

TECHNICAL MANUAL

MODULAR COOLING SYSTEM Models MCS40 & 50 G01, H01 & J01 Series



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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 (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 (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.

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 (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 (781) 933-7300.

- **Never place the unit in a location where excessive heat, moisture, or corrosive materials are present.**
- **The unit must be plugged into a properly grounded power source.**
- **Never connect the SUPPLY or RETURN fitting to your building water supply or any pressurized source.**
- **Performing installation, operation, or maintenance procedures other than those described in this manual may result in a hazardous situation and may void the manufacturer's warranty.**
- **Transport the unit with care. Sudden jolts or drops can damage the plumbing lines.**
- **Observe all warning labels. Never remove warning labels.**
- **Never operate damaged or leaking equipment.**
- **Never operate the unit without water in the reservoir.**
- **Always turn the unit off and disconnect the power cord from the power source before performing service, maintenance, or before moving the unit.**
- **Never operate equipment with a damaged power cord.**
- **Only a qualified technician should perform repairs.**

LABELS AND SILKSCREEN MARKING



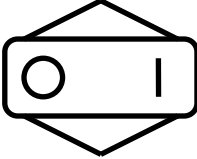
RETURN

This symbol labels the port where heated fluid returning from the customer's machine is connected.

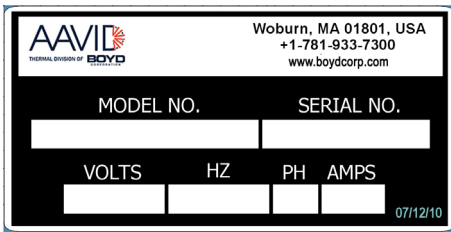


SUPPLY

This symbol labels the port where the line containing cooled fluid supplied to the customer's machine is connected.



This symbol is used to signify the power mode of the rocker style switch on the AC main line; Power On (I), Power Off (O).



This symbol is placed on the machine to identify the model number, Volts, Amps, Hz, and Phase.



This symbol indicates when the water level is low.



The Protective Earth (ground) Terminal



This symbol certifies that we conform to the EMC Directive and all applicable directives at the time of marking.

**IEC 127 TYPE T
5A**

5AMP/250V~ Time Lag Fuses, 5 X 20mm J01, H01

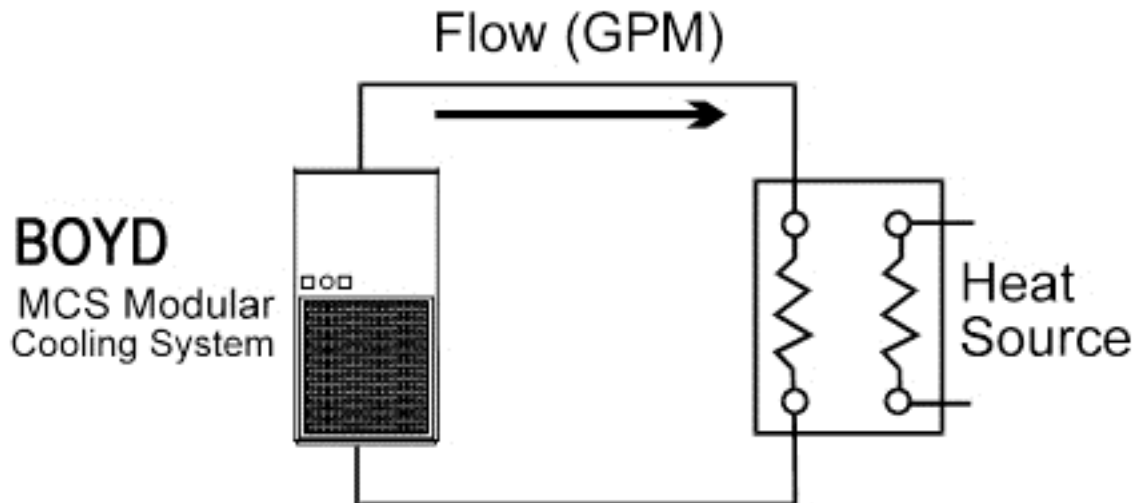
**TIME LAG FUSE
10A**

10AMP/125V~ Time Lag Fuses $\frac{1}{4}$ X $1\frac{1}{4}$ in. G01

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.



Specifications	
Operating Environment	5°C - 40°C 80% RH
Unit Dimensions	width 15" x depth 15" x height 24"
Weight	60 lbs.
Hose Connections	3/8 FNPT
Input Power	G01: 115V~ 60Hz 1PH H01: 230V~ 50Hz 1PH J01: 230V~ 60Hz 1PH
Fuse Type	G01: 10 AMP/1250V~, Time Lag Fuse G01: 5 AMP/250V~, IEC 127 Type T J01: 5 AMP/250V~, IEC 127 Type T
Cooling Capacity, MCS40/MCS50 (using water, 5°C ITD)	G01: 2400 Watts / 3500 Watts H01: 1920 Watts / 2916 Watts J01: 2400 Watts / 3500 Watts
Flow Rate, Standard / Optional	G01: 1.8 GPM / 2.3 GPM optional H01: 1.5 GPM / 1.8 GPM Optional J01: 1.8 GPM / 2.3 GPM Optional
Pump Motor	¼ HP
Tank Capacity	1.5 Gal.
Noise Level	53 DBA
Flow Capacity	Up to 35 PSI (Internal pressure factory set)
Add bypass pressure	35 PSIG

INSTALLATION

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) Install the 5 micron cooling fluid filter by unscrewing the filter housing, inserting the filter and hand tightening the filter housing on the filter unit.
- 5) Connect IEC 320 Type Power Cord to power entry module, and to standard power source.
- 6) 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.
- 7) Turn on the system using the ON/OFF toggle switch located on the front panel.
- 8) 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.



--IMPORTANT--

Do not operate cooling system until leak has been repaired.

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  **SUPPLY** and  **RETURN** labels. Lines should be connected to the supply and return ports. The cooling system process fluid supply and return ports are equipped with standard 3/8" 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.

---IMPORTANT---

**Never connect the SUPPLY or RETURN fitting
to your building water supply or any pressurized source.**

Flexible tubing, if used, should be of heavy wall or reinforced construction. All tubing should be rated to withstand 80 psig at $\pm 30^{\circ}\text{C}$. 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 indicator light will illuminate. Top off the tank until the lamp turns off.

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

Refer to the Specification section, and to the product label on the rear of the unit for the specific electrical requirements of your unit. The cooling systems power entry module is configured with a standard international IEC320 inlet. A cord set with an IEC320 outlet and an inlet plug that is compatible to the local power grid and power requirements of the cooling system.

- **The power cord must be connected to a properly grounded outlet.**
- **It is the user's responsibility to ensure a ground connection is provided.**

SYSTEM MAINTENANCE / SERVICE

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

Noise Level

Any abnormal sound or substantial increase in noise level since the last weekly inspection may indicate an impending pump or fan problem, which should be further investigated.

Leakage

Observation of fluid on the floor surface, coming out from under the system, calls for a further check for possible leaks.

Fluid Level

Any significant drop in the fluid level since the previous weekly check should be investigated further. If there is no visual system leak, then the loss may be due to leakage elsewhere in the equipment.

Periodic Inspections

Fan Assembly

No maintenance is required.

Pump

No maintenance is required.

Motor Lubrication

Oiling instructions are posted on each motor. Lubrication is recommended after 3 years of normal or 1 year of heavy-duty service. Use electric motor or SAE 10 Oil.

Water Filter

A dirty filter can lead to a decrease in system performance in a short period of time. It is recommended that the filter be replaced after the first month of operation on new systems to ensure that the system runs at maximum capacity. After this initial filter replacement, the water filter should be replaced every six months under normal operating conditions. More frequently under severe conditions.

Low Level Indicator

The level switch indicates the user in the event of accidental loss of fluid. Since this switch is "passive" during normal operation, it is advisable to "exercise" it about once every 6 months, to make sure it is still functional.

Algae

To restrict growth of algae in the reservoir, it is recommended that the reservoir cover be kept in place and that all circulation lines be opaque to ultraviolet. This will minimize the entrance of light, which is required for the growth of most common algae. Contact our Customer Support Department if algae becomes a problem.

Reservoir

Periodically inspect the fluid inside the reservoir. If the fluid appears dirty, flush the reservoir with a cleaning fluid compatible with the circulating system and the cooling fluid. It is important to flush, drain and refill every 6 months, or each time the water filter is replaced.

Air Filter

It is recommended that a visual inspection of the fins be made monthly after initial installation. After several months, the frequency of replacement should be established. For proper operation, the unit needs to pull substantial amounts of air. A build up of dust or debris on the air filter will lead to a loss of cooling capacity. The frequency of filter replacement depends on the operating environment.

Spare Parts List

DESCRIPTION	BOYD PART NUMBER
Air Filter Spare Part	330-0021
5 Micron Water Filter Spare Part	330-0022
Pump 1.8 GPM / 2.3 GPM	410-0103-01 / 410-0112
Motor 115VAC	230-0202
Motor 230VAC	230-0214
Fan 115VAC / 230VAC MCS40	230-0192 / 230-0193
Fan 115VAC / 230VAC MCS50	230-0494 / 230-0495

TROUBLE SHOOTING GUIDE

Problem	Recommend Remedy
Unit will not start	<p>Check the line cord; make sure it is plugged in.</p> <p>Check the voltage on the power source. Make sure it is within the rated voltage of the unit $\pm 10\%$.</p> <p>Check that the Power Switch is on and that the fuses have not blown.</p>
Unit will not circulate fluid	<p>Check the reservoir level. Fill, if necessary.</p> <p>Check for blockage.</p>
Inadequate cooling capacity	<p>Check and verify that the air filter is free of dust and debris.</p> <p>Check for proper clearance for air circulation and ventilation.</p>

Service Assistance

If, after following these trouble shooting steps, your unit fails to operate properly, contact Boyd for assistance.

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

Boyd's warranty is set forth in the Terms and Conditions included with each system quotation and are available here <https://www.boydcorp.com/terms-and-conditions-of-sale.html>

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

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.