

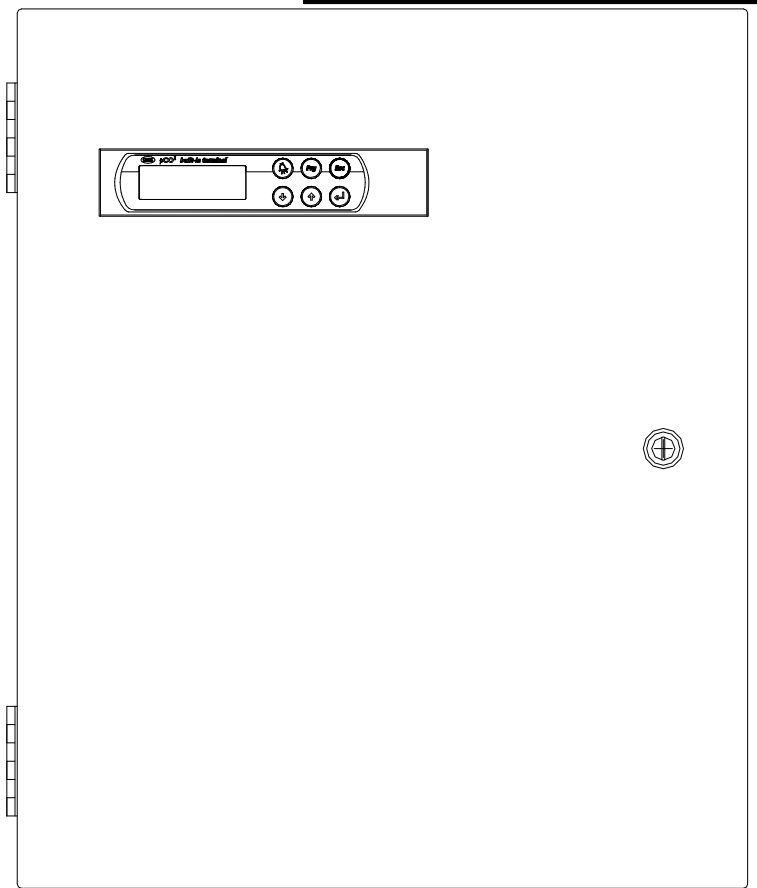
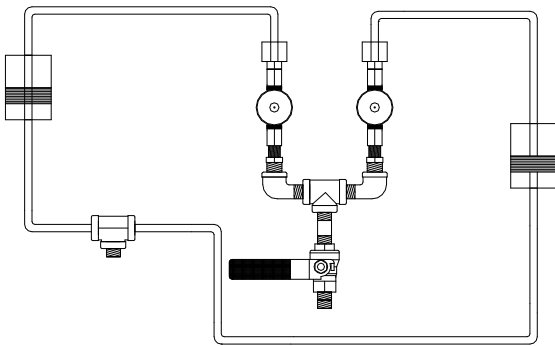
# MC

## Room Atomizing Humidification System

(Modulating Operation)

### Installation Operation & Maintenance Manual

Read and Save  
these Instructions



**CAREL**

## Warning!



L'installazione del prodotto deve obbligatoriamente comprendere la connessione di messa a terra, usando l'apposito morsetto giallo-verde in morsettiera. Non utilizzare il neutro come connessione a terra.

*The product must be installed with the earth connected, using the special yellow-green terminal on the terminal block. Do not use the neutral for the earth connection.*

Le produit doit être installé avec la connexion terre branchée, en utilisant la signalisation et les bornes spécifiques (jaune/vert) à la mise à la terre. Ne pas utiliser le neutre comme mise à la terre.

*Das Produkt muss geerdet werden. Verwenden Sie hierfür den gelb-grün Anschluss an der Klemmleiste. Verwenden Sie nicht den Null-Leiter für die Erdung.*

La instalación del producto debe obligatoriamente incluir la conexión de la toma de tierra, utilizando el borne amarillo/verde del regletero. No utilizar el neutro como conexión a tierra.

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### About Support Systems:

The MC system requires clean compressed air and water to operate efficiently and with minimal maintenance.

■ **Compressed Air Requirements:** 0.15 CFM per pound of water per hour is required. DO NOT UNDERSIZE AIR COMPRESSORS. The system cabinets should be fed with a minimum of 100 psi of compressed air. Internal regulators are used to reduce it to the required discharge pressure to the atomizing heads (30 psi at manifold ends, at full load output conditions). Compressor after cooler, moisture separator and trap, and 0.1 micron coalescing filter are the minimum requirements. Oil from compressed air will cause excessive maintenance on the atomizing heads. SUPPLY AIR PIPING MUST BE SIZED PROPERLY TO AVOID EXCESSIVE PRESSURE DROP.

■ **Water Requirements:** The system requires 5 psi of clean water at the atomizing manifolds. 20 psi to the cabinet is the recommended minimum. If water lines are old, steel, or galvanized, then a water filter is required prior to the control cabinet. NEVER use steel or galvanized pipe

**How the MC Works**

The MC atomizing system is built around the exclusive atomizing nozzle design developed by Carel LLC over 10 years ago. This nozzle has many exclusive features:

- All stainless steel construction
- Special piston lubricant that avoids liberation of ions
- Most efficient design of air use versus droplet size
- Simple design with extremely low maintenance

The MC atomizing head uses what is called “Supersonic Vacuum Implosion” technology. This technology produces small droplets using minimal compressed air with relatively low pressures (30 psi air, 5 psi water). Air and water regulators and solenoid valves in the control cabinet control the pressures and flow to the nozzles.

On a call for humidity, the air valve is opened and air flows to the nozzles. When the air pressure rises high enough, it will push back the pistons in the atomizing nozzles, pulling back the cleaning needle and opening the water seat, allowing water to then flow out of the nozzles and be atomized. The nozzles are failsafe in that if the air pressure is too low, the pistons will remain closed and prevent water flow. The tip of the cleaning needle is also used as a secondary modulation valve giving the MC its exclusive 100:1 modulating turn down.

In operation, compressed air exits the front of the nozzle through a precision metered orifice which surrounds the water orifice. As the air exits at supersonic speed, it produces a high vacuum around the water orifice. Water is drawn into the vacuum and super compressed. The water is then instantly accelerated to supersonic speed and decompressed, tearing it into tiny droplets and also distorting the droplets wildly. This distortion causes micro ingestion of the surrounding atmospheric air, enhancing the speed at which the droplets then evaporate. Modulating the compressed air supply to the heads causes the pistons to move, modulating the water flow.

**LIMITED WARRANTY**

All products manufactured by Carel USA, LLC are warranted to the original purchaser to be free from defects in materials and workmanship in the course of normal and reasonable use for a period of 2 years from the date of installation or 2 years and 1 month from the date of shipment (The OEM controls warranty is 2 years from date of manufacture), whichever comes first, so long as the product has been installed and operated in accordance with all appropriate manuals and wiring diagrams, and started up by a qualified Carel USA technician. Any product or part that is found to be defective will, at the option of Carel USA, LLC be replaced or repaired. Carel USA, LLC reserves the right to inspect any part or installation before replacing or repairing defective parts. After startup of the product, labor for repairs or replacement of parts is not covered by this warranty. Products not included in this warranty are NTC and PTC probes, transformers (TRA series), and routinely replaceable parts such as steam cylinders and gaskets. Carel USA, LLC assumes no liability for consequential or inconsequential damage, or damage due to negligence or improper use. Under the terms of this warranty, the original purchaser may have certain legal rights and other rights, which may vary from state to state. The Warranty will not be considered valid if a product is damaged due to negligence, mishandling or misapplication, or if the product label is missing. Carel USA will attempt to repair or replace the products within two (2) months of the receipt of the returned goods.

## Installation Instructions

### Step 1 Installation Rules

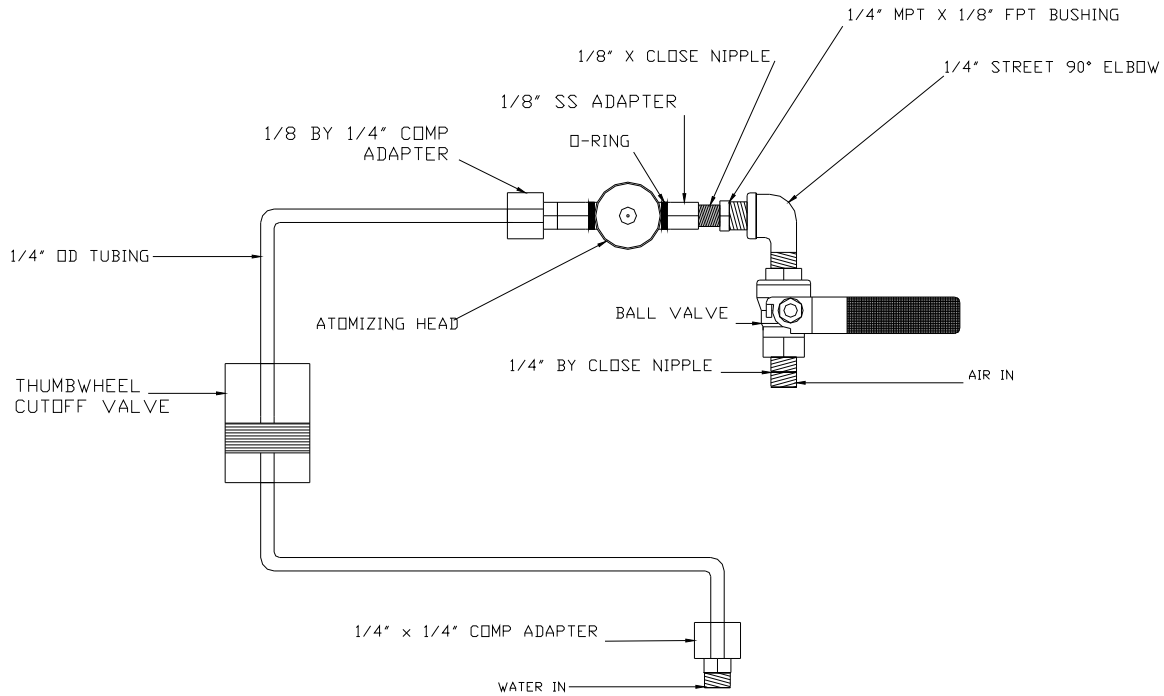
The following general rules need to be applied to any MC installation. Carel will not take responsibility for any system installed that does not follow these rules and warranty may be voided.

1. **All atomizing heads on a system must be at the same elevation.** Due to the low water pressure involved, a deviation in elevation of heads of more than 3 inches may be enough to cause the lower heads to spray heavy while the higher heads don't spray at all.
2. **Keep minimum pressure drops in the air and water piping.** Always use minimum 1/2" I.D. water lines. Use minimum 1/2" I.D. air lines up to 200 lbs/hr in capacity and/or when the total system layout is less than 100 feet. Use minimum 3/4" I.D. air lines when the system capacity is over 200 lbs/hr and/or they total system layout is more than 100 feet. Avoid excessive use of sharp 90° elbows (use sweep elbows or 2-45° elbows when possible) - neatness is secondary to function. **NOTE: It is the installer's responsibility to insure that the air and water lines are sized to provide proper pressure and volume to the cabinet and then to the atomizing heads.**
3. **Avoid vertical bends in air and water system piping.** These could trap dirt, water or air and prevent proper blowout of the lines during maintenance.
4. **Heads should be mounted above the air and water lines.** This insures that sediment and debris will not flow into the atomizing heads to cause maintenance.
5. **Position atomizing heads to avoid direct discharge onto obstructions.** As a rule of thumb, the atomizing heads discharge a plume of mist up to 15 feet long and to 4 feet in diameter. Anything in this plume has the potential to get wet.
6. **Position the heads to allow access for maintenance.** Position over aisles or along walls where access is easy, rather than over equipment and racks.
7. **The control cabinet should be located at least 3 feet below the elevation of the atomizing heads.** This is to allow a column of water pressure against the water regulator contained in the control cabinet to allow controllability.
8. **Size the compressor properly.** 0.15 CFM per pound of water per hour is required. **DO NOT UNDERSIZE AIR COMPRESSORS.** The system cabinets should be fed with a minimum of 100 psi compressed air. Internal regulators are used to reduce it to the required discharge pressure to the atomizing heads (30 psi at manifold ends, at full load output conditions).
9. **Compressed air must be clean and without oil.** Compressor after cooler, moisture separator and trap, and 0.1 micron coalescing filter are the minimum requirements. Oil from compressed air will cause excessive maintenance on the atomizing heads, causing a premature buildup of mineral around the water nozzle tip and in the front air orifice of the atomizing heads, blocking air flow and causing a heavy spray.
10. **Insure proper water supply.** 20 psi to the cabinet is the recommended minimum (100 psi maximum). If water lines are old, steel, or galvanized, then a water filter is required prior to the control cabinet. **NEVER** use steel or galvanized pipe within the system.

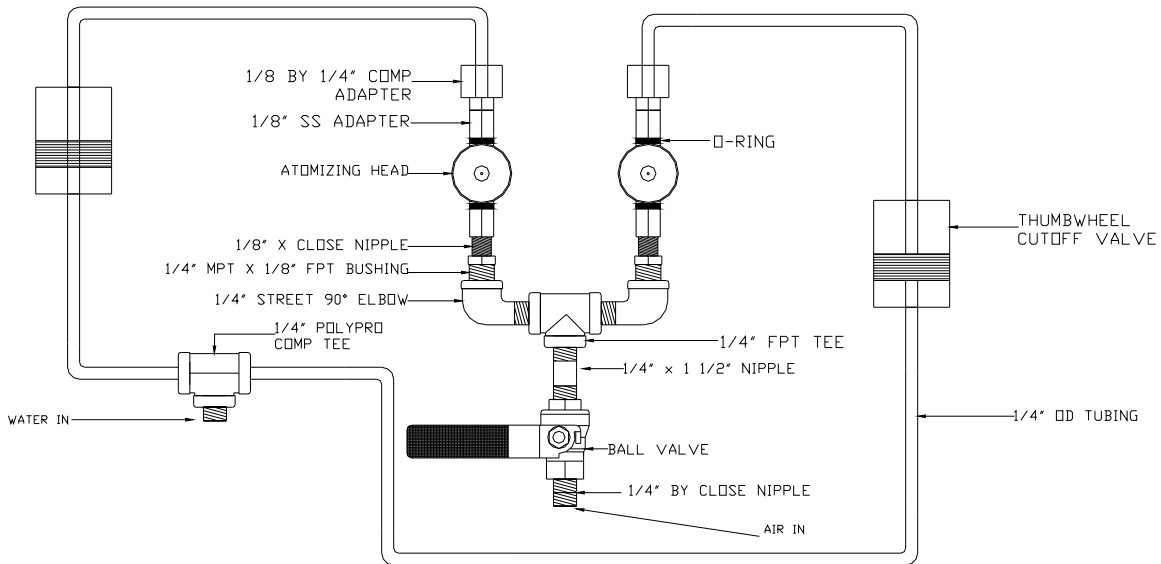
**Step 2 Assemble atomizing head assemblies**

Assemblies are shipped preassembled except for connection of the plastic water lines. The supporting air and water lines, and tees are supplied by the installer. All threaded fittings on the head assemblies for air and water are 1/4" MPT.

**Single Head Assembly**



**Double Head Assembly**



## Step 3 Plan system layout (assistance is available from Carel USA)

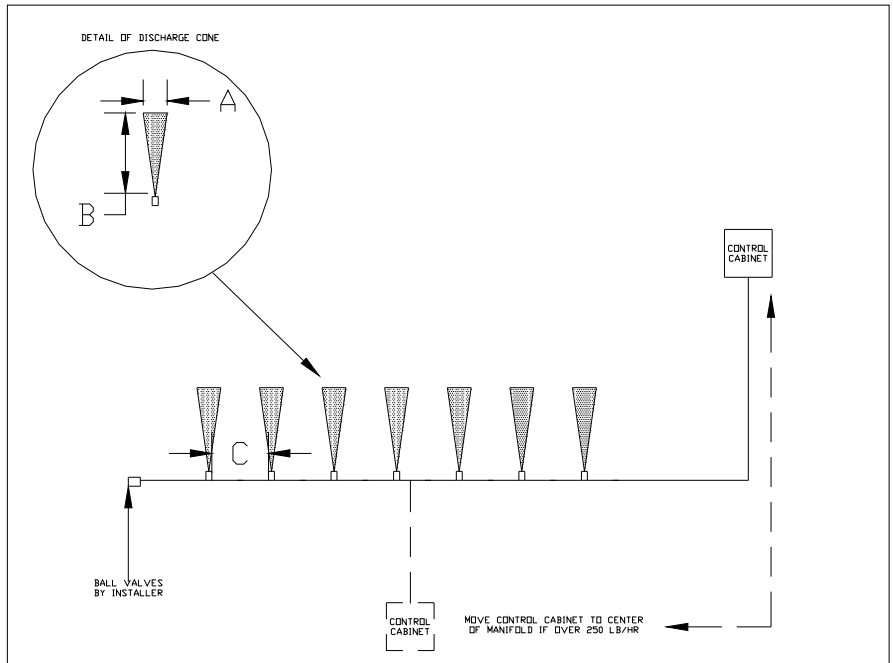
First, determine where the atomizing heads can be best located to maintain necessary clearances per the following diagrams. The atomizing heads may be located along a wall with all heads discharging in the same direction,

RECOMMENDED MINIMUM DISTANCES  
(INCHES)

LBS/HR	A	B	C
6	30"	180"	30"
9	30"	192"	30"
12	36"	204"	36"
15	48"	240"	48"

RECOMMENDED  
MINIMUM INSTALL  
HEIGHT

LBS/HR	HEIGHT (FEET)
6	8'
9	8'
12	15'
15	20'



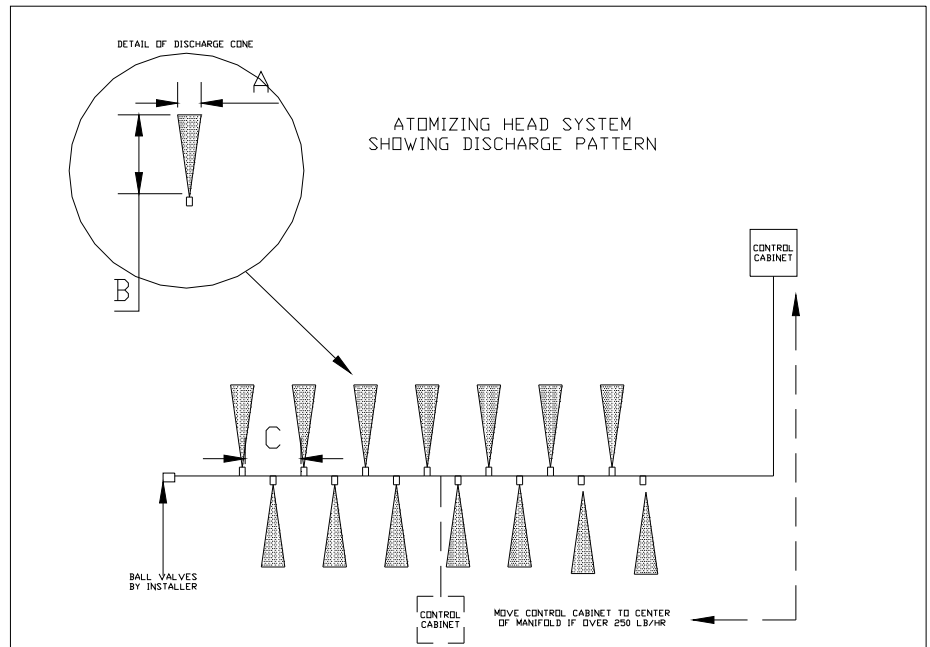
or down the center of the building with every other head discharging in opposite directions,

RECOMMENDED MINIMUM DISTANCES  
(INCHES)

LBS/HR	A	B	C
6	30"	180"	30"
9	30"	192"	30"
12	36"	204"	36"
15	48"	240"	48"

RECOMMENDED  
MINIMUM INSTALL  
HEIGHT

LBS/HR	HEIGHT (FEET)
6	8'
9	8'
12	15'
15	20'



**NOTE: The installer is responsible for the final position of the atomizing assemblies. Assemblies may have to be moved after startup if obstructions do not allow clear discharge.**

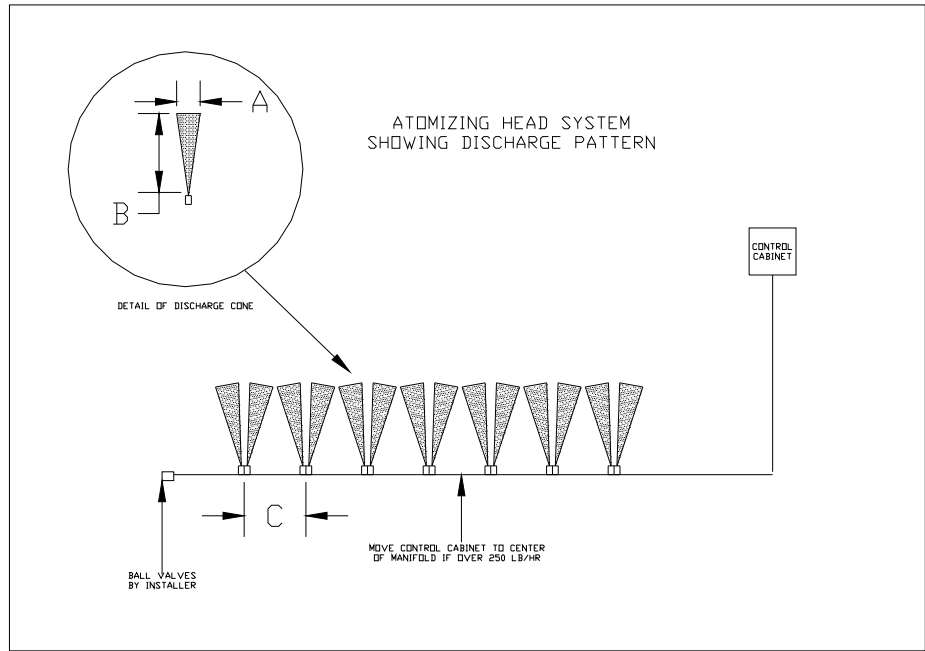
or double head assemblies discharging in the same direction (or with every other head opposite).

RECOMMENDED MINIMUM DISTANCES (INCHES)

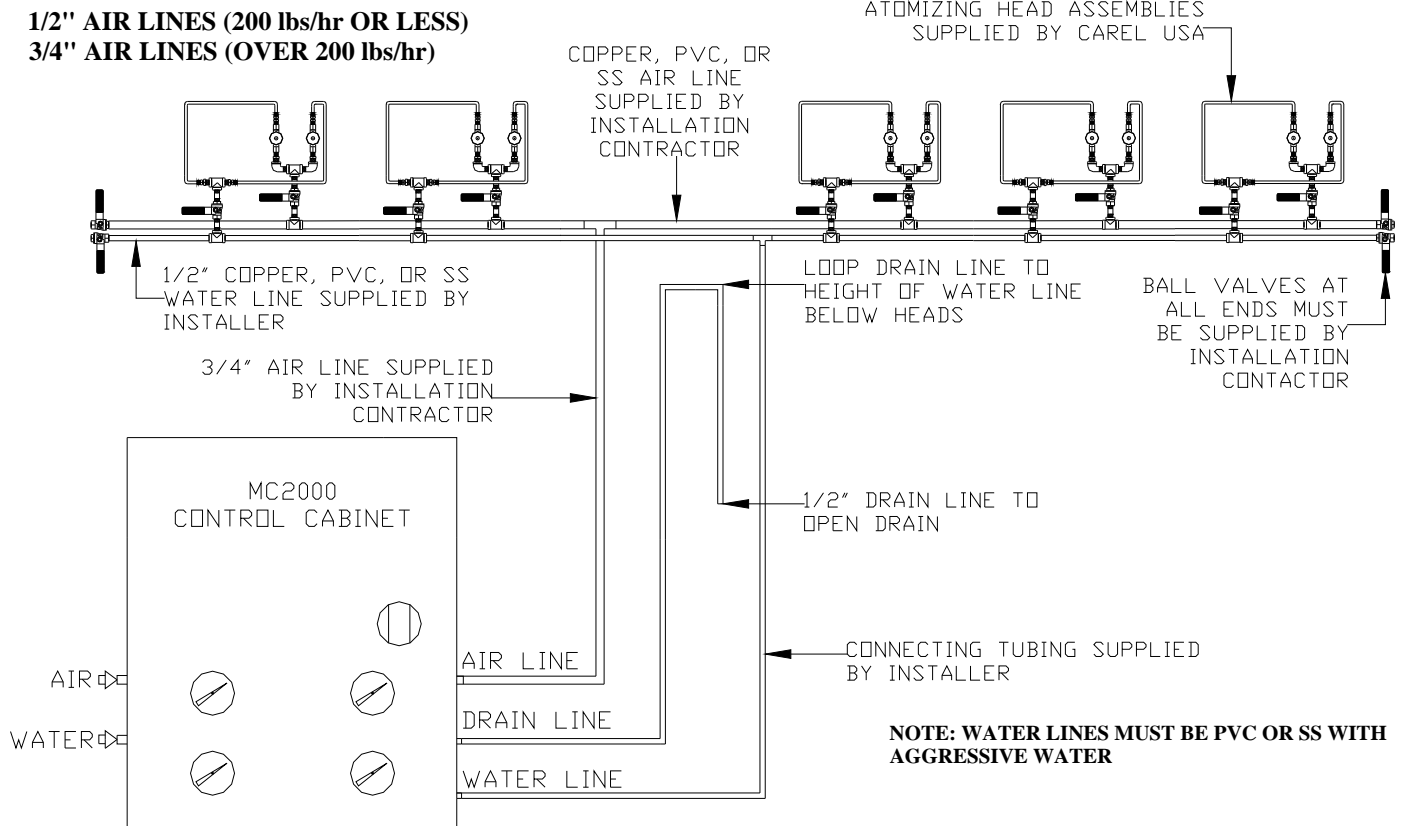
LBS/HR	A	B	C
6	30"	180"	60"
9	30"	192"	60"
12	36"	204"	72"
15	48"	240"	96"

RECOMMENDED MINIMUM INSTALL HEIGHT

LBS/HR	HEIGHT (FEET)
6	8'
9	8'
12	15'
15	20'



The entire system layout then should resemble the following:



**NOTE:** You can feed the system from the end when the capacity is under 200 lbs/hr and shorter than 100 feet in length. Over 200 lbs/hr or longer than 100 feet, feed from the center as shown.



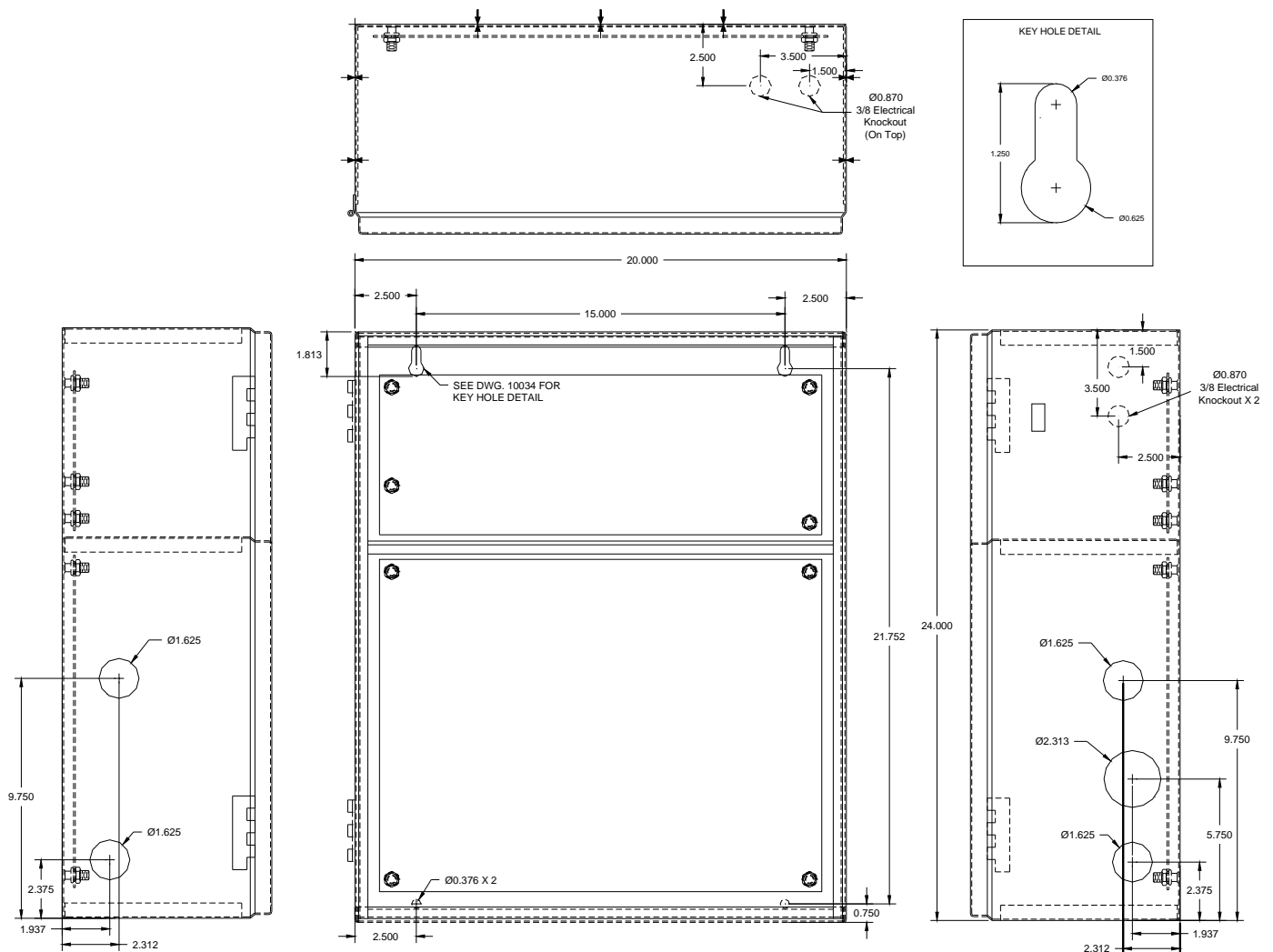
## Step 4 Mount the cabinet

The control cabinet should be mounted to a solid surface at a convenient height. However, the cabinet should not be located above the atomizing heads. Optimum installation is with the control cabinet at least 3 feet or more below the atomizing heads.

Air and water inlet connections are on the left side of the cabinet, outlet connections on the right, so leave at least 2 feet clearance on both sides for these.

Cabinet must be mounted level and indoors. Minimum temperature = 40°F, maximum temperature and humidity = 120°F and 85%RH noncondensing.

Dimensions and mounting holes for the cabinets are as follows.



**Step 5 Connect air and water**

The air and water ball valves shown at right are supplied loose with the cabinet. Solder a piece of 1/2" copper tube (no longer than 2') to the 1/2" ball valve (supplied). Slip tube in top hole and 5/8" compression fitting then tighten. Cement a piece of 1/2' schedule 80 PVC pipe (no longer than 2') to the 1/2" union PVC ball valve (supplied). Slip pipe in bottom hole and cement to the union fitting in cabinet.



On the inlet side (left), the top connection is for air, bottom one is for water. On the outlet side (right) the middle connection is the drain.

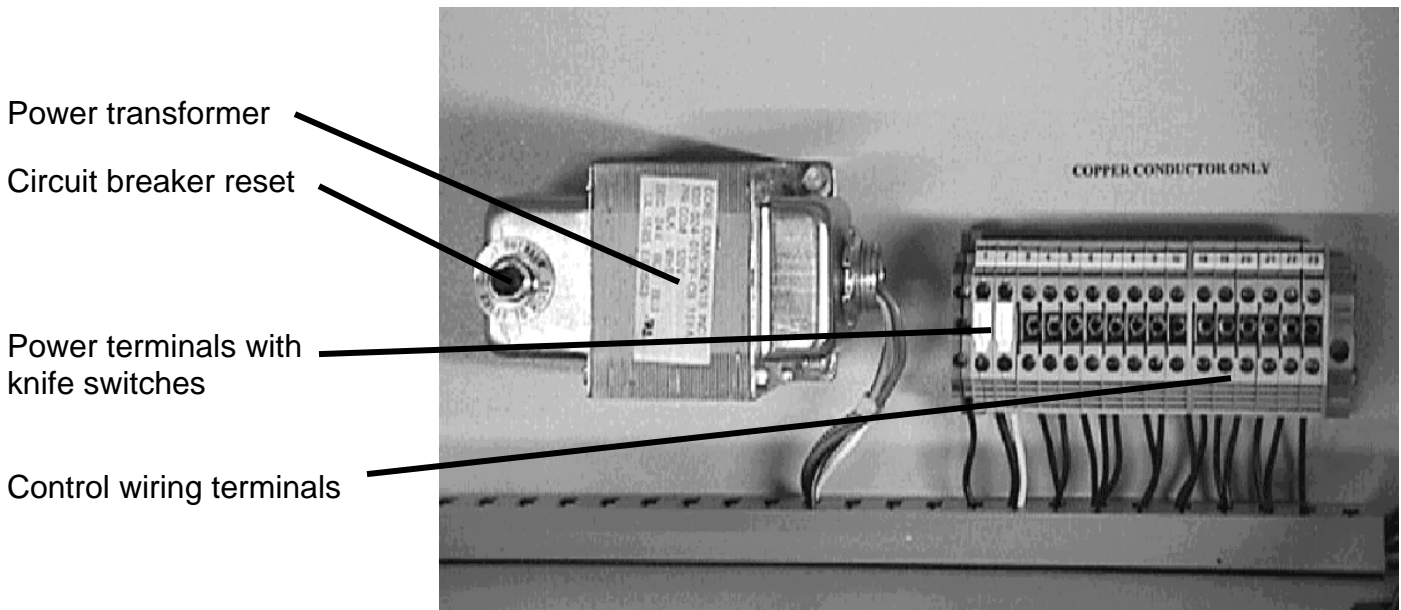
Use 1/2" water lines to feed the cabinet and from the cabinet to the atomizing manifold. Use 1/2" air lines when the system is under 200 lbs/hr and the piping distance is less than 100 feet. Use 3/4" air lines when the system is over 200 lbs/hr and/or the piping distance is longer than 100 feet. If the piping has excessive elbows and is more than 100 feet, then use 1" air lines.

**NOTE: Use two (2) wrenches on all fittings to prevent twisting of the fittings inside the cabinet, which can cause them to leak.**

**NOTE: It is the installer's responsibility to size the air and water lines to minimize the pressure drop and provide 100 psi air and 20 psi water minimum to the cabinet in sufficient volume for system operation.**

**Step 6 Connect electric power**

- In the top of the cabinet are the electrical connections. Connect 110 VAC to terminals 1 and 2 and the ground wire to the green and yellow ground terminal. Cabinet requires a 5 Amp service.
- The terminals have knife blade disconnects. The power transformer has an internal circuit breaker.



Power transformer

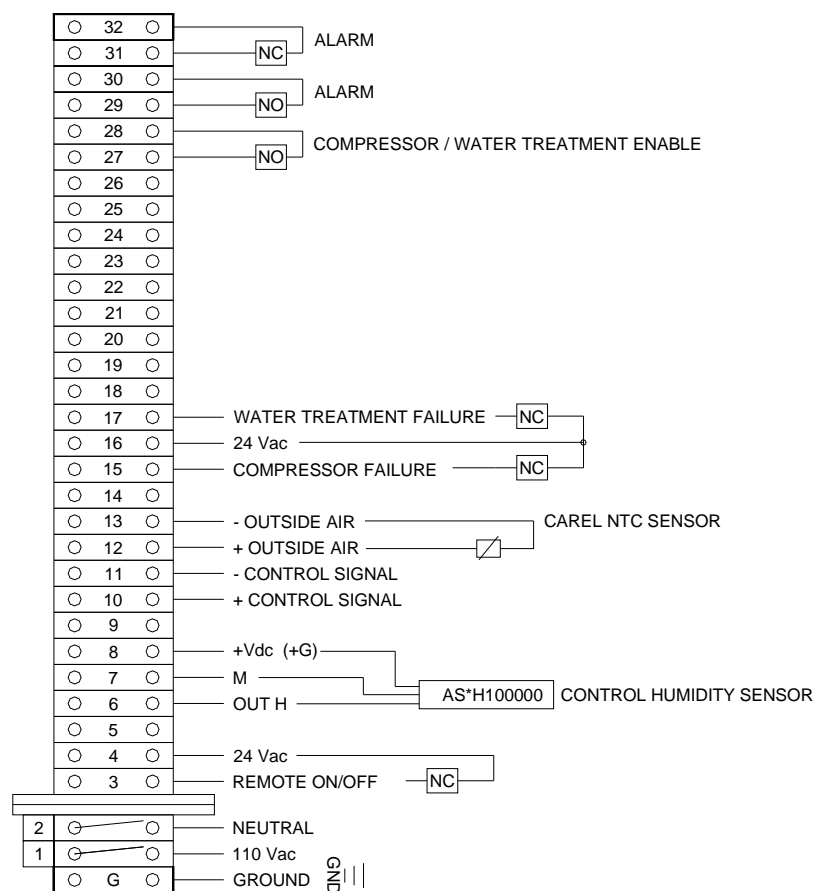
Circuit breaker reset

Power terminals with knife switches

Control wiring terminals

## Step 7 Mount and wire sensors & safeties

### Master control cabinet wiring



The control humidity sensor is located in the room.

The hi-limit humidity sensor is not used. The airflow switch is not used.

Terminals 29 - 32 are connected to a SPDT relay. Terminals 30 & 32 are the common of the relay.

Compressor/water treatment enable is a SPST relay.

FIELD WIRING

Water treatment and compressor failure alarms need to come from a dry contact. 24 VAC provided by the MC cabinet (#16).

Carel NTC sensors do not have polarity.

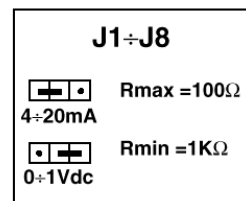
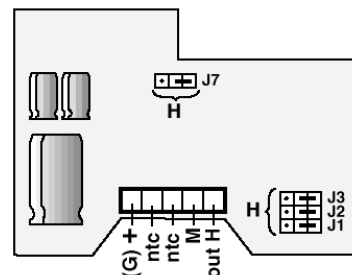
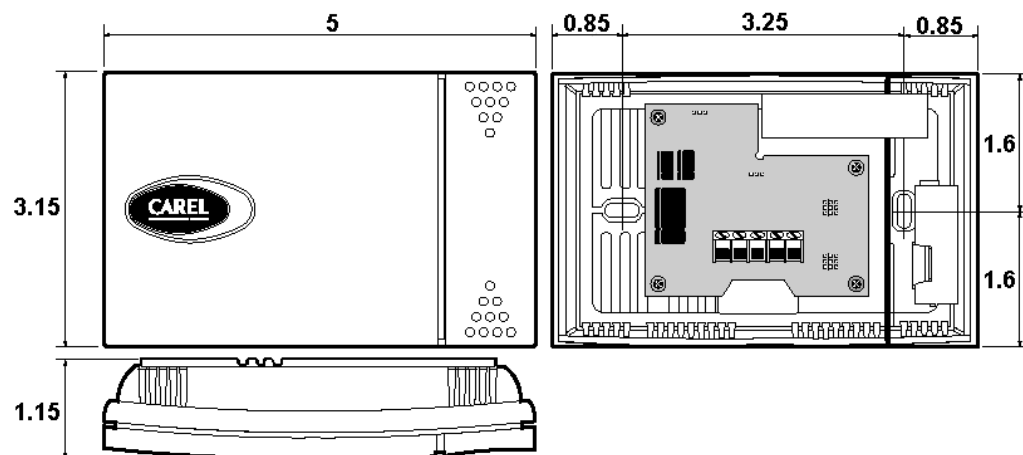
DDC input control signal

Remote on/off input needs to come from dry contacts. 24 VAC provided by the MC cabinet (#4). If a remote on/off device is not used, then a jumper must be placed across terminals 3 & 4.

Wire all power and controls according to local and national electrical codes. Wire the control cabinets according to the wiring diagrams supplied with the cabinets themselves. Wiring diagrams in this manual are for reference only.

### DPWC Wall Humidity Sensors

Model	Description	Humidity: Thin film capacitor Linear 0-1 Vdc or 4-20 mAdc from 10 to 90%RH Accuracy: +- 3%RH from 20 to 90%RH calibrated at 55%RH and 25°C (77°F) +- 5%RH above 90%RH and below 20%RH Response time: 60 seconds Power: 12 to 24 Vac/dc or +12 to -12 Vdc Housing: Wall: ABS with glass fiber fill Certifications: Calibrated to NIST traceable humidity/temperature standard, CE Approved
DPWC111000	Wall Humidity sensor (replaces ASWH100000 and SHWOOP)	



**Step 8 Installation Checklist**

The following checklist should be reviewed BEFORE contacting your CAREL representative for system start-up:

- \_\_\_\_\_ 1. Proper electric power is connected to the control cabinet. Controls light when power is turned on by the on/off switch.
- \_\_\_\_\_ 2. All plumbing connections are complete and tested for leaks. NOTE: Flush air & water lines before cabinet. All manifolds are supplied pretested and cleaned. DO NOT flush manifolds through the cabinet.
- \_\_\_\_\_ 3. All sensors are installed and connected. Wiring tested by turning on power by the on/off switch on the control cabinet and verifying proper humidity readouts.
- \_\_\_\_\_ 4. All computer and/or DDC wiring is completed to the control cabinet and the signal is verified.
- \_\_\_\_\_ 5. Air compressor is installed and has been started up. The compressor has a minimum of an aftercooler, moisture separator and trap, and a 0.1 micron coalescing filter. (Oil in the heads will degrade performance and drastically increase maintenance.) Check compressor size - should be sized to deliver 0.15 CFM per lbs/hr of capacity.
- \_\_\_\_\_ 6. Drain from cabinet is connected to an open drain and looped to height of nozzles or no more than 6" below supporting water line.
- \_\_\_\_\_ 7. All air and water lines and manifolds are terminated with removable plugs. Air gauge on end of air line.
- \_\_\_\_\_ 8. All atomizing heads are connected to the air and water manifolds properly. Verify air to air and water to water.
- \_\_\_\_\_ 9. Installation, plumbing and wiring matches layout drawings and specifications.
- \_\_\_\_\_ 10. Supply water is connected and available. Water treatment system has been started.

**Checklist checked by:** \_\_\_\_\_ **Date checked:** \_\_\_\_\_

**NOTE: The above checklist MUST be returned before factory startup is begun. If any of the above items are found not to be ready at time of startup, a second startup charge may be assessed.**

## Step 9 Startup Procedures

**You will need:** A VAC/VDC multimeter, a set of wrenches, a flat blade screwdriver, and a rag and bucket.

- **Close all atomizing head air and water valves.** It is extremely important that no dirt gets into the atomizing heads during startup.
- **Clean main air and water supply lines to the control cabinet.** With the air and water shut off at their source, break the unions on the intake side of the control cabinet. Put on safety glasses. Place a cloth over the open ends of both the air and water lines to catch any flying debris. Slowly open the air and water valves respectively and bleed the lines until all dirt has been removed.
- **Clean all air and water manifolds.** Turn on the system power at the control cabinet and activate the system. To activate the system, go to the Technician's Menu by pressing the PRG button. Select "MANUAL CONTROL". Enter 100% in the manual control screen by pressing ENTER, DOWN once, and ENTER again. Adjust air pressure to 30 psi, and water pressure to 5 psi to the manifold. Place a cloth over the open ends of both the air and water lines to catch any flying debris. Slowly open the air and water ball valves and bleed the lines until all dirt has been removed from both lines and all air is out of the water lines. Shut off the system at the cabinet.
- **Open all valves at the heads.** With the system OFF, open all valves at the heads.
- **Start the system.** With power to the system, go to the Technician's Menu by pressing the PRG button. Select "MANUAL CONTROL". Enter 100% in the manual control screen by pressing ENTER, DOWN once, and ENTER again. Once the modulating valve has fully opened, adjust the air pressure to 30 psi at the end of the air manifold, note the cabinet pressure reading. Adjust the water pressure until you see visible spray out of each nozzle, note the cabinet pressure reading. The water pressure may be adjusted up or down slightly to achieve the heaviest spray possible without wetting items near the heads. Turn off Manual Control and return to automatic control.

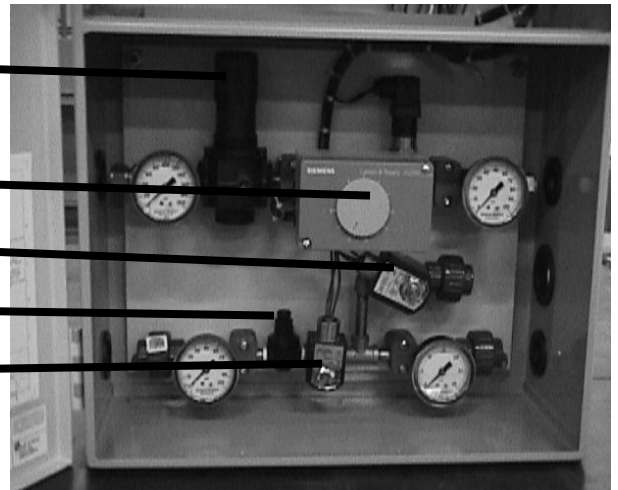
**Air regulator**

**Modulating air valve**

**Drain solenoid**

**Water regulator**

**Water feed solenoid**



- **Set in final setpoints.** See "Operating the MC controls following.

**STARTUP IS COMPLETE - REFER TO OPERATING INSTRUCTIONS.**



## Operating the MC controls

The MC system uses the very latest Carel controls technology known as the pCO2 programmable controller. There is a backlit, 4 line by 20 character display and 6 user interface buttons.



### Keyboard COMMANDS

Button		Description
	<b>ESC</b>	Escapes to previous screen-loop. When already in the Technician's Menu, pressing ESC takes you to the main status screen.  If ESC's green LED is blinking, part of the system is under "Manual Control."
	<b>PROGRAM</b>	Shortcut to the Technician's Menu, where all application settings can be reached. If protected, a password will need to be entered.
	<b>ALARM</b>	Turns off the buzzer and displays the first alarm screen in the alarm-loop.  A red LED located under the Alarm button will be energized when there are alarms present. If the red LED is blinking, that means an alarm has occurred, but the condition has been corrected and the alarm can now be reset.
	<b>UP</b>	Cycles upward through the screens, when cursor is in top left corner. When cursor is in a field, the value of the field is increased. The longer the button is held, the faster the value increases.
	<b>DOWN</b>	Cycles downward through the screens, when cursor is in top left corner. When cursor is in a field, the value of the field is decreased. The longer the button is held, the faster the value decreases.
	<b>ENTER</b>	Cycles through fields in a screen. When in a field, pressing ENTER confirms the current value into the field and goes to the next field.
	<b>UP + DOWN</b>	Shortcut to quickly see the Software Application's Version Number and Date.  It is in this screen from which you can restore the Factory Settings, by pressing , then , then , and finally  one last time.
	<b>ESC + PRG</b>	Shortcut to quickly see the System Type and Number of Humidification Stages.  When in the Alarm History Screen, pressing ESC+PRG will erase the history.
	<b>ESC + ALARM</b>	Keyboard shortcut to reset all Manually controlled points to Automatic control.  When in the System Run Hours screens, pressing these keys will reset the currently selected Stage's Run Hours.

**NOTE:** The standard MC display will have fields that can display values or accept values. Values that are read only are preceded by a colon (:), ex: "Room: 040.4 %RH" indicates that the 040.4 is a display only value and cannot be changed. Values that can be changed (such as set points) are preceded by an arrow (>), ex: "Room> 040.4 %RH" can be changed by entering the field and using the **UP** and **DOWN** buttons.

On initial powerup, the controller will go through a series of self-tests and then activate the program, bringing up the following series of screens:

1 Initial Power Up	2	3
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center;">CAREL MC Atomizing Humidifier Ver: 1.02 01/13/04</p> </div> <p>This is called the "splash screen", which appears on initial power up only and displays the software version and date. You can reaccess this screen at any time by pressing the <b>UP</b> and <b>DOWN</b> buttons simultaneously.</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center;">MC ATOMIZING System: OFF 100%***** Room: 040.4 %RH Supply: 040.4 %RH</p> </div> <p>This is the main display screen. It shows the system status - on/off, modulation % and the 4 blocks indicate stages on. Room and supply humidities are also displayed.</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center;">Other Inputs DDC Demand:000.0% Outside Temp:000.0°F Supply Temp:000.0°F</p> </div> <p>DDC input demand and other available sensors are displayed in this screen if they are connected.</p>

All functions are then accessed through the Technician's Menu which is accessed by pressing the **PROGRAM** button, which displays the Technician's Menu with rolling choices:

The choices are accessed by using the **UP** and **DOWN** buttons to scroll the choice to the stationary arrow line.

```

*TECHNICIANS MENU*

> SYSTEM STATUS
  user settings
  current alarms
  run hours
  service settings
  factory settings
  date / time
  manual control
  alarm history
  communications
    
```

Then press **ENTER** to make your selection and go to that next screen.

Pressing **ESC** will return you to the main display screen.

The following pages show each of the above menu selections.

**NOTE:** The screens shown following are comprehensive. Depending on configuration, some of the items shown following will not appear.

### System Status

See the standard screens shown at the top of this page.



## User Settings

(Initial password is 0001)

1 USER SETTINGS	2	3
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre>ROOM HUMIDITY SETUP Setpoint&gt; 050.0 % Band&gt; 10.0 % Type&gt;Prop Time&gt;010s</pre> </div> <p>Room humidity setpoint and band may be changed. The band is the proportional band from the set point. In this example, the system will operate at 49%RH and reach full output at 40%RH. Type is Proportional or Proportional + Integral. Time is the integral time during which output is increased to achieve setpoint.</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre>SUPPLY HUMID. SETUP Setpoint&gt; 090.0 % Band&gt; 10.0 %</pre> </div> <p>Supply humidity high limit setpoint may be changed. The band is the proportional band from the setpoint. In this example, the system will begin modulating down at 80%RH and will be off at 90%RH.</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre>STAGING SETUP ON    OFF Stage 1&gt;010% &gt;000% Stage 2&gt;035% &gt;025%</pre> </div> <p>The point at which the atomizing stages come on and off within the proportional band may be changed. For this example, stage 1 will activate at 10% of the proportional band or about 49%RH, shutting off at 50%RH. Stage 2 would activate at 46.5%RH and shut off at 47.5%RH.</p>

4	5
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre>STAGING SETUP ON    OFF Stage 3&gt;060% &gt;050% Stage 4&gt;090% &gt;075%</pre> </div> <p>Stages 3 and 4 on and off points may be changed.</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre>OUTSIDE TEMP RESET Setpoint&gt; 055.0°F Band&gt; 05.0°F Hum Set Drop&gt;:10.0%</pre> </div> <p>This screen displays only if the outside air reset temperature sensor is installed and activated. As the outside air temperature drops below Setpoint, the Room Humidity Setpoint is automatically reduced by the Hum Set Drop value to avoid condensation.</p>

**Current Alarms**

1 CURRENT ALARMS	2	3
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>*** ALARM ***</p> <p>ROOM HUMIDITY SENSOR FAILURE</p> </div> <ul style="list-style-type: none"> <li>• Check sensor wiring</li> <li>• Check sensor, clean or replace</li> <li>• Check controller input, replace controller if bad</li> </ul>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>*** ALARM ***</p> <p>SUPPLY AIR HUMIDITY SENSOR FAILURE</p> </div> <ul style="list-style-type: none"> <li>• Check if sensor is getting wet</li> <li>• Check sensor wiring</li> <li>• Check sensor, clean or replace</li> <li>• Check controller input, replace controller if bad</li> </ul>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>*** ALARM ***</p> <p>DDC SIGNAL SENSOR FAILURE</p> </div> <ul style="list-style-type: none"> <li>• Check DDC signal</li> <li>• Check DDC wiring &amp; polarity</li> <li>• Check that DDC signal is isolated</li> <li>• Check impedance of DDC input</li> <li>• Check controller input, replace controller if bad</li> </ul>
4	5	6
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>*** ALARM ***</p> <p>OUTSIDE AIR TEMP SENSOR FAILURE</p> </div> <ul style="list-style-type: none"> <li>• Check sensor wiring</li> <li>• Check sensor, clean or replace</li> <li>• Check controller input, replace controller if bad</li> </ul>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>*** ALARM ***</p> <p>SUPPLY AIR TEMP SENSOR FAILURE</p> </div> <ul style="list-style-type: none"> <li>• Check sensor wiring</li> <li>• Check sensor, clean or replace</li> <li>• Check controller input, replace controller if bad</li> </ul>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>*** ALARM ***</p> <p>LOSS OF AIRFLOW</p> </div> <p>On loss of air flow, system shuts down. System will restart when air flow is restored.</p> <ul style="list-style-type: none"> <li>• Check air flow switch, adjust</li> <li>• Check wiring - switch should open on air flow loss</li> <li>• Check digital input on controller, replace controller if bad</li> </ul>
7	8	9
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>*** ALARM ***</p> <p>COMPRESSOR FAILURE</p> </div> <p>Compressor has failed. System will not operate.</p> <ul style="list-style-type: none"> <li>• Consult compressor manuals and contact compressor technical support</li> </ul>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>*** ALARM ***</p> <p>WATER TREATMENT FAILURE</p> </div> <p>Water treatment system has failed. System will not operate.</p> <ul style="list-style-type: none"> <li>• Consult water treatment manuals and contact water treatment technical support</li> </ul>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>*** ALARM ***</p> <p>HIGH ROOM HUMIDITY</p> </div> <p>Room humidity has exceeded the high limit alarm set point.</p> <ul style="list-style-type: none"> <li>•</li> </ul>
10	11	12
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>*** ALARM ***</p> <p>LOW ROOM HUMIDITY</p> </div> <p>Room humidity has fallen below the low limit alarm set point. System will still run.</p> <ul style="list-style-type: none"> <li>• Check if the system is operating correctly</li> <li>• Look for openings in the room that could leak humidity</li> <li>• Check sensor calibration</li> </ul>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>*** ALARM ***</p> <p>HIGH SUPPLY AIR HUMIDITY</p> </div> <p>Supply air humidity has exceeded the high limit alarm set point. System should be off.</p> <ul style="list-style-type: none"> <li>• Make sure alarm set point is higher than the supply set point</li> <li>• Check sensor calibration</li> <li>• Set alarm set point higher if too low</li> </ul>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>*** ALARM ***</p> <p>LOW SUPPLY AIR HUMIDITY</p> </div> <p>Supply air humidity is below the low supply air humidity alarm set point.</p> <ul style="list-style-type: none"> <li>• If initial startup - wait</li> <li>• Check if system is operating correctly</li> <li>• Check sensor calibration</li> </ul>

# Installation, Operation, Maintenance Manual

13	14	15
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; text-align: center;"> <p>*** ALARM ***</p> <p>HIGH CUSTOMER SENSOR READING</p> </div> <ul style="list-style-type: none"> <li>Check sensor calibration</li> <li>Set alarm set point higher if too low</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; text-align: center;"> <p>*** ALARM ***</p> <p>LOW CUSTOMER SENSOR READING</p> </div> <ul style="list-style-type: none"> <li>Check sensor calibration</li> <li>Set alarm set point lower if too high</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; text-align: center;"> <p>*** ALARM ***</p> <p>MAINTENANCE STAGE 1</p> </div> <p>Indicates that this humidification stage has exceeded its maintenance alarm run hours.</p> <ul style="list-style-type: none"> <li>Perform maintenance</li> <li>Reset maintenance alarm</li> </ul>

16	17	18
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; text-align: center;"> <p>*** ALARM ***</p> <p>MAINTENANCE STAGE 2</p> </div> <p>Indicates that this humidification stage has exceeded its maintenance alarm run hours.</p> <ul style="list-style-type: none"> <li>Perform maintenance</li> <li>Reset maintenance alarm</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; text-align: center;"> <p>*** ALARM ***</p> <p>MAINTENANCE STAGE 3</p> </div> <p>Indicates that this humidification stage has exceeded its maintenance alarm run hours.</p> <ul style="list-style-type: none"> <li>Perform maintenance</li> <li>Reset maintenance alarm</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; text-align: center;"> <p>*** ALARM ***</p> <p>MAINTENANCE STAGE 4</p> </div> <p>Indicates that this humidification stage has exceeded its maintenance alarm run hours.</p> <ul style="list-style-type: none"> <li>Perform maintenance</li> <li>Reset maintenance alarm</li> </ul>

19
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; text-align: center;"> <p>NO MORE ALARMS</p> <p>Press DOWN to Repeat Press ENTER to Clear</p> </div> <p>End of the alarm screen loop. Pressing ENTER will clear and reset the alarms. Alarms still present will then repeat.</p>

**Run Hours**

1 RUN HOURS	2	3
<div data-bbox="147 279 483 430" style="border: 1px solid black; padding: 5px;"><pre>SYSTEM RUN HOURS Stage 1&gt; 00000 hr Alarm set&gt; 1000 hr Next alarm&gt; 1000 hr</pre></div> <p>Stage run hours are shown, as well as the maintenance alarm set point and the time to the next alarm. Pressing ALARM + ESC at the same time will reset the Stage Run Hours. Pressing ESC + PRG while the Alarm Set is selected will reset the Next Alarm remaining time.</p>	<div data-bbox="618 279 954 430" style="border: 1px solid black; padding: 5px;"><pre>SYSTEM RUN HOURS Stage 2&gt; 00000 hr Alarm set&gt; 1000 hr Next alarm&gt; 1000 hr</pre></div> <p>Stage run hours are shown, as well as the maintenance alarm set point and the time to the next alarm. Pressing ALARM + ESC at the same time will reset the Stage Run Hours. Pressing ESC + PRG while the Alarm Set is selected will reset the Next Alarm remaining time.</p>	<div data-bbox="1089 279 1425 430" style="border: 1px solid black; padding: 5px;"><pre>SYSTEM RUN HOURS Stage 3&gt; 00000 hr Alarm set&gt; 1000 hr Next alarm&gt; 1000 hr</pre></div> <p>Stage run hours are shown, as well as the maintenance alarm set point and the time to the next alarm. Pressing ALARM + ESC at the same time will reset the Stage Run Hours. Pressing ESC + PRG while the Alarm Set is selected will reset the Next Alarm remaining time.</p>

4
<div data-bbox="147 764 483 915" style="border: 1px solid black; padding: 5px;"><pre>SYSTEM RUN HOURS Stage 4&gt; 00000 hr Alarm set&gt; 1000 hr Next alarm&gt; 1000 hr</pre></div> <p>Stage run hours are shown, as well as the maintenance alarm set point and the time to the next alarm. Pressing ALARM + ESC at the same time will reset the Stage Run Hours. Pressing ESC + PRG while the Alarm Set is selected will reset the Next Alarm remaining time.</p>

## Service Settings

(Initial password is 0001)

<p style="text-align: center;"><b>1 SERVICE SETTINGS</b></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre> SENSOR FAIL ALARMS   ENABLE DELAY Room Hum&gt;YES &gt;010s Supply Hum&gt;YES &gt;010s                     </pre> </div> <p>For each sensor connected, set ENABLE to Yes to enable the alarm and enter alarm delay time.</p>	<p style="text-align: center;"><b>2</b></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre> SENSOR FAIL ALARMS   ENABLE DELAY Out Temp&gt;YES &gt;010s Supply Tmp&gt;YES &gt;010s                     </pre> </div> <p>For each sensor connected, set ENABLE to Yes to enable the alarm and enter alarm delay time.</p>	<p style="text-align: center;"><b>3</b></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre> SENSOR FAIL ALARMS   ENABLE DELAY DDC Demand&gt;YES &gt;010s                     </pre> </div> <p>For each sensor connected, set ENABLE to Yes to enable the alarm and enter alarm delay time.</p>
<p style="text-align: center;"><b>4</b></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre> WARNING ALARMS Room Humidity High&gt; 065.0 %RH Low&gt; 035.0 %RH                     </pre> </div> <p>Set high and low set points for alarm.</p>	<p style="text-align: center;"><b>5</b></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre> WARNING ALARMS Supply Humidity High&gt; 095.0 %RH Low&gt; 040.0 %RH                     </pre> </div> <p>Set high and low set points for alarm.</p>	<p style="text-align: center;"><b>6</b></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre> WARNING ALARMS Customer Sensor High&gt; 075.0 %RH Low&gt; 025.0 %RH                     </pre> </div> <p>Set high and low set points for alarm.</p>
<p style="text-align: center;"><b>7</b></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre> SENSOR CALIBRATION Room Humidity Offset&gt; 00.0 %RH Actual&gt; 000.0 %RH                     </pre> </div> <p>Sensor calibration. The Actual reading is the raw sensor input. Calibrate by entering a + or - value to the Offset. This is then added to the Actual value to provide the displayed value which is also used for control.</p>	<p style="text-align: center;"><b>8</b></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre> SENSOR CALIBRATION Supply Air Humidity Offset&gt; 00.0 %RH Actual&gt; 000.0 %RH                     </pre> </div> <p>Sensor calibration. The Actual reading is the raw sensor input. Calibrate by entering a + or - value to the Offset. This is then added to the Actual value to provide the displayed value which is also used for control.</p>	<p style="text-align: center;"><b>9</b></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre> SENSOR CALIBRATION DDC Demand Signal Offset&gt; 00.0 % Actual&gt; 000.0 %                     </pre> </div> <p>Sensor calibration. The Actual reading is the raw sensor input. Calibrate by entering a + or - value to the Offset. This is then added to the Actual value to provide the displayed value which is also used for control.</p>
<p style="text-align: center;"><b>10</b></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre> SENSOR CALIBRATION Outside Air Temp Offset&gt; 00.0 °F Actual&gt; 000.0 °F                     </pre> </div> <p>Sensor calibration. The Actual reading is the raw sensor input. Calibrate by entering a + or - value to the Offset. This is then added to the Actual value to provide the displayed value which is also used for control.</p>	<p style="text-align: center;"><b>11</b></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre> SENSOR CALIBRATION Supply Air Temp Offset&gt; 00.0 °F Actual&gt; 000.0 °F                     </pre> </div> <p>Sensor calibration. The Actual reading is the raw sensor input. Calibrate by entering a + or - value to the Offset. This is then added to the Actual value to provide the displayed value which is also used for control.</p>	<p style="text-align: center;"><b>12</b></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <pre> STAGING DELAYS Time Between&gt; 000 s Min On Time&gt; 010 s Min Off Time&gt; 010 s                     </pre> </div> <p>To prevent the humidification stages from short cycling, there should be a time delay between stages and then a minimum on and off time for all stages.</p>

13	14
<div data-bbox="147 201 483 348" style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">STAGING DELAYS Comp/Water On&gt;00 min Comp Off Del&gt;010 sec</div> <p>Allows the user to configure the time before Stage 1 (Comp/Water On) and the Purge time for the Compressor (Comp Off Del).</p>	<div data-bbox="618 201 954 348" style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">CLEAN-OUT CYCLE Enabled&gt; YES Time ON&gt; 30 min Time OFF&gt; 30 sec</div> <p>This sets the clean-out cycle for the atomizing heads. When enabled, whenever the system runs for more than the Time ON, it will shut down for Time OFF to allow the heads to automatically clean themselves. This feature is not needed with demineralized water and may be disabled.</p>

## Factory Settings

(Initial password is 9999)

1 FACTORY SETTINGS	2	3
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre> SENSOR SELECTION Room Humidity&gt; YES Supply Humidity&gt; YES                     </pre> </div> <p>If a sensor is wired into the system, enable it by setting it to YES.</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre> SENSOR SELECTION DDC Input&gt; NO Outside Temp&gt; NO Supply Temp&gt; NO                     </pre> </div> <p>If a sensor is wired into the system, enable it by setting it to YES.</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre> SYSTEM CONFIGURATION No. of Stages&gt; ONE DDC Input&gt; DEMAND                     </pre> </div> <p>Enter the number of humidification stages. The DDC input (if present) may be set to DEMAND which allows direct control, or to?</p>
4	5	6
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre> SENSOR CONFIGURATION Room Humidity Type&gt; 0-1Vdc Scale&gt; 000 to 100 %                     </pre> </div> <p>Enter the type of signal from the sensor. (0-10Vdc, 0-1Vdc, 4-20mA) Enter the sensor's scale over the input range.</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre> SENSOR CONFIGURATION Supply Air Humidity Type&gt; 0-1Vdc Scale&gt; 000 to 100 %                     </pre> </div> <p>Enter the type of signal from the sensor. (0-10Vdc, 0-1Vdc, 4-20mA) Enter the sensor's scale over the input range.</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre> SENSOR CONFIGURATION DDC Signal Type&gt; 0-10Vdc Scale&gt; 000 to 000 %                     </pre> </div> <p>Enter the type of signal from the sensor. (0-10Vdc, 0-1Vdc, 4-20mA) Enter the sensor's scale over the input range.</p>
7	8	9
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre> SENSOR CONFIGURATION Outside Air Temp Type&gt; NTC                     </pre> </div> <p>Enter the type of signal from the sensor. (NTC, PT1000) Enter the sensor's scale over the input range.</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre> SENSOR CONFIGURATION Supply Air Temp Type&gt; NTC                     </pre> </div> <p>Enter the type of signal from the sensor. (NTC, PT1000) Enter the sensor's scale over the input range.</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre> RELAY OUTPUT CONFIG Comp / Water&gt; No Global Alarm&gt; Yes                     </pre> </div> <p>Relay output configuration. Set to enable compressor or water treatment enable relay. Set to enable the global alarm relay.</p>
10	11	12
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre> DIGITAL-INPUT CONFIG Remote On/Off&gt; YES Current: CLOSED Action&gt; N/O                     </pre> </div> <p>Set digital input configuration. Displays Current status of relay. Set Action of relay on alarm. N/O means relay is normally open and closes on alarm.</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre> DIGITAL-INPUT CONFIG Airflow Switch&gt; YES Current: CLOSED Act&gt;N/C Delay&gt;002s                     </pre> </div> <p>Set digital input configuration. Displays Current status of relay. Set Action of relay on alarm. N/O means relay is normally open and closes on alarm.</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <pre> DIGITAL-INPUT CONFIG Compressor Fail&gt;NO Current: CLOSED Act&gt;N/C Delay:000s                     </pre> </div> <p>Set digital input configuration. Displays Current status of relay. Set Action of relay on alarm. N/O means relay is normally open and closes on alarm.</p>

<b>13</b>	<b>14</b>	<b>15</b>
<pre>DIGITAL-INPUT CONFIG Water Fail&gt; NO Current: CLOSED Act&gt;N/C Delay&gt;002s</pre>	<pre>MODULATING CONFIG Stage #1 Air Valve  From&gt;0.0 to 10.0 Vdc</pre>	<pre>MODULATING CONFIG Stage #2 Air Valve  From&gt;0.0 to 10.0 Vdc</pre>
<p>Set digital input configuration. Displays Current status of relay. Set Action of relay on alarm. N/O means relay is normally open and closes on alarm.</p>	<p>Set modulating configuration of stage modulating air valve. This is used to allow different scaled valves if required.</p>	<p>Set modulating configuration of stage modulating air valve. This is used to allow different scaled valves if required.</p>

<b>16</b>	<b>17</b>	<b>18</b>
<pre>MODULATING CONFIG Stage #3 Air Valve  From&gt;0.0 to 10.0 Vdc</pre>	<pre>MODULATING CONFIG Stage #4 Air Valve  From&gt;0.0 to 10.0 Vdc</pre>	<pre>CHANGE PASSWORDS  Service&gt; 0001 Factory&gt; 9999</pre>
<p>Set modulating configuration of stage modulating air valve. This is used to allow different scaled valves if required.</p>	<p>Set modulating configuration of stage modulating air valve. This is used to allow different scaled valves if required.</p>	<p>Service and factory passwords can be changed here. NOTE: If you forget the factory password, you must call the factory.</p>

<b>19</b>
<pre>SYSTEM CONFIGURATION  Temp Unit&gt; °F Outdoor Reset&gt; YES</pre>
<p>Set temperature display/control units. Enable outdoor reset capability.</p>

**Factory Defaults (Caution)**

<p>To get to the factory default screens, you need to be in the initial power up “splash screen”:</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <pre>CAREL MC Atomizing Humidifier Ver: 1.02 01/13/04</pre> </div> <p>which can be reached either by powering off the control cabinet and then repowering it, or by pressing the <b>UP</b> and <b>DOWN</b> buttons simultaneously. Then press <b>ENTER</b>, followed by <b>ALARM</b>. The cursor will jump into the version date. Press <b>UP</b> and then <b>ENTER</b> again.</p>	<p>The factory default screen:</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <pre>SYSTEM TYPE  &gt; Duct Master Number stages&gt; ONE</pre> </div> <p>Choices are:</p> <ul style="list-style-type: none"> <li>Room Master</li> <li>Room Master + Mod.</li> <li>Duct Master</li> <li>DDC Signal</li> <li>DDC w/ High Limit</li> </ul> <p>The number of stages are the number of slave cabinets.</p>
--	--

**NOTE: Changing factory defaults will erase all variables and reset them. You will need to go entirely through the program and insure that the proper settings are in place.**



## Date/Time Setting

**1 DATE/TIME**

```
DATE / TIME SETTINGS
> 10/08/2003 > 11:51
> FRIDAY      DST>YES
```

User can change date and time in this screen by changing field values. DST enables or disables daylight saving time.

## Manual Control

(Initial password is 9999)

**1 MANUAL CONTROL**

```
MANUAL CONTROL
OUTPUT LEVEL> 000%
```

Entering a value in OUTPUT LEVEL will cause the system to modulate to that output. Stages will activate per their configuration information. When OFF is displayed, system is in automatic control.

## Alarm History

**1 ALARM HISTORY**

```
Alarm History    01
COMPRESSOR FAILURE
Room: 040% Sup: 080%
08:08:59 08/08/2003
```

The last 100 alarms will be displayed here, along with the time they occurred and the Room and Supply Humidity at the time of alarm. Pressing **UP** or **DOWN** allows you to cycle through the alarms, while pressing **ESC + PRG** at the same time will clear the alarm history.

**Communications**

1 COMMUNICATIONS	2	3
<div data-bbox="147 317 483 468" style="border: 1px solid black; padding: 5px;"> <pre>SUPERVISOR SETUP   Ident#&gt; 00001   BaudRate&gt; 19200   Protocol&gt; MODBUS</pre> </div> <p>SUPERVISOR is the most fundamental screen and is always visible. Here you set the unique IDENTifier for the pCO2, the Baudrate, and which PROTOCOL you would like to speak. The options are Carel LOCAL, Carel REMOTE, MODBUS-slave, and KYOCERA 2235 cell.</p>	<div data-bbox="618 317 954 468" style="border: 1px solid black; padding: 5px;"> <pre>COMMUNICATIONS SETUP   Modem setup   Pass&gt; 0001 Rings&gt; 01   Type&gt; Tone</pre> </div> <p>If you have selected REMOTE or KYOCERA protocol, the next two screens will appear.</p> <p>MODEM_1 will let you set up the Incoming-call variables. The password, number of rings, and type of phone line are selectable here.</p>	<div data-bbox="1088 317 1424 468" style="border: 1px solid black; padding: 5px;"> <pre>ALARM DIAL-OUT    Enabled&gt; OFF   Total Numbers&gt; 1</pre> </div> <p>MODEM_2 allows you to enable Outgoing-call based on Alarms. If ALARM DIAL-OUT is Enabled, the TOTAL phone NUMBERS and next two screens will appear. TOTAL NUMBERS is the amount of phone numbers present in the ADDRESS BOOK (see MODEM_5 below)</p>
4	5	6
<div data-bbox="147 833 483 984" style="border: 1px solid black; padding: 5px;"> <pre>MODEM SETUP   Manual Dial&gt; YES   Delay Time&gt; 060 s   Max time&gt; 720 s</pre> </div> <p>MODEM_3 is where the multiple phone number configuration is stored. If the pCO2 attempts to dial out and does not get through, it will wait DELAY_TIME seconds, and dial the next phone number in the ADDRESS BOOK. It will continue trying until it gets through, or MAX TIME seconds, whichever comes first.</p>	<div data-bbox="618 833 954 984" style="border: 1px solid black; padding: 5px;"> <pre>MODEM STATUS   Current Phone #&gt; 1   Line&gt; FREE Time&gt;000   Currently&gt; Off-line</pre> </div> <p>MODEM_4 is a status screen that shows which phone number is being dialed, and how long it has been trying.</p>	<div data-bbox="1088 833 1424 984" style="border: 1px solid black; padding: 5px;"> <pre>ADDRESS BOOK    Modify Phone Num&gt; 1   17172935210</pre> </div> <p>MODEM_5 is where you input which phone numbers the pCO2 should try to dial on Alarm. You can enter up to TOTAL NUMBER (See MODEM_3 above) numbers.</p>

## Maintenance Instructions

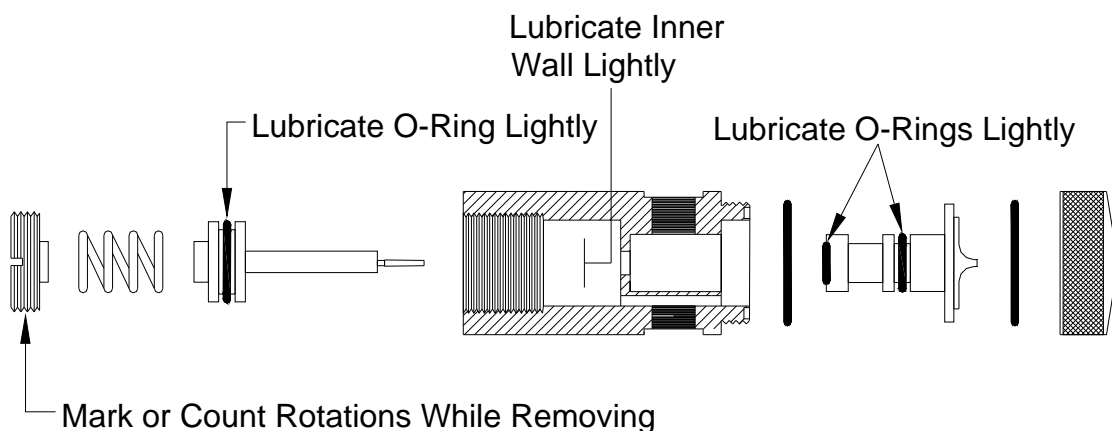
Although the MC system requires very little maintenance itself, some components such as the air compressor may require more. You should always follow the component manufacturer's recommended maintenance schedules. The following maintenance is recommended:

- **Air compressor.** Follow the manufacturer's recommendations. An overloaded or improperly maintained compressor will throw more oil off into the air supply and will increase the maintenance of the atomizing heads.
- **Atomizing heads.** Once per year, the air cap at the front of each nozzle should be removed for inspection. The water nozzle located inside the air cap should be cleaned off with a soft cloth saturated with a 5% phosphoric or acetic acid solution. The air caps should be immersed in the same solution until clean. The air cap orifice should be checked for wear or occlusion. Place the air caps back on the heads tightly.

The piston should be removed, cleaned and regreased every 3-5 years. The O-rings are replaced every 8-10 years. Follow these steps when performing total cleaning and regreasing of the nozzles:

- Before disassembling the nozzles, mark the back adjustment screw or count the number of turns while removing it. This will insure proper calibration when reassembling the nozzles.
- After disassembling, clean nozzle parts using any standard humidifier cleaner or 5% phosphoric acid.
- Replace O-rings if they appear cracked or worn.
- Lubricate all parts indicated ONLY with CAREL approved lubricant (Dow Corning #4 Insulating Compound).
- Reassemble nozzle.

CAREL also offers a nozzle cleaning service at nominal charge. Contact your local CAREL representative for details.



- **Air and water lines.** Once per year, the air and water lines should be blown out to get rid of any debris, sediment or oil that may have collected.

- **Regulators, solenoids, valves.** Once per year, open these devices, inspect them for wear, and clean them. Replace any worn parts.

- **Controls and sensors.** Once per year, the sensors should be recalibrated against an accurate psychrometer. The sensors do not have a calibration potentiometer. Sensor calibration settings are found under the Service Settings menu on the controller.

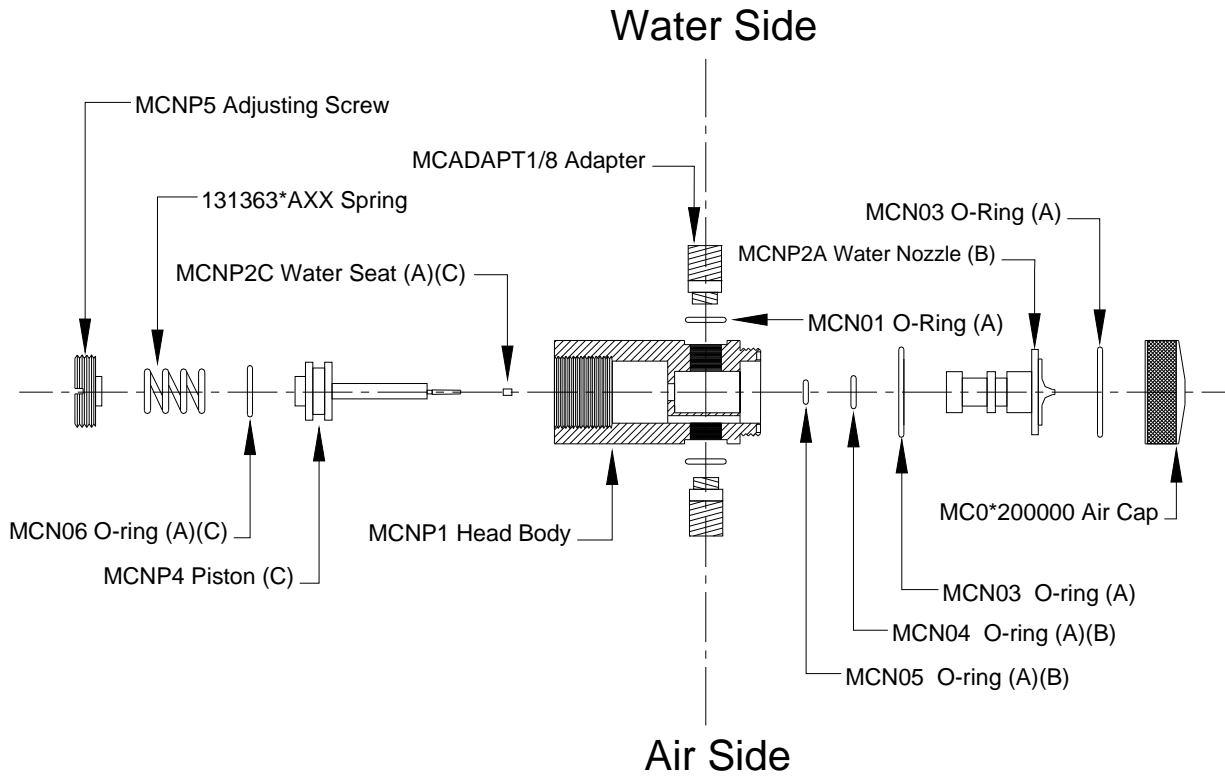
## Trouble Shooting Instructions

Hopefully, you will never have a problem with your MC system, but if you should, please refer to this section BEFORE calling your local CAREL representative.

- ***Air bleeds from regulator.***
  - Dirt has become lodged on the seat in the regulator. Unscrew the cap on the bottom of the regulator and remove the seat. Clear any dirt from the rubber seal and reinsert the seat and cap.
  
- ***Heads spit or discharge a solid stream of water.***
  - If the system is new and all of the heads are exhibiting a solid stream discharge, check the connections for air and water to insure that they are not reversed.
  - If the heads have just been cleaned, check the orientation of the heads to insure that they have not been installed with the air and water reversed.
  - With the system off, check that the modulating piston has not traveled beyond its normal operating range and become “stuck” in the back of the head (air pressures in excess of 40psi at the heads can cause this problem). When looking at the discharge end of the atomizing head, you should be able to see the tip of the piston extending through the water nozzle when it is off. If you cannot see the piston:
    - Mark the position of the rear adjusting screw, then remove the adjusting screw and remove the piston from the head (see page 25). If the piston or its o-ring is damaged replace any damaged parts, and reassemble the head. Return the adjusting screw to the marked position.
  - Check for dirt or debris in the air orifice. Remove the air cap; inspect the underside of the cap for dirt or debris. Inspect the area around the tip of the water nozzle for dirt or debris.
    - If the dirt or debris is small in quantity and loose, wipe it away and reassemble the head. (most likely the debris is from constructing the air lines)
    - If the dirt or debris is large in quantity, and appears rusty, this is probably coming from iron air lines that are now rusting. This rust can cause severe problems in the operation of the atomizing heads. The heads will need to be cleaned, the air lines blown out and filters installed.
    - If the dirt or debris appears to be adhered to the tip of the water nozzle, this is an indication of oil in the air lines. Oil in the air will break the surface tension of the water and cause “wicking” of the minerals on the outside of the water nozzle. The MC system is self cleaning, for the inside of the water nozzle, but it cannot clear mineral that is on the outside of the nozzle. The heads must be cleaned of all oil, the air lines also must be cleaned, and proper filters installed.
  - Check for dirt or debris on the shut-off seat of the modulating piston. If the problem is noticed only on shut down of the system, there is dirt on the seat of the piston. Remove the air cap and the water nozzle, and clean off any visible dirt or debris on the rubber seat on the piston. Use clean dry air to “blow out” the water nozzle. Reassemble the head.
  
- ***Individual heads spray heavier than the rest.***
  - Check that all valves on the heads are either full open or full closed.
  - Check the air cap and water nozzle orifices for wear or occlusion. Clean or replace if necessary.
  - Remove the atomizing heads in question and check the adjustment of the maximum capacity against a calibrated water flow meter, one head at a time. If the water flow is incorrect at the design pressures (30psi air / 5psi water), then turn the adjusting screw in the back of the head clockwise to reduce the flow and counter clockwise to increase it.

- **All heads spray too heavy or too light.**
  - Check the condition of the air stream. If you are doing startup of the unit, and forcing the system to operate at 100% with little to no actual demand, then the observation of too much mist may be inaccurate.
  - With the system at 100% demand (output), adjust the air and water pressure regulators in the control cabinet to their proper settings of 30psi air and 5psi water at the end of the manifolds. Now adjust the water pressure regulator up/down until an acceptable output is observed. (**Warning:** Increasing the water pressure to gain more output may actually result in less evaporation due to the larger droplet sizes created. You must confirm the proper pressure settings before calling to discuss performance issues.)
  
- **Sputtering heads.**
  - Check for air in the water lines. Bleed the water lines at the ends.
  - Check O-Rings and seals, for tears or breaks, replace any worn O-Rings or seals.
  - Check for loose air caps, a loose air cap can cause air to bleed back into the water.
  - Clogged drain line.
  
- **Individual heads drip after shutdown.**
  - Check the seat of the modulating piston for dirt, or wear. Clean or replace.
  - Check all O-Rings for wear, tears, or breaks. Replace as required (see page 25).
  - Check solenoid valves for proper operation.
  
- **Water pressure rises and/or is uncontrollable.**
  - Check the atomizing heads for loose air caps. A loose air cap can cause air to bleed into the water line and falsely pressurize it.
  - Check all O-Rings for wear, tears, or breaks. Replace as required.
  - Check the water regulator for dirt or debris on the seat. Clean or replace.
  - If incoming water pressure varies more then 20 PSI add a external regulator.
  
- **Controller does not function.**
  - No Display.
    - Check the primary voltage and confirm that you have 110 to 120VAC, at field wiring terminals 1 and 2. If not, check the breaker that is supplying the cabinet.
    - Check that the remote on/off between terminals 3 & 4 (if used) is closed. By placing a jumper between terminals 3 and 4 (this “jumps” out the airflow proving switch), if the controller then gets a display, you need to check the switch for proper functioning and wiring. It should be wired to close on for system operation.
    - Check the secondary voltage and confirm that you have 24VAC leaving the transformer. If not, check the integral breaker on the transformer.
    - Check that the on/off switch is in the on position.
  - Display, but no function.
    - Check that the on/off switch is in the on position.
    - Check the displayed value versus the set point. (Is there a demand for humidification?) The system will only come on if there is a demand.
    - Check the program parameters of the controller. Refer to the lower right hand corner of the wiring diagram supplied with the cabinet, for the factory recommended settings.

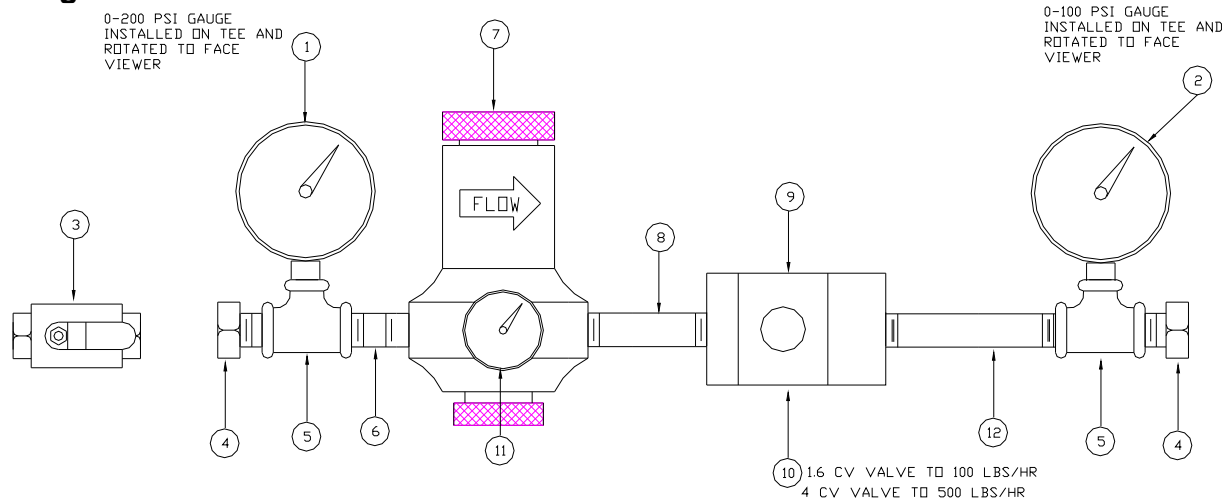
## Parts of Atomizing Heads



Part Number	Description
MCHH***000	Complete MC dispersion head assembly (***= 006; 009; 012; 015)
MCKSEA1000	O ring and seal rebuild kit for 1 ea. dispersion head (Kit parts noted as (A) 1 per head
MCNP1	Head body
MCKNOZ1000	Water nozzle piece with o rings dispersion nozzle (Kit parts noted as (B) 1 per head
MC0*200000	Air cap - Cspecify size - 6=A 9=B 12=C 15=D lb/hr) 1 per head
MCKPIS1000	Piston with cleaning needle - O ring and seat (Kit parts noted as (C) 1 per head
MCNP5	Adjusting screw 1 per head
131363*AXX	Piston spring (*specify head sizer: 6=0; 9&12=1; 15=2) 1 per head
1108315AXX	Pipe bolt clamp (4/head)
MCNCLAMP	Pipe clamp (2/head)
MCNPLATE	Slide bolt plate (2/head)
MCNVALVC	Slide valve stem
MCNVALVE	Slide valve slide

## Parts of Control Cabinet Control Sections

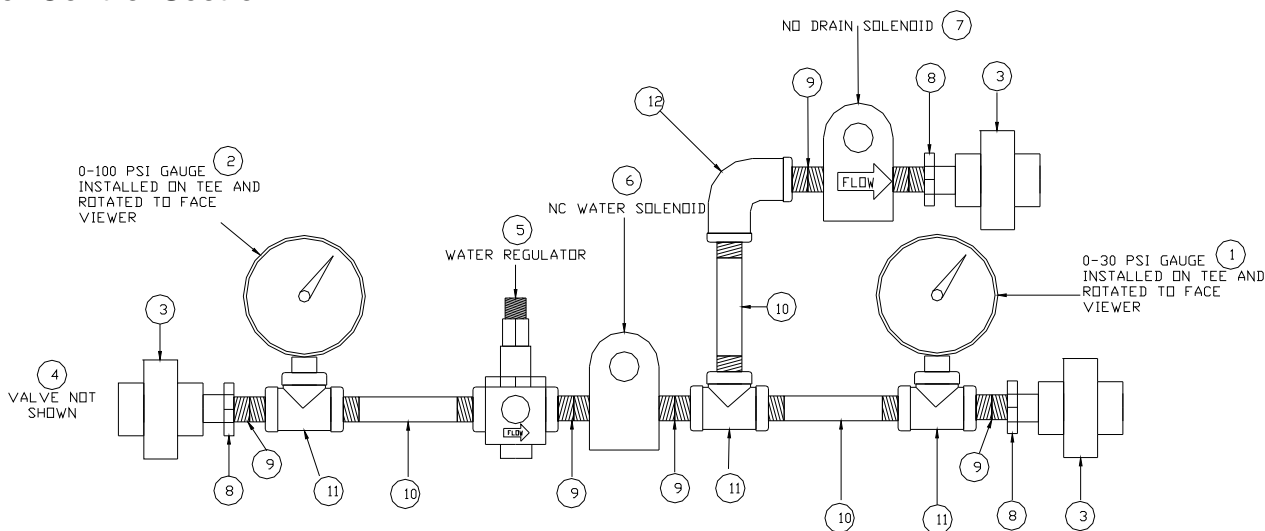
### Modulating Air Control Section



PART NUMBER	QUAN.
① MCPG200	1
② MCPG100	1
③ MCBALL VAL VEB1/2S	1
④ MCCOMPBI/2MPTX5/8	2
⑤ MCTEERBI/2X1/4FPT	2
⑥ MCNIPBI/2XC	1

PART NUMBER	QUAN.
⑦ MCAIRREGBI/2	1
⑧ MCNIPBI/2X21/2	1
⑨ SQS65.5U	1
⑩ 599-02006C (1.6 Cv) 599-02010C (4 Cv)	1
⑪ MCCSGAG100	1
⑫ MCNIPBI/2X31/2	1

### Water Control Section



PART NUMBER	QUAN.
① MCPG30	1
② MCPG100	1
③ MCUNIONPVC1/2S	3
④ MCBALL VAL VEPVC1/2	1
⑤ MCWATEREG1/4	1
⑥ MCSOLSS1/4NC	1

PART NUMBER	QUAN.
⑦ MCSOLSS1/4ND	1
⑧ MCBUSHPVC1/2SX1/4FPT	3
⑨ ALNIPSS1/4XC	6
⑩ MCNIPSS1/4X21/2	3
⑪ MCTEESS1/4FPT	3
⑫ MCELBOWSS1/4FPT	1

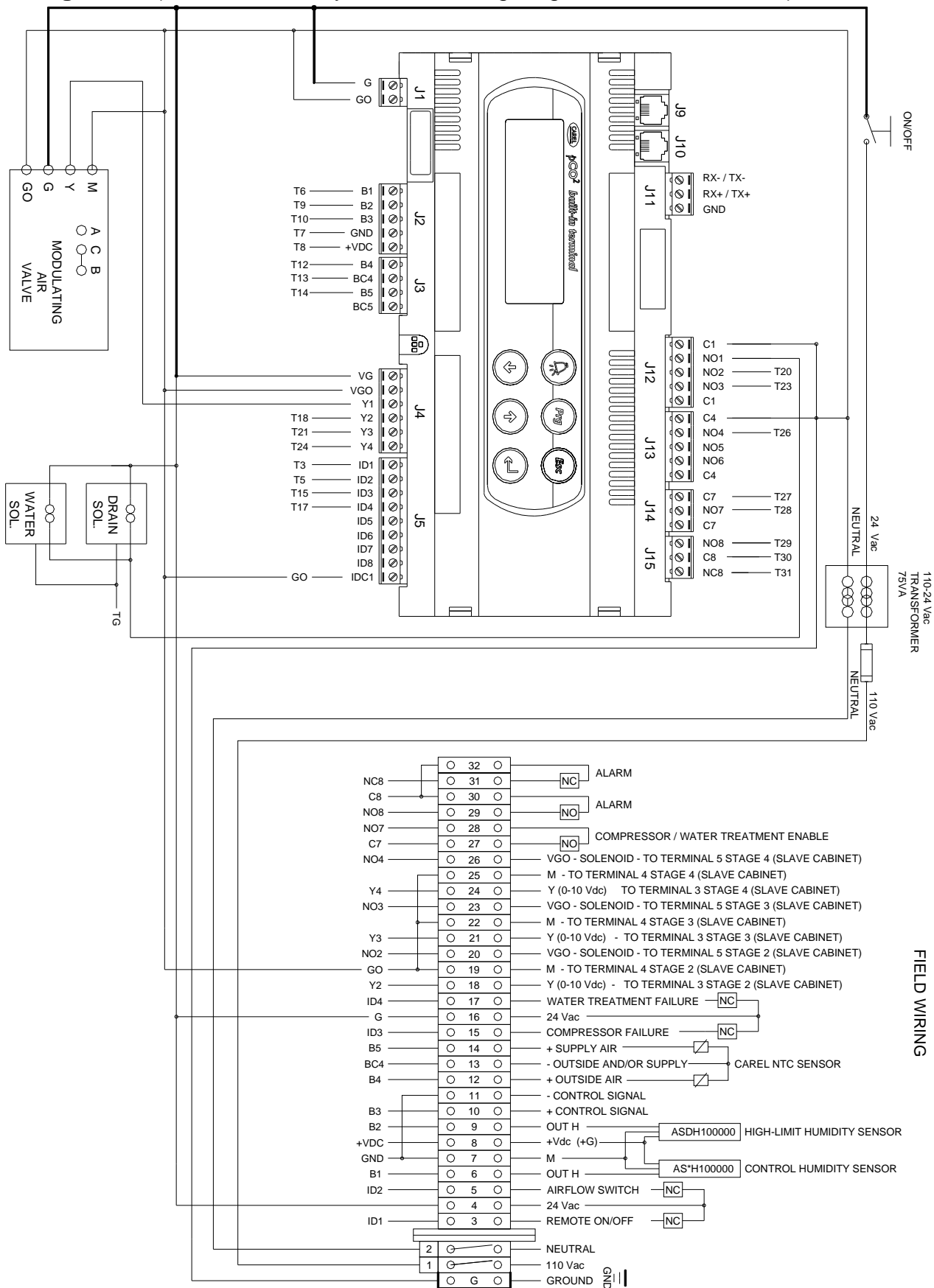
**Other Parts**

<b>Part No.</b>	<b>Description</b>
<b>Control Cabinet Parts:</b>	
MCAIRREGB1/2	1/2' Air regulator
MCWATREG1/4	Obsolete - see part number 1309819AXX
1309819AXX	1/4" water regulator
MCPG30	0-30 psi panel gauge
MCPG100	0-100 psi panel gauge
MCPG200	0-200 psi panel gauge
MCCSGAG100	0-100 psi air gauge for regulator
TRANS75	110 VAC to 24 VAC transformer, 75 VA
MCSOLB1/4NC	1/4" NC brass solenoid solenoid valve, air or water (Voltage)
MCSOLB1/4NO	Obsolete - see part number MCSOLSS1/4NO
MCSOLSS1/4NO	1/4" NO S/S solenoid solenoid valve, drain (Voltage)
MCSOLSS1/4NC	1/4" NC S/S solenoid solenoid valve, water (Voltage)
MCSOLB1/2NC	1/2" NC brass solenoid valve, air or water (Voltage)
SQS65.5U	Obsolete - see part number DSA004E001
DSA004E001	Modulating air valve motor (2001)
599-02006C	Modulating air valve body, 0-100 lb/hr
599-02010C	Modulating air valve body, 100-500 lb/hr
MCAIRSEC	Complete 1/2" air control section for ON-OFF systems
MCAIRMS	Complete 1/2" air control section with modulating valve 0-100 lb/hr - Ser. #>2300
MCAIRML	Complete 1/2" air control section with modulating valve 100-500 lb/hr - Ser. #>2300
MCWATERAGG	Complete 1/2" water control section - for all types of water
MCRSWITCH	SP/ST On/Off Rocker Switch
PCO2000BS0U00	PCO Controller (specifiy room, supply, return, control) - Ser.# >2300
PCO2CON0S0	PCO controller plug in wiring connectors
IRDRW40000	IR Controller for Room On-Off system cabinet - Ser.# >2300
<b>NOTE: Where identified - for parts with Ser.# &lt;2300 - contact Carel USA</b>	



## Wiring Diagrams

**Modulating Room (for reference only - refer to wiring diagram in control cabinet)**







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