



# Water Treatment Systems

OPERATION,  
INSTALLATION AND  
MAINTENANCE  
MANUAL

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**TWC Series**

Where water  
means business.





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## Foreword

The water treatment system contains a controller, chemical feed pumps, a water meter, and a blow down valve intended to provide control of scale and biological growth in an open-loop evaporative cooling tower system.

This manual is to serve as a guide for installing, operating, and maintaining the equipment. Improper installation, operation, and maintenance can lead to poor performance and/or equipment damage. Use qualified installers and service technicians for all installation and maintenance of this equipment.

This manual is for our standard product. The information in this manual is general in nature. Unit-specific drawings and supplemental documents are included with the equipment as needed. Additional copies of documents are available upon request.

Due to the ever-changing nature of applicable codes, ordinances, and other local laws pertaining to the use and operation of this equipment, we do not reference them in this manual.

## Safety Guidelines

Observe all safety precautions during installation, start-up, and service of this equipment. The following is a list of symbols used in this manual and their meaning.



*General Warning*



*Electricity Warning*



*Sharp Element Warning*



*Hot Surface Warning*



*Flammable Material Warning*



*Explosive Material Warning*



*General Mandatory Action*



*Wear Eye Protection*



*Wear Protective Gloves*



*Wear Ear Protection*



*Disconnect Before Carrying Out Maintenance or Repair*



*Connect an Earth Terminal to Ground*

Only qualified personnel should install, start-up, and service this equipment. When working on this equipment, observe precautions in this manual as well as tags, stickers, and labels on the equipment.



*WARNING: Any use or misuse of this equipment outside of the design intent may cause injury or harm.*



*WARNING: This equipment contains hazardous voltages that can cause severe injury or death.*



*WARNING: This equipment contains hot water or coolant under pressure. Accidental release of hot water or coolant under pressure can cause personal injury and or property damage.*



*WARNING: This equipment may contain fan blades or other sharp edges. Make sure all fan guards and other protective shields are securely in place.*



*WARNING: The exposed surfaces of motors, piping, and other fluid circuit components can be very hot and can cause burns if touched with unprotected hands.*



*CAUTION: Disconnect and lock out incoming power before installing, servicing, or maintaining the equipment. Connecting power to the main terminal block energizes the entire electric circuitry of the unit. Shut off the electric power at the main disconnect before opening access panels for repair or maintenance.*



*CAUTION: Wear eye protection when installing, maintaining, or repairing the equipment to protect against any sparks, debris, or fluid leaks.*



**CAUTION:** The equipment will exceed 70 dBA sound pressure at 1 meter distance and 1 meter elevation when operating. Wear ear protection as required for personal comfort when operating or working in close proximity to the chiller.



**CAUTION:** Wear protective gloves when installing, maintaining, or repairing the equipment to protect against any sparks, debris, or fluid leaks.

## Pre-Installation

### Receiving Inspection

When the unit arrives, verify the information on the unit nameplate agrees with the order acknowledgement and shipping papers. Inspect the equipment for any visible damage and verify all items shown on the bill of lading are present. If damage is evident, document it on the delivery receipt by clearly marking any item with damage as "unit damage" and notify the carrier. In addition, notify our Customer Service Department and they will provide assistance with preparing and filing freight damage claims, including arranging for an estimate on repair costs; however, filing the shipping damage claim is the responsibility of the receiving party. Do not install damaged equipment without getting the equipment repaired.

Shipping damage is the responsibility of the carrier. To protect against possible loss due to damage incurred during shipping and to expedite payment for damages, it is important to follow proper procedures and keep records. Photographs of damaged equipment are excellent documentation for your records.

Start unpacking the unit, inspect for concealed damage, and take photos of any damage found. Once received, equipment owners have the responsibility to provide reasonable evidence that the damage did not occur after delivery. Photos of the equipment damage while the equipment is still partially packed will help in this regard. Refrigerant lines can be susceptible to damage in transit. Check for broken lines, oil leaks, damaged controls, or any other major component torn loose from its mounting point.

Record any signs of concealed damage and file a shipping damage claim immediately with the shipping company. Most carriers require concealed

damages be reported within 15 days of receipt of the equipment. In addition, notify our Customer Service Department and they will provide assistance with preparing and filing freight damage claims, including arranging for an estimate on repair costs; however, filing the shipping damage claim is the responsibility of the receiving party.

### Unit Storage

When storing the unit it is important to protect it from damage. Blow out any water from the unit; cover it to keep dirt and debris from accumulating on or getting in and store in an indoor sheltered area that does not exceed 145°F.

## Installation - Mechanical

### Foundation

Install the unit on a rigid, non-warpage mounting pad, concrete foundation, or level floor suitable to support the full operating weight of the equipment. When installed the equipment must be level within ¼ inch over its length and width.

### Unit Location

The unit is available in many different configurations for various environments. Refer to the proposal and order acknowledgement document for the equipment to verify the specific design conditions in which it can operate.

To ensure proper airflow and clearance space for proper operation and maintenance allow a minimum of 12 inches of clearance between the sides of the equipment and any walls or obstructions. Avoid locating piping or conduit over the unit to ensure easy access with an overhead crane or lift to lift out heavier components during replacement or service.

### Rigging

The unit has a base with casters to facilitate easy movement and positioning. Follow proper rigging methods to prevent damage to components. Avoid impact loading caused by sudden jerking when lifting or lowering the unit. Use pads where abrasive surface contact may occur.

### Fluid Distribution Piping

Proper insulation of chilled process fluid piping is crucial to prevent condensation. The formation of

condensation adds a substantial heat load to the cooling system.

The importance of properly sized piping cannot be overemphasized. See the ASHRAE Handbook or other suitable design guide for proper pipe sizing. In general, run full size piping out to the process and then reduce the pipe size to match the connections on the process equipment. One of the most common causes of unsatisfactory unit performance is poor piping system design. Avoid long lengths of hoses, quick disconnect fittings, and manifolds wherever possible as they offer high resistance to water flow. When manifolds are required, install them as close to the use point as possible. Provide flow-balancing valves at each machine to assure adequate water distribution in the entire system. Install shut-off valves at each machine to allow for isolation of the unit.

## Installation - Electrical

All wiring must comply with local codes and the National Electric Code. Minimum Circuit Amps (MCA) and other unit electrical data are on the unit nameplate. A unit specific electrical schematic ships with the unit. Measure each leg of the main power supply voltage at the main power source. Voltage must be within the voltage utilization range given on the drawings included with the unit. If the measured voltage on any leg is not within the specified range, notify the supplier and correct before operating the unit. Voltage imbalance must not exceed two percent. Excessive voltage imbalance between the phases of a three-phase system can cause motors to overheat and eventually fail. Voltage imbalance is determined using the following calculations:

$$\% \text{ Imbalance} = (V_{\text{avg}} - V_x) \times 100 / V_{\text{avg}}$$

$$V_{\text{avg}} = (V_1 + V_2 + V_3) / 3$$

$V_x$  = phase with greatest difference from  $V_{\text{avg}}$

For example, if the three measured voltages were 442, 460, and 454 volts, the average would be:

$$(442 + 460 + 454) / 3 = 452$$

The percentage of imbalance is then:

$$(452 - 442) \times 100 / 452 = 2.2 \%$$

This exceeds the maximum allowable of 2%.

There is a terminal block for main power connection to the main power source. The main power source should be connected to the terminal block through an appropriate disconnect switch. There is a separate lug in the main control panel for grounding the unit. Check the electrical phase sequence at installation and prior to start-up. Operation of the unit with incorrect electrical phase sequencing will result in improper pump performance. Check the phasing with a phase sequence meter prior to applying power. The proper sequence should read "ABC" on the meter. If the meter reads "CBA", open the main power disconnect and switch two line leads on the line power terminal blocks (or the unit mounted disconnect). Do not interchange any load leads that are from the unit contactors or the motor terminals.



**WARNING:** This equipment contains hazardous voltages that can cause severe injury or death.



**WARNING:** This equipment contains hot water or coolant under pressure. Accidental release of hot water or coolant under pressure can cause personal injury and or property damage.



**WARNING:** This equipment may contain fan blades or other sharp edges. Make sure all fan guards and other protective shields are securely in place.



**WARNING:** The exposed surfaces of motors, piping, and other fluid circuit components can be very hot and can cause burns if touched with unprotected hands.



**CAUTION:** Disconnect and lock out incoming power before installing, servicing, or maintaining the equipment. Connecting power to the main terminal block energizes the entire electric circuitry of the unit. Electric power at the main disconnect should be shut off before opening access panels for repair or maintenance.



**CAUTION:** Wear eye protection when installing, maintaining, or repairing the equipment to protect against any sparks, debris, or fluid leaks.



**CAUTION:** Wear protective gloves when installing, maintaining, or repairing the equipment to protect against any sparks, debris, or fluid leaks.



**CAUTION:** Wire the unit ground in compliance with local and national codes.



## Controller Operation

The system uses a controller that monitors the amount of make-up water added to the system. It controls a blow down valve and two chemical feed pumps. Contact your chemical supplier for expert review of your water chemistry needs and for assistance in properly programming and setting up the controls and your water monitoring and maintenance program.

## Start-Up

Use a qualified technician to perform the start-up procedure in sequence. The following serves as a checklist for the initial start-up and for subsequent start-ups if the unit is out of service for a prolonged time.

The factory default values in the controller are as follows.

**Table 1 – Factory Default Controller Settings**

Item	Parameter	Default Setting
Relay 1	Name	BLOW (blow down valve)
	Setpoint	1000 micro Ohms
	Deadband	30 micro Ohms
	Timeout	3 hours
	Bio-Lockout	Yes
Relay 2	Name	INHIB (scale inhibitor)
	By	Water Meter
	Setpoint	50 gallons
	Feed Time	1 minute
	Bio-Lockout	No
Relay 3	Name	BIO (biocide)
	By	BioSchedule
	Day	Wednesday
	Feed Duration	1 hour
	Lockout	2 hours
Relay 4	Name	ALRM (alarm)
	By	Alarm
	Activate	All alarms
Alarms	High	1,200 micro Ohms
	Low	750 micro Ohms
Meters	Make-up contacts per gallon	1" turbine = 60 2" turbine = 15
Clock	Time Zone	Central Standard Time



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### Step 1 – Connect Chemical Feed Lines

Connect the chemical feed lines from the chemical feed pumps to the drums of chemicals.

### Step 2 – Check Water Make-Up and Drain Lines

Check the drain line is properly connected and any valves leading from the unit to the drain are open. In addition, check the water make-up line is connected and properly installed and any valves in the make-up line are fully open.

### Step 3 - Connect Power

Connect main power properly ensuring it matches the voltage shown on the nameplate of the unit. After making proper power connection and grounding, turn the main power on.

The unit is now ready for service.



## Preventive Maintenance

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Once your unit is in service, the maintenance is simple. Periodically check the chemical levels and make sure they are adequate for normal operation. Also, check all chemical and water for leaks and repair as needed. As recommended by your chemical provider perform periodic water chemistry tests to check water chemistry and make any controller settings adjusted as needed to maintain the desired water chemistry of the system.

## Notes

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