by a one (1) year warranty. Blower motors are covered by a two (2) year warranty, and blower fans are covered by 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, UPON CUSTOMERS 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.

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 any grease other than the ones recommended in the instruction manual or approved by MOKON in writing, may void your warranty. Consult the MOKON service department with questions on grease selection.

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.

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

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