

TECHNICAL MANUAL

MODULAR COOLING SYSTEM MODELS MCS40 & 50 SERIES G02 & J02



One Company, Many Solutions



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INTRODUCTION

Receiving your New Modular Cooling System

Inspect your new Modular Cooling System immediately upon receiving it. If the unit shows shipping damage, contact the transportation company and file a freight damage claim. Retain all cartons and packing material until the unit is operated and found to be in good condition. Your unit has been fully tested at the Boyd factory with clean water. Although the system has been drained, some residual fluid may remain. This will not hinder the performance of the chiller.

About the Warranty

All units returned for warranty claims must have an RMA (Return Material Authorization) number on the outside of the container. Call Boyd Customer Service at +1-781- 933-7300 for an RMA number. Refer to the end of manual for the chiller warranty. Units should be drained of all fluids and packaged in its original packaging.

Customer Service Support

Boyd is committed to servicing the customer, both during and after the sale. If you have any questions concerning the operation of your unit, contact our Application Engineering Department at +1-781-933-7300. To facilitate your call, please have the **model number** and **serial number** of the unit (located on the rear of the chiller) for the Boyd Applications Engineer.

Email:

Boyd's service department can be reached by sending an e-mail to Service@boydcorp.com.

Service Hotline

Boyd has a 24 hour per day, 7 day per week service hotline to help you with questions on the startup and operation of your Modular Cooling System. **(We recommend you review the troubleshooting guide before calling our service hotline.)** Boyd service can be reached by dialing +1-781-933-7300. To facilitate your call please have the **model number** and **serial number** (located on rear of the chiller) of the unit for the Boyd Service Technician.

SAFETY PRECAUTIONS

This system is designed to provide fluid cooling only as specified in this manual. If you use this system in a manner other than as specified, the safety protection of the system may be impaired.

Warnings are posted throughout the manual. Read and follow these important instructions. Failure to observe these instructions or use the chiller other than as specified may impair safety protection, void the warranty, and can result in permanent damage to the unit, significant property damage, personal injury and/or death.

Make sure you read, understand, and follow all instructions and safety precautions listed in this manual before operating your unit. If you have any questions concerning the operation of your unit or the information in this manual, please contact our Applications Engineering Department at +1-781-933-7300.

- 1) Do not operate the unit without fluid in the reservoir.
- 2) Never place the unit in a location where excessive heat, moisture, or corrosive materials are present.
- 3) The unit must be plugged into a properly grounded power source.
- 4) Do not connect the SUPPLY or RETURN fitting to your building water supply or any pressurized source.
- 5) Do not use or maintain the unit outdoors. These units were not designed to withstand outdoor weather conditions.
- 6) Performance of installation, operation, or maintenance procedures other than those described in this manual may result in a hazardous situation and may void the Boyd warranty.
- 7) Transport the unit with care. Sudden jolts or drops can damage the unit.
- 8) Observe all warning labels. Never remove warning labels.
- 9) Do not operate damaged or leaking equipment.
- 10) Always turn the unit "OFF" and disconnect the power cord from the power source before performing any service, maintenance procedures or before moving the unit.
- 11) Do not operate equipment with damaged power cords.
- 12) A qualified technician should perform service and repairs.

MODEL NUMBER DESCRIPTION

MCS40 G02 BC 1 CXXX

Standard Modification → Custom Options

Basic Model Number	Electrical Configurations	Pump Options
<p>MCS40 – 2,400 Watts</p> <p>MCS50 – 3,500 Watts</p>	<p>G02 = 115V~ 60 Hz 1ph</p> <p>J02 = 230V~ 50/60 Hz 1ph</p>	<p>BC = 1.8 gpm Brass, Positive Displacement Pump</p> <p>BE = 2.3 gpm Brass, Positive Displacement Pump</p> <p>DA=1/4 Hp Centrifugal Pump</p>

NOTE: Refer to the product ID label on the rear of your chiller for the configuration you have purchased. The table above refers to Boyd's standard product offering for the MCS40 & 50 Series.

PRODUCT SPECIFICATIONS

MODEL NUMBERS		MCS40	MCS50
Cooling Capacity (Using water, 25°C ITD)	Watts	2,400	3,500
	Btu/Hr	8,200	12,000
Case Dimensions	Width-Inches	15	
	Depth-Inches	15	
	Height-Inches	24	
Fluid Connections (FNPT, Internal)	Inlet	½"	½"
	Outlet	½"	½"
Available Pressure Head		See Performance Graph	
Reservoir Capacity	Gallons (liters)	1.5 (5.6)	1.5 (5.6)
Maximum Liquid Temperature		131°F (55°C)	
Full Load Amperage	115v 50/60Hz 1Phase	6	6
	230v 50/60Hz 1Phase	3	3
Approximate Dry Weight Stand-Alone Case	1lb. (kg)	60 (27)	65 (29)
Recommended Coolant		Water	Water

LABELS AND SILKSCREEN MARKING



ATTENTION / WARNING LABEL: This label tells maintenance and users to consult the technical manual for more information.



VOLTAGE LABEL: Disconnect power warning.



POWER SWITCH: The symbol on the Power Switch is used to signify the power mode of the rocker style switch on the AC main ; Power On (I), Power Off (O).



RETURN TO COOLING SYSTEM: The symbol on this label is used to identify the port where heated fluid returning from the customer's machine is connected.



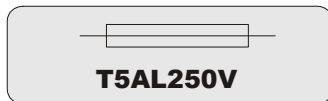
SUPPLY TO EQUIPMENT: The symbol on this label is used to identify the line containing cooled fluid supplied to the customer's machine is connected.



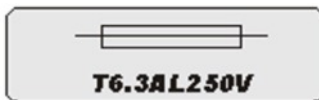
GROUND LABEL: Protective earth (ground) terminal)



FUSE LABEL: This label is affixed to identify the type of fuse 2AMP/250V~ Time Lag Fuses, 5 x 20mm



FUSE LABEL: This label is affixed to identify the type of fuse 5AMP/250V~ Time Lag Fuses, 5 x 20mm



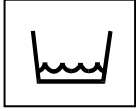
FUSE LABEL: This label is affixed to identify the type of fuse 6.3AMP/250V~ Time Lag Fuses, 5 x 20mm

**RESERVOIR
ACCESS PANEL**

Label indicates the location of the reservoir access panel.

**FILTER CARTRIDGE HAS
BEEN INSTALLED**

Label indicates that the Filter Cartridge is installed.



LOW LEVEL

Label indicates when coolant level is low.



LOW FLOW

Label indicates the flow of the coolant is low.



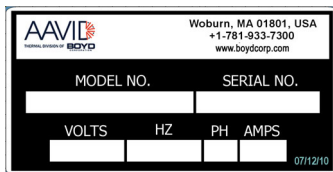
ETL LABEL: Certifies that conformity to the UL standard 61010A-1 and is certified to CAN/CSA STDC22.2 No. 1010.1



CE LABEL: The symbol on this label identifies that the equipment has been certified to regulations of the European Community.

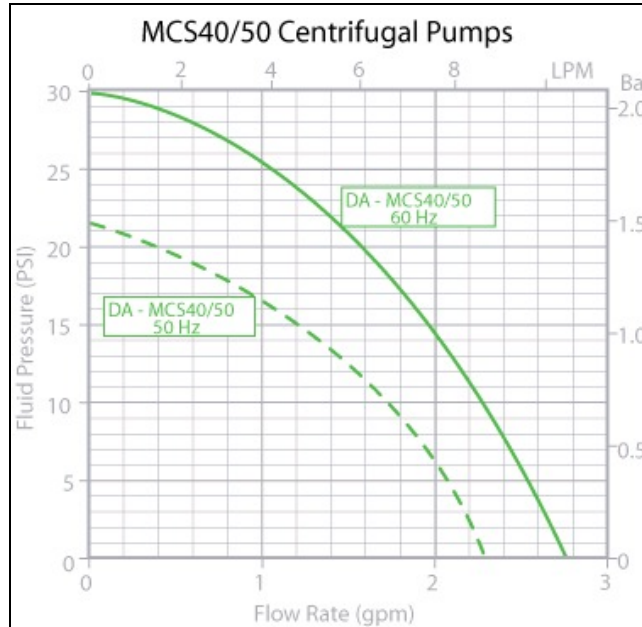
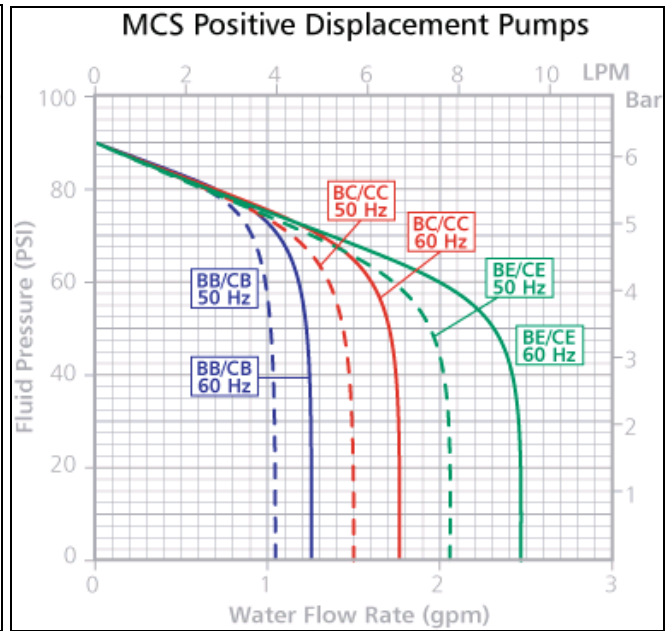
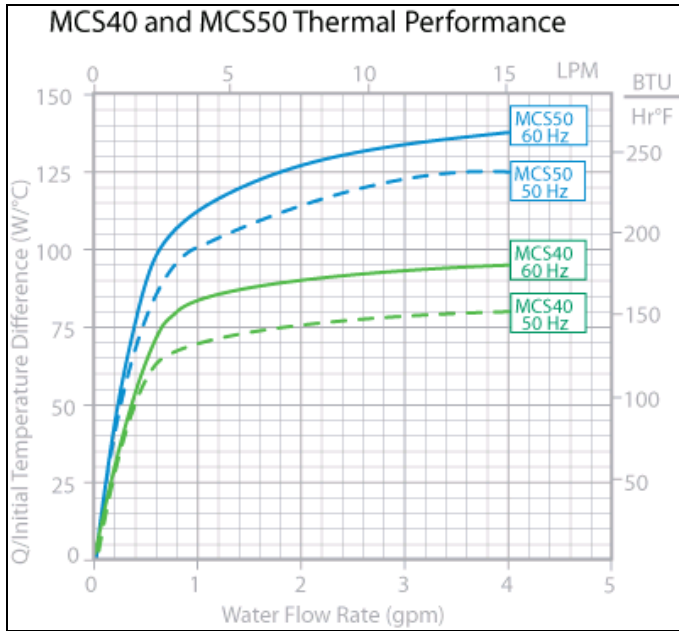


WEEE LABEL: The crossed out wheeled bin label requires that the product be disposed of or recycled with the requirements of local law.



PRODUCT ID LABEL: This Identification label is affixed on the backside of unit to identify the model number, Serial No., Volts, Hz, and Phase and Amps.

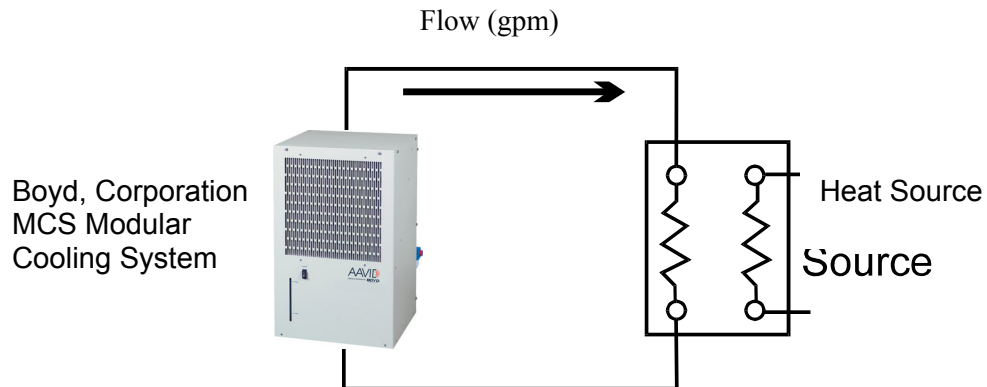
PERFORMANCE GRAPHS



GENERAL INFORMATION

Cooling System Description

The MCS 40/50 is a water-to-air type liquid cooling system designed for use with laboratory equipment. The MCS 40/50 pumps ambient temperature water from the reservoir tank to the heat source being cooled, through a radiator where it is cooled, and then the fluid returns to the tank. The external plumbing and the heat source are provided by the end user and are generally unique to the user's process and/or location.



INSTALLATION AND OPERATIONAL INSTRUCTIONS

Quick Reference Start-Up Procedure

- 1) Locate the unit as close to the heat load as possible leaving at least 18" around the case for air circulation and ventilation.
- 2) Remove plastic caps covering fluid ports.
- 3) Attach process fluid lines to the inlet and outlet ports on the rear panel.
- 4) Remove reservoir cover and fill tank with clean water. Continue to add water until the system is filled and the reservoir remains at a constant level.
 - * For Systems with Centrifugal pump the pump must be primed prior to starting.
- 5) Connect IEC 320 Type Power Cord to power entry module, and to standard power source.
- 6) Turn on the system using the ON/OFF toggle switch located on the front panel.
- 7) Check all external fittings and hoses for fluid leaks. If a leak exists, turn cooling system off and take necessary action to repair the leak.

NOTICE

Do not operate cooling system until leak has been repaired. Operating equipment with a fluid leak can lead to damage to equipment.

Priming Centrifugal Pumps

NOTICE

Running a Centrifugal pump dry for even a few seconds can permanently damage the pump. This style of pump must be "primed" prior to operation.

Pump priming must be performed under the following conditions:

- a. At initial start-up.
 - b. The system is drained of its fluid.
 - c. A new pump is installed.
- Centrifugal pumps are classified as non-self priming pumps. This means that the pump will not displace the air inside the pump housing, which prevents fluid from being drawn in. Each must be "primed" prior to operation. "Priming" simply means to manually introduce fluid into the pump housing prior to operation.
 - In a typical chiller installation, the flow of fluid through the pump suction hose into the pump is prevented by the presence of trapped air. Without a way for the air to escape, the fluid has no way of entering the pump housing. The following are recommended procedures to prime a turbine or centrifugal pump.
 - To prime pump valve, disconnect the supply line from the rear of the chiller. Allow time for the fluid to gravity feed into the pump housing. If there is difficulty priming the pump using this method, use a wet vac to assist in drawing the fluid from the tank into the pump housing.

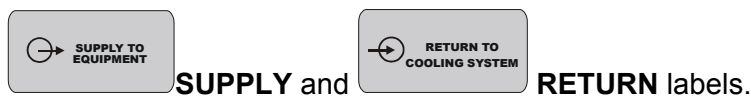
Note: If the pump has failed to prime turn the chiller off and contact Boyd's Service Department at +1-781-933-7300.

Selecting Proper Location

Locate the cooling system in an area with 18" minimum clearance in the rear of the unit for air circulation and ventilation. The cooling system should be located as close as possible to the heat load to minimize pressure drop due to excessive line length. Cooling lines are best run at or near the same level as the cooling system, until reaching the equipment being cooling.

Plumbing to Process Fluid

The process fluid connection ports are located on the rear of the system and are labeled with the



Lines should be connected to the supply and return ports. The cooling system process fluid supply and return ports are equipped with standard 1/2" NPT fittings. When connecting fluid lines to the cooling system, use pipe sealant to ensure a leak-tight seal. Opaque lines should be used to help prevent algae growth if system is exposed to prolonged non-operating periods.

NOTICE Never connect the SUPPLY or RETURN fitting to your building water supply or any pressurized source. Doing so could result in damage to the equipment.

Flexible tubing, if used, should be of heavy wall or reinforced construction. All tubing should be rated to withstand 80 psig at +30°C. Make sure all tubing connections are securely clamped. Avoid running tubing near radiators, hot water pipes, etc. If substantial lengths of tubing are necessary, insulation may be required to prevent loss of cooling capacity.

It is important to use the largest diameter tubing practical. Tubing should be as straight as possible, without bends and without diameter reductions. If substantial lengths of cooling lines are required, they should be pre-filled with cooling fluid before connecting them to the unit.

Fluid

Boyd recommends using clean water in the cooling system. Positive displacement pumps are susceptible to damage from abrasive materials in the process fluid. Avoid using local water with high mineral content.

Allowance should be made for the internal volume of cooling lines between the cooling system and the equipment. The tank (reservoir) can be accessed from the rear by removing the reservoir cover. Fill the tank and check level after operating for a short period of time. It may be necessary to add fluid if the level has dropped substantially.

NOTE: If the fluid is exposed to sunlight, add an algaecide to the fluid to control organic growth in lines.

Fluid Level

When the fluid is low in the tank, the sitetube on the front of the unit will be near or at the minimum water level. Top off the tank until the water has reached the maximum water level.

Fuses

If the circuit becomes overloaded, the fuse will blow. To replace, simply remove the blown fuse from the fuse draw on the power inlet module and replace.

Electrical Requirements

⚠ WARNING In order to avoid an electrical potential at the cooling system frame due to insulation failure, a proper ground connection to the system must be provided. Failure to do so could result in damage to the equipment, personal injury, and/or death.

Refer to the Specification section and to the product ID label on the rear of the unit for the specific electrical requirements of your unit. The cooling system power module is configured with a standard international IEC320/C20 inlet. To safely operate the chiller, use an SJT cord set with an IEC 320/C19 receptacle and an inlet plug that is compatible to the local power grid and the power requirements of the cooling system.

SYSTEM MAINTENANCE / SERVICE

⚠ WARNING A qualified service technician must perform all service and maintenance internal to the chiller. Unqualified individuals conducting service on the chiller could result in damage to the equipment, personal injury, and/or death.

The cooling system has been designed to require minimal maintenance after the unit has been installed.

Operating experience with each unique equipment installation will dictate reasonable frequency of system inspections and/or scheduled maintenance. Suggested guidelines are as follows:

Weekly Inspections

Cleaning your Unit

⚠ WARNING Always disconnect power to chiller when performing service. Failure to do so could result in damage to the equipment, personal injury and/or death.

You can clean your unit by using a damp cloth to remove any build up of dust or debris that has collected over time. Frequency of cleaning depends on the operating environment.

Noise Level

Any abnormal sounds or a substantial increase in noise level since the last weekly inspection may indicate the following: an impending pump, fan or coolant blockage problem. Investigate the cause and perform the necessary service. Refer to the troubleshooting section that starts in this manual.

Leakage

If you notice coolant on the floor near the chiller or dripping from the chiller enclosure turn off the chiller. Disconnect the power cord. Find and repair any leaks immediately.

Coolant Level

Any significant drop in the coolant level should be investigated further. If there is no visible system leak, then the loss may be due to equipment leakage elsewhere.

Fan Assembly

No maintenance is required on the fan. Listen for any abnormal sounds.

Water Filter

With a new system the filter quickly accumulates foreign matter introduced during system setup. This can lead to a decrease in system performance in a short period of time. Inspect the filter cartridge one day after you set up a new system to ensure the filter is clean and the system runs at maximum capacity. After this initial filter inspection, check the filter weekly. For replacement filters contact Boyd's Customer Service at +1-781-933-7300.

Low Level Switch

The level switch protects the pump in the event of accidental fluid loss. Since this switch is "passive" during normal operation, it is advisable to check it every 6 months. Open the tank cover and push down on the switch to see if the low level alarm is activated.

Algae

Boyd recommends the use of an algae inhibitor to prevent growth in the reservoir.

Cleaning the System and Reservoir

To clean the system use following these steps:

1. Drain the entire unit including the hoses and equipment being cooled.
2. Replace the coolant with clean water.
3. Run the unit with the clean water for 10 minutes.
4. Drain the unit again.
5. Replace all filters.
6. Refill unit with either water or a water and freezing point depressant.

Pump Strainer

All positive displacement pumps have a strainer to protect the vanes inside the pump. For pumps less than 2.5 gpm it is located in the pump housing. For larger PD pumps it is installed in the hose between the pump and the tank. Periodically inspect and clean the positive strainer. If it becomes fouled the flow rate will decrease and the pump may wear prematurely.

Pumps

As a precaution, the pump must be periodically replaced. This will avoid damaging the unit and the cost associated with excessive downtime. Typical operating life of the pump depends on pump type.

Pump Model	Typical Operating Life
Positive Displacement	7,000 Hours
Centrifugal	28,000 Hours

Note: Please contact Boyd for pump pricing and delivery.

TROUBLE SHOOTING GUIDE

Problem	Recommend Remedy
Unit will not start	Check the line cord; make sure it is plugged in. Check the voltage on the power source. Make sure it is within the rated voltage of the unit \pm 10%. Check that the Power Switch is on and that the fuses have not blown.
Unit will not circulate fluid	Check the reservoir level. Fill, if necessary. Check filter and strainer for blockage.

Service Assistance

If, after following these trouble shooting steps, your unit fails to operate properly, contact Boyd for assistance or refer to website www.Boyd.com/service

SPARE PARTS LIST

Item#	Description	Boyd P/N
Accessories		
1	Filter, Air	330-0021
2	Filter, Water 5 Micron	330-0022
Fans		
3	Fan, 115VAC MCS40 / 50	101116-01
4	Fan, 230VAC MCS40 / 50	101116-02
Pumps		
5	Pump, Centrifugal	101773-06
	Pump, Brass 1.8 gpm	410-0103
	Pump, Brass 2.3 gpm	410-0112
	Pump, Stainless Steel 1.8 gpm	410-0135
	Pump, Stainless Steel 2.3 gpm	410-0143
Motors		
6	Motor, ¼ Hp 115V~	230-0202
	Motor, ¼ Hp 208/230V~	230-0214

BOYD COOLING SYSTEMS SERVICE POLICY

Boyd's cooling systems are the product of over 50 years of thermal engineering and manufacturing experience. We designed them to provide superior reliability, easy maintenance, and worry-free operation. However, occasionally a system may need repair. To ensure your process is back up and running quickly, Boyd has implemented the following cooling system service policy.

Boyd's Standard Warranty

Lytron's warranty is set forth in the Terms and Conditions included with each system quotation and are available here <https://www.lytron.com/product-support/Service-Warranty-Information.cfm>

Diagnostic Consultation:

At no cost, Boyd will attempt to diagnose the problem over the phone. Our service department can be reached by calling 781-933-7305 and following the menu or contacting one of our regional [Service-Depots](#). Service technicians are available 24 hours/7 days for consultation. Boyd strongly encourages customers to take advantage of this service before returning a cooling system to Boyd for evaluation. Often a problem with a system can be fixed quickly in-house or it is determined that it is an application problem. By utilizing our service hotline, you can avoid the downtime and expense associated with returning the system to our factory. Phone diagnosis can be difficult and may actually be a trial and error process. Boyd will not assume any liability for misdiagnosis when diagnosing over the phone.

Warranty and Non-warranty Returns:

To return a cooling system, a Boyd Return Material Authorization (RMA) number must be obtained from Boyd's service department which can be reached by calling 781-933-7300, or by completing the [Request-for-RMA](#) form and e-mailing it to service@boydcorp.com. Prior to calling Boyd, the system part number, serial number, and a detailed description of the problem must be collected, as this information is required to assign an RMA number.

A credit card or, for existing customers, a purchase order, (PO), is also required for the evaluation and repair charges if Boyd determines the system is not defective as defined by the warranty (see below for more details). The amount suggested will cover the evaluation fee and most repair charges for non-warranty repairs.

The RMA number should be indicated on the outside packaging of the returned unit. Systems must be returned clean, dry, and free from chemicals to Boyd's factory, shipping costs prepaid. Boyd is not responsible for any damage incurred in the return shipment. Coolant disposal fees may apply for returned units. Please contact your service representative for details.

Debit memos should not be issued for any repair, either warranty nor non-warranty repairs.

Boyd ordinarily will evaluate the unit within 2 or 3 business days of receipt. Boyd will use reasonable effort to repair the unit promptly, in most cases within one week of receiving all of the required parts. Boyd's warranty covers repair of the unit but Boyd's warranty does not cover cosmetic issues. If upon examination Boyd determines the system has not failed as defined by the warranty, an evaluation fee will be charged. The evaluation fee will be charged regardless of disposition (i.e.: scrap) and will be credited towards the total repair cost. Once the unit has been evaluated by our Service Group, all work

Modular Cooling System MCS40 & 50 Series Technical Manual

will be quoted to the customer before proceeding with the repair. This quote will not cover the repair of cosmetic issues unless specifically requested to do so.

Repair warranty:

Boyd warranties the replacement parts and labor for 90 days from the repair date under the terms of our standard warranty or the balance of the original warranty, whichever is longer.

Product Specific, Defined Refurbishment Program:

Boyd warranties the replacement parts and labor per the specific quoted length of time from the refurbishment date under the terms of our standard warranty or the balance of the original warranty, whichever is longer. The refurbishment of the unit(s) must be quoted as such with a defined bill of material listing the items covered and the length of the extended warranty.

Return Shipments:

Boyd's warranty covers payment for standard, ground return shipment of warranted repairs. The incremental difference for expedited return shipments, if requested, are the responsibility of the customer. After non-warranty repair, Boyd will ship the system back using the customer's preferred shipping method.

Field Service/Commissioning Charges

Where available, Boyd can arrange field service for cooling system commissioning or repair. Under no circumstances does Boyd's warranty cover on-site service. All on-site service must be arranged through Boyd's service department. The charges for this service include an administrative fee, a charge for on-site services provided, any related travel charges, and parts not covered under warranty.

All requests for On-Site Services require a PO or credit card authorization before services will be scheduled.

When using Boyd-arranged, on-site service, Boyd warranties the replacement parts and repair labor for 90 days from the repair date under the terms of our standard warranty or for the balance of the original warranty, whichever is longer. If non-authorized labor repairs the system or installs replacement parts, Boyd does not warranty the parts or work and this action potentially voids any remaining warranty.

Boyd is expanding its worldwide service presence. Please contact the Service Department for the latest areas where on-site service is available.

Replacement Parts:

Replacement parts can be ordered using a credit card or purchase order. Parts being returned from systems under warranty should be returned using a Boyd issued RMA number. If the parts are found to be defective and the claim is within the warranty period, credit will be issued for the price of the parts and one-way ground shipping charges. If the parts are not defective or indicate end user damage, no credit will be issued. Boyd will not cover the incremental cost of air shipment of replacement parts, regardless of warranty status.

In-stock parts will normally ship the next business day; non-stocked parts will be shipped as quickly as reasonably possible.

This policy is subject to change. Please check with Boyd's service department for the current policy.

BOYD WARRANTY

Boyd agrees that the apparatus manufactured by it will be free from defects in materials and workmanship for the warranty period under normal use and service and when properly installed. The warranty period for Kodiak[®] standard, RM, and XL recirculating chillers is two years from date of shipment of such apparatus to the original purchaser, maintenance items excluded, and one year from date of shipment of such apparatus to the original purchaser for all other products Boyd sells. See Boyd's Cooling System Service Policy (F7.02.25) for additional warranty details on systems. Boyd's obligation under this agreement is limited solely to repair or replacement, at its option, at its factories, of any part or parts thereof, returned to Boyd with transportation charges prepaid, which examination shall disclose to Boyd's satisfaction to have been defective. THE FOREGOING EXPRESS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. BOYD'S OBLIGATION UNDER THIS WARRANTY IS STRICTLY AND EXCLUSIVELY LIMITED TO THE REPAIR OR REPLACEMENT OF DEFECTIVE COMPONENT PARTS AND BOYD DOES NOT ASSUME OR AUTHORIZE ANYONE TO ASSUME FOR IT ANY OTHER OBLIGATION. BOYD ASSUMES NO RESPONSIBILITY FOR INCIDENTAL, CONSEQUENTIAL, OR OTHER DAMAGES INCLUDING, BUT NOT LIMITED TO LOSS OR DAMAGE TO PROPERTY, LOSS OF PROFITS OR REVENUE, LOSS OF THE UNIT, LOSS OF TIME, OR INCONVENIENCE. Boyd's liability does not include any labor charges for replacement of parts, adjustments, repairs, or any other work done outside its factories or service centers and its liability does not include any resulting damage to persons, property, equipment, goods or merchandise arising out of any defect in or failure of its apparatus. Boyd's obligation to repair or replace shall not apply to any apparatus which shall have been repaired or altered outside of its factory or service centers in any way, or which has been subject to negligence, to misuse, or to pressures in excess of stated limits. On parts not of Boyd's manufacture, such as motors, controls, etc., Boyd extends only those warranties given to Boyd, Corporation to the extent Boyd can do so. Boyd's agreement hereunder runs only to the immediate purchaser from Boyd, Corporation and does not extend, expressly or by implication, to any other person.