

WaterGard™ LLC+u water level control

INSTALLATION - OPERATION - MAINTENANCE

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READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.



contents

Note

This manual contains vital information for the proper installation and operation of the WaterGard readyLLC+u controls. Carefully read the manual before installation or operation and follow all instructions. Save this manual for future reference.

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The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels, or to important information concerning the life of the product.

⚠ Warning

Indicates presence of a hazard which can cause severe personal injury, death or substantial property damage if ignored.

Note

Indicates special instructions on installation, operation or maintenance which are important but not related to personal injury hazards.

introduction

These instructions are intended to assure that field connections are completed properly and the control system operates for the maximum time possible. Since product warranty may depend on your actions, please read these instructions thoroughly prior to operation. Additionally separate WaterGard and LLC+u user manuals are provided with additional detail for those specific products.

If you have questions about the operation and/or maintenance of this control system and you do not find the answers in this manual, please contact your Marley sales representative.

Warning

Hazard of electrical shock or burn. Be sure to turn off power to the panel before servicing. If working on equipment out of site of panel disconnect, lockout using standard lockout procedure.

Safety First

The Marley control system uses UL listed components installed in accordance with the National Electric Code. The location of the cooling tower and field installation of the control system can affect the safety of those responsible for installing, operating or maintaining the tower and controls. However, since SPX Cooling does not control the tower location, or field installation, we cannot be responsible for addressing safety issues that are affected by these items.

Warning

The following safety issues should be addressed by those responsible for installation, maintenance or repair of the tower and controls:

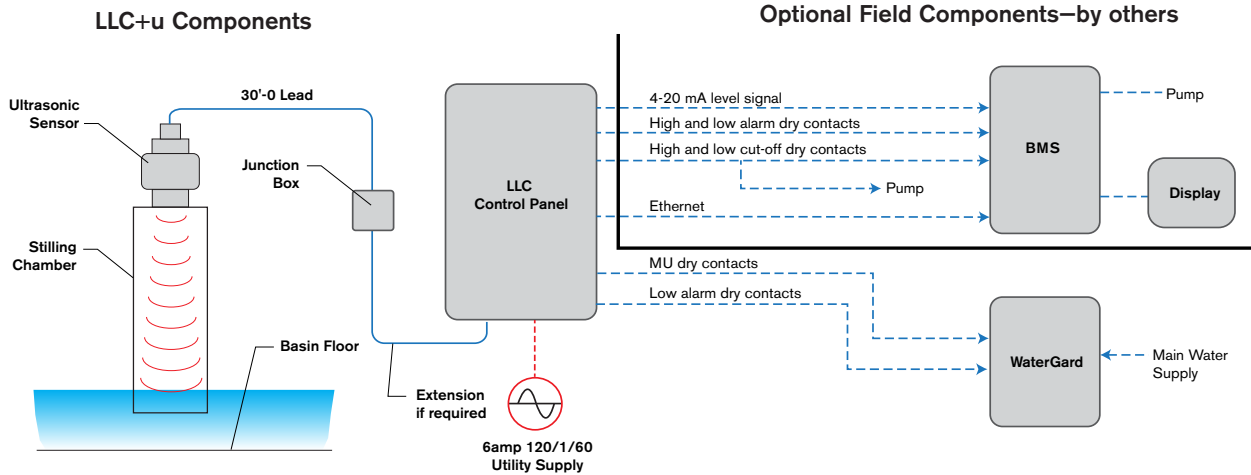
- Access to and from the control panel (including the customer supplied main disconnect/branch circuit protection.)
- Proper grounding of electrical control circuits.
- Sizing and protection of branch circuits feeding the control panel.
- Qualification of persons who will install, maintain and service the electrical equipment.

These are only some of the safety issues that may arise in the design and installation process. SPX Cooling strongly recommends that you consult a safety engineer to be sure that all safety considerations have been addressed.

Other safety issues are addressed in literature supplied with your tower. You should closely review the literature prior to installing, maintaining or repairing your cooling tower.

description

SYSTEM DIAGRAM



The Liquid Level Control systems are used to accomplish five different functions:

- Water Makeup
- Low Water Alarm
- Low Water Cutoff
- High Water Alarm
- High Water Cutoff

The most common application of a water level control system is water makeup. The system regulates the amount of water in the water collection basin and keeps it within normal operating levels. This makeup system is used to control a remotely installed water solenoid valve. When the water level drops below a programmed pre-set level, the solenoid valve is energized by the control system to fill the basin to its proper level.

The high water alarm and low water alarms can be utilized to give warnings associated with water levels outside of normal operating range. To communicate the status of these alarms, the control system provides dry contacts to

interface with various digital control systems or connected to user supplied alarm indicators to signal when corrective action is required. Low-water cutoffs are commonly used to protect pumps from operating without sufficient water. When used in unattended operating environments, the low-water cutoff is configured to shut the pump down, preventing damage and costly repairs. Dry contacts can be wired directly in series with pilot duty controls or to digital control systems to initiate the shutdown of the pumps or other protected equipment during low-water alarm states.

Marley LLC+u ultrasonic system can be integrated with the Marley WaterGard inlet filtration device to maintain healthy cooling tower water conditions by removing dissolved solids in the make-up. The standard Marley LLC+u control panel enclosure is constructed out of fiberglass and rated to NEMA 4X.

description

PANEL LAYOUT



Route incoming power cable from the bottom of the enclosure up into the top (line) side of the main circuit breaker.

Circuit breaker powers a remote solenoid.

H-O-A selector switch for makeup solenoid circuit.

If a makeup solenoid circuit is provided, connect the solenoid wires here at points 4A and 2A. This circuit provides 120 VAC power for the solenoid.

4-20mA output signal representing actual water level for remote BMS monitoring.

Connect alarm and/or cutoff control wiring to the grey terminal points.

Ultrasonic sensor wiring.

Seal field-added conduit holes with silicone or expanding foam to create a vapor barrier to prevent water vapor inside the enclosure.

Selector Switch Operation

HAND: position: Solenoid will energize. **OFF:** position: Solenoid is de-energized

AUTO: Solenoid will operate depending on water level in relation to water probe height.

programming

SCREEN LAYOUT



Red boxes indicate the relay inside the control panel has been energized
LEVELININCHES—real time readout of water level in the water collection basin
GOTO SETUP—navigates to a Parameters screen to set water level status indication heights.

Default password is 1492

INFO—navigates to a screen showing current setup

CIRCUIT PROTECTION



Main circuit breaker powers the control panel

Feeder breaker powers the remote solenoid.

HAND-OFF-AUTO SELECTOR SWITCH



The water makeup selector switch is located on the right-hand side of the enclosure.

HAND = Solenoid will be in the energized (ON) state

OFF = Solenoid is in the de-energized OFF state

AUTO = Solenoid will operate depending on water level in relation to water probe height.

programming

OPERATING MODES

The water makeup indicators on the HMI display the current operating mode selected by the selector switch. Operating modes are as follows:



HAND = Makeup is manually controlled. The water makeup solenoid valve is ON and energized when controls are in this state.



OFF = This mode turns the liquid level controller to the OFF state. Cooling tower can run normally with the LLC+u panel in this state.

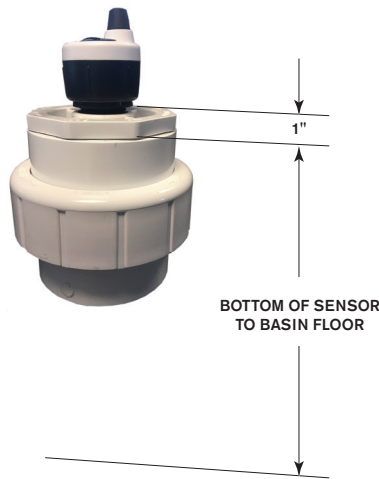


AUTO = Solenoid operates based on water level based on pre-programmed setpoints.

PROGRAMMING STEPS

Marley LLC+u Ultrasonic systems are programmed in the field, following these steps.

1. Measure the distance from the bottom of the ultrasonic sensor to the basin floor.



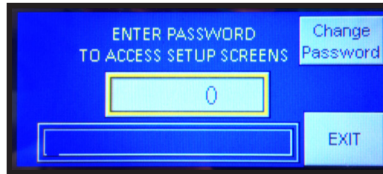
2. Power ON the control panel circuits by switching both circuit breakers to the up position.



programming



3. Enter the setup sequence by pressing GOTO SETUP.

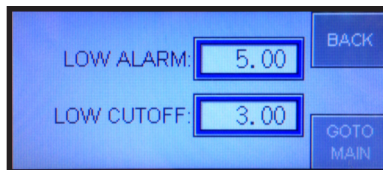
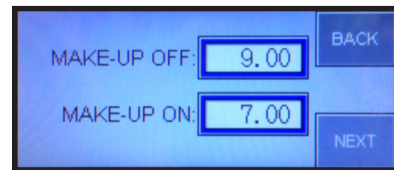
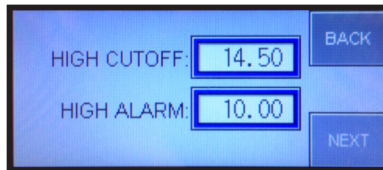


4. Enter the password 1492.



5. When prompted enter the measured sensor height distance.

6. Press next to enter the water level programming screens. Enter water level setpoints by pressing the light blue cell and entering a value on the yellow keypad. Then press ENT to save the entry.



7. When finished press GO TO MAIN to return to the main screen.

Note

The main screen displays actual water level and relay actions. This control system is programmed to react slowly to provide stable, efficient control of the system



installaton

Operation

The LLC+u water level control system consists of an ultrasonic sensor placed to measure the water level in the cold water basin. The sensor is typically located inside the cooling tower or on some cooling towers in an external chamber. A PLC with HMI touch screen is used to program water level heights and offers a visual indication of the water level. Internal relays with form "C" contacts are used as switches, one for each water setpoint.

Programming is accomplished in the field based on recommended cooling tower water level heights. Contact your Marley sales representative for recommended setpoint levels. The sensor is programmed with a height from sensor to bottom of the basin floor. Individual setpoint levels are programmed for high cutoff, high alarm, makeup, low alarm and low cut off. Alarm set point may be used to complete a remote BMS alarm circuit. Cut off set point may be used to shut of a circulating pump.

A 4-20mA output is provided for BMS remote monitoring of water level

Water Makeup Function

The circuitry for water makeup in the LLC+u control panel provides an independent circuit breaker for direct connection to a 110-120VAC water solenoid valve. This added feature allows customer installation without having to provide an additional power circuit to energize the solenoid. The solenoid is connected to terminals 2A and 4A as represented on the control's specific wiring diagram.

Purpose and Function of the HAND-OFF-AUTO Switch

Located on the right side of the control's enclosure is a HAND-OFF-AUTO switch. This switch is used primarily at cooling tower startup and in maintenance procedures where the tower basin is empty or has been drained. When the tower's basin needs to be manually filled, the switch is placed in the HAND position. This selection bypasses the probe assembly's feedback and directly energizes the solenoid valve connected to the water supply. Once the cooling tower basin is filled, the switch is placed in the AUTO position to allow the adjusted ultrasonic sensor to monitor and sustain the proper operating level. Placing the switch in the OFF position completely interrupts any monitoring or fill action normally provided by the LLC+u control panel. Normal tower operation depends upon the HAND-OFF-AUTO switch being positioned in the AUTO mode at all times.



installation

WaterGard System

WaterGard is a membrane-based dissolved-solids rejection unit. The systems are built on factory assembled skids that consist of a controller, pump, sediment filter, membrane filters and an optional granular activated carbon (GAC) fluidized bed for pre-treatment. WaterGard system controller function is integrated with LLC+u signals.

WaterGard systems require two status signals from the LLC+u:

- Demand for makeup water
- Status indicator of low level alarm for WaterGard system to bypass filtered water in order to maintain proper water basin depth.

Status signals are provided on LLC+u control panels at clearly marked terminal block points for easy connection in the field. When the WaterGard system is integrated with LLC+u, WaterGard takes control of makeup water and the LLC+u control panel is no longer directly connected to the water makeup solenoid. All makeup water is initiated through the WaterGard system.

When the liquid level controller generates a water makeup signal, the WaterGard system opens the water supply solenoid and activates its internal pump to filter water for the tower basin. If the LLC+u activate a low level alarm, the WaterGard will activate a second solenoid that bypasses the filters to rapidly fill the cooling tower basin avoiding shutdown.

Configuration 1–Single LLC+u - Single WaterGard Unit

Principle of operation: When a LLC+u controller is connected to a single WaterGard unit, water makeup is controlled by the WaterGard control systems. Two sets of dry contacts are present in each LLC+u panel, one for connection to makeup command in the WaterGard, a second for WaterGard bypass if a low alarm in the LLC+u is activated. When a single cooling tower connected to a single WaterGard unit system there is no need for a solenoid valve in the water piping between the LLC+u and the WaterGard therefore terminal connection points for makeup solenoid in the LLC+u do not need to be connected.

Wiring and plumbing connections: Refer to **Table 1** and the schematic in this manual for Configuration 1.

Table 1

LLC+u Terminal	WaterGard Terminal
Double end arrow indicates the connection between the two terminal blocks	
E81-1 ←	→ E81
E82-2 ←	→ E82
E11-1 ←	→ E11
E52-1 ←	→ E52

Note

The solenoid terminals in LLC+u panel will not be connected. Water basin supply pipe is directly connected to the WaterGard outlet.

Configuration 2A–Single LLC - Two to Four WaterGard Units

Principle of operation: When a single LLC+u controller is connected to a multiple (four or less) WaterGard units, water makeup is provided by all WaterGard units at the same time. Up to four sets of dry contacts are present in each LLC+u panel. One of these single sets from the LLC+u panel will connect with the corresponding points in one of the WaterGard units. This technique will allow for up to four sets of contacts for makeup and four sets for low level alarm. In this arrangement terminal point connections for makeup solenoid in the LLC+u will not be utilized.

Wiring and plumbing connections: Refer to **Table 2** and the schematic in this manual for Configuration 2A.



installation

LLC+u Terminal	WaterGard 1 Terminal	WaterGard 2 Terminal	WaterGard 3 Terminal	WaterGard 4 Terminal
Double end arrow indicates the connection between the two terminal blocks				
E81-1	←→ E81			
E82-1	←→ E82			
E11-1	←→ E11			
E52-1	←→ E52			
E81-2	←→	→ E81		
E82-2	←→	→ E82		
E11-2	←→	→ E11		
E52-2	←→	→ E52		
E81-3	←→		→ E81	
E82-3	←→		→ E82	
E11-3	←→		→ E11	
E52-3	←→		→ E52	
E81-4	←→			→ E81
E82-4	←→			→ E82
E11-4	←→			→ E11
E52-4	←→			→ E52

Table 2

This connection pattern can be duplicated for up to four WaterGard units. Water basin supply is directly connected to WaterGard outlet.

Configuration 2B—Single LLC - Five to Seven WaterGard Units

Principle of operation: When a single LLC+u controller is connected to a multiple (more than four) WaterGard units, water makeup is provided by all WaterGard units at the same time. Five sets of dry contacts are present in each LLC+u panel along with an available expansion relay box powered from the primary LLC+u controller to support an additional four WaterGard units. If more than five WaterGard systems are necessary, one additional external relay box can be included to add additional relays in groups of four relays. Consult your Marley sales representative if a system requires more than 13 WaterGard units to be powered from a single LLC+u controller.

Wiring and plumbing connections: Refer to **Table 3** and the schematic in this manual for Configuration 2B.

Water basin supply is directly connected to WaterGard outlet.

installation

LLC+u Terminal	WaterGard 1 Terminal	WaterGard 2 Terminal	WaterGard 3 Terminal	WaterGard 4 Terminal	WaterGard 5 Terminal	External Relay Box	WaterGard 6 Terminal	WaterGard 7 Terminal
Double end arrow indicates the connection between the two terminal blocks								
E81-1	←→ E81							
E82-1	←→ E82							
E11-1	←→ E11							
E52-1	←→ E52							
E81-2	←	→ E81						
E82-2	←	→ E82						
E11-2	←	→ E11						
E52-2	←	→ E52						
E81-3	←		→ E81					
E82-3	←		→ E82					
E11-3	←		→ E11					
E52-3	←		→ E52					
E81-4	←			→ E81				
E82-4	←			→ E82				
E11-4	←			→ E11				
E52-4	←			→ E52				
E81-5	←				→ E81			
E82-5	←				→ E82			
E11-5	←				→ E11			
E52-5	←				→ E52			
LA COIL	←					→ LA COIL		
2A	←					→ 2A		
MU COIL	←					→ MU COIL		
2A	←					→ 2A		
						E81-X1 ←→ E81		
						E82-X1 ←→ E82		
						E11-X1 ←→ E11		
						E52-X1 ←→ E52		
						E81-X2 ←	→ E81	
						E82-X2 ←	→ E82	
						E11-X2 ←	→ E11	
						E52-X2 ←	→ E52	
LA COIL (low alarm status) - 2A (low alarm status) MU COIL (makeup status) - 2A (makeup status)								

Table 3

installation

Configuration 3—Single WaterGard Unit - Multiple LLCs

Principle of operation: When multiple cooling towers each having an individual LLC+u connected to a single WaterGard system, the individual cooling tower’s local water makeup solenoid will be used to allow makeup water into the cooling tower water collection basin from the WaterGard unit at each individual cooling tower. Makeup statuses are connected in parallel allowing each LLC+u to send individual signals. The Low Alarm status is connected in series to require the WaterGard unit to bypass the WaterGard system when required. Both connections will route through the closest LLC+u system to the WaterGard unit. If connecting more than three LLC+u systems please consult your Marley sales representative.

Wiring and plumbing connections: Refer to **Table 4** and the schematic in this manual for Configuration 3.

LLC+u 1 Terminal	LLC+u 2 Terminal	LLC+u 3 Terminal	WaterGard Terminal
Double end arrow indicates the connection between the two terminal blocks			
E81-1 ←	→ E81-1		
E82-1 ←	→ E82-1		
	E81-1 ←	→ E81-1	
	E82-1 ←	→ E82-1	
		E81-1 ←	→ E81
		E82-1 ←	→ E82
E11-1 ←			→ E11
E52-1 ←	→ E11-1		
	E52-1 ←	→ E11-1	
		E52-1 ←	→ E52

Table 4

installation

Configuration 4A—Multiple LLCs - Two to Four WaterGard Units

Table 5 shows three LLCs and four WaterGard units. This scheme can be repeated for up to five WaterGard units in the system.

Wiring and plumbing connections: Refer to **Table 5** and the schematic in this manual for Configuration 4A.

LLC+u 1 Terminal	LLC+u 2 Terminal	LLC+u 3 Terminal	WaterGard 1 Terminal	WaterGard 2 Terminal	WaterGard 3 Terminal	WaterGard 4 Terminal
Arrows indicate the connection between the two terminal blocks						
E81-1 ←	→ E81-1 ←	→ E81-1 ←	→ E81			
E82-1 ←	→ E82-1 ←	→ E82-1 ←	→ E82			
E11-1 ←			→ E11			
E52-1 ←	→ E11-1					
	E52-1	E11-1 ←	→ E52			
E81-2 ←	→ E81-2 ←	→ E81-2 ←	→ E81			
E82-2 ←	→ E82-2 ←	→ E82-2 ←	→ E82			
E11-2 ←			→ E11			
E52-2 ←	→ E11-2					
	E52-2 ←	→ E11-2 ←	→ E52			
E81-3 ←	→ E81-3 ←	→ E81-3 ←			→ E81	
E82-3 ←	→ E82-3 ←	→ E82-3 ←			→ E82	
E11-3 ←					→ E11	
E52-3	E11-3					
	E52-3 ←	→ E11-3 ←			→ E52	
E81-4 ←	→ E81-4 ←	→ E81-4 ←				→ E81
E82-4 ←	→ E82-4 ←	→ E82-4 ←				→ E82
E11-4 ←						→ E11
E52-4 ←	→ E11-4					
	E52-4 ←	→ E11-4 ←				→ E52

Table 5

Configuration 4B—Multiple LLCs - Multiple WaterGard Units

Table 6 shows three LLCs and nine WaterGard units.

Wiring and plumbing connections: Refer to **Table 6** and the schematic in this manual for Configuration 4B.



LLC+u 1 Terminal	LLC+u 2 Terminal	LLC+u 3 Terminal	WG 1 Terminal	WG 2 Terminal	WG 3 Terminal	WG 4 Terminal	WG 5 Terminal	Relay Box 1	Relay Box 1	Relay Box 1	WG 6 Terminal	WG 7 Terminal
Double end arrow indicates the connection between the two terminal blocks												
LA COIL								LA COIL				
2A								2A				
CU COIL								CU COIL				
2A								2A				
	LA COIL								LA COIL			
	2A								2A			
	CU COIL								CU COIL			
	2A								2A			
		LA COIL								LA COIL		
		2A								2A		
		CU COIL								CU COIL		
		2A								2A		
E81-1	↔ E81-1	↔ E81-1	↔ E81									
E82-1	↔ E82-1	↔ E82-1	↔ E82									
E11-1			↔ E11									
E52-1	↔ E11-1											
	E52-1	↔ E11-1										
		E52-1	↔ E52									
E81-2	↔ E81-2	↔ E81-2	↔ E81									
E82-2	↔ E82-2	↔ E82-2	↔ E82									
E11-2			↔ E11									
E52-2	↔ E11-2											
	E52-2	↔ E11-2										
		E52-2	↔ E52									
E81-3	↔ E81-3	↔ E81-3	↔ E81									
E82-3	↔ E82-3	↔ E82-3	↔ E82									
E11-3			↔ E11									
E52-3	↔ E11-3											
	E52-3	↔ E11-3										
		E52-3	↔ E52									
E81-4	↔ E81-4	↔ E81-4	↔ E81									
E82-4	↔ E82-4	↔ E82-4	↔ E82									
E11-4			↔ E11									
E52-4	↔ E11-4											
	E52-4	↔ E11-4										
		E52-4	↔ E52									
E81-5	↔ E81-5	↔ E81-5	↔ E81									
E82-5	↔ E82-5	↔ E82-5	↔ E82									
E11-5			↔ E11									
E52-5	↔ E11-5											
	E52-5	↔ E11-5										
		E52-5	↔ E52									
								E81-X1	↔ E81-X1			
								E82-X2	↔ E82-X2			
								E81-X1	↔ E81-X1			
								E82-X2	↔ E82-X2			
								E81-X1	↔ E81			
								E82-X2	↔ E82			
								E11-X1	↔ E11			
								E52-X1	↔ E11-X1			
								E52-X1	↔ E11-X1			
								E52-X1	↔ E52			
								E81-X1	↔ E81-X1			
								E82-X1	↔ E82-X1			
								E81-X1	↔ E81-X1			
								E82-X1	↔ E82-X1			
								E81-X1	↔ E81			
								E82-X1	↔ E82			
								E11-X1	↔ E11			
								E52-X1	↔ E11-X1			
								E52-X1	↔ E11-X1			
								E52-X1	↔ E52			

Table 6

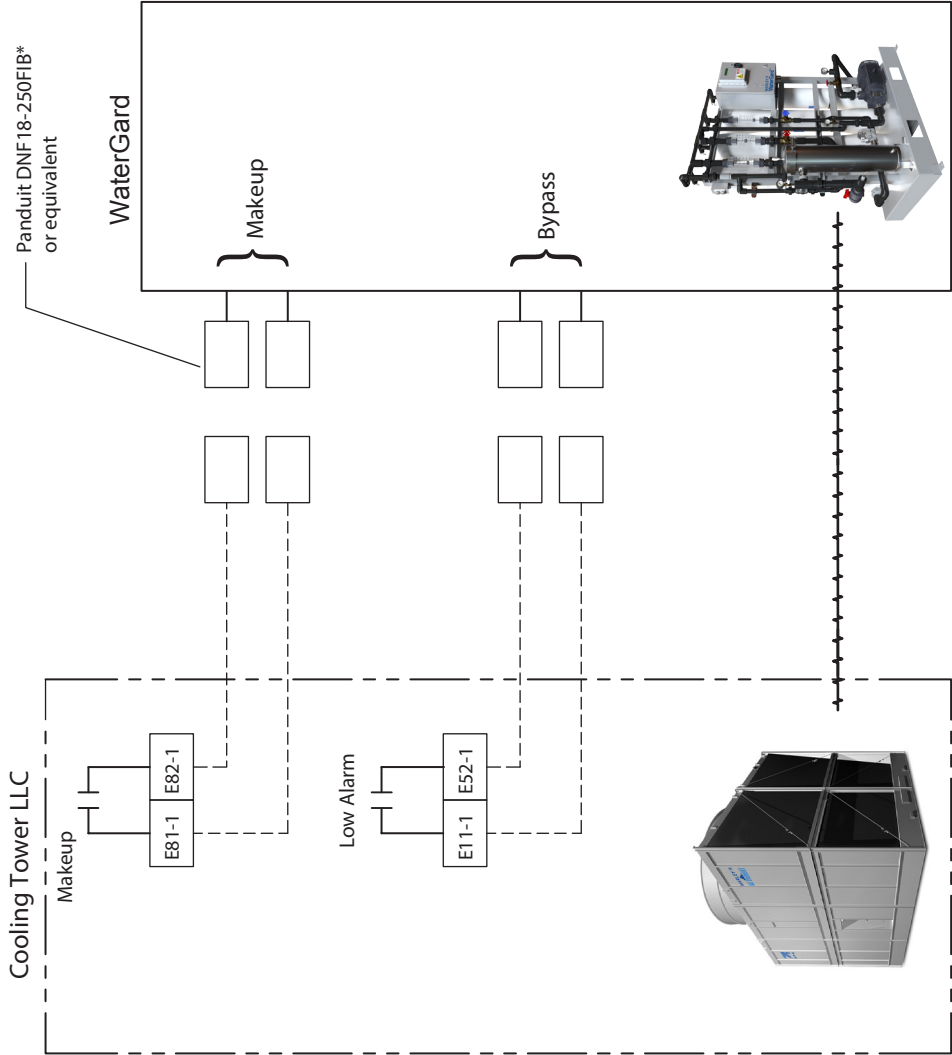
troubleshooting

LLC+u control panels are tested before shipment to guarantee smooth installation and operation. Any potential issues outside of the control panel should be investigated prior to troubleshooting the control panel. Typically most issues are found in field wiring connections in the control panel. When troubleshooting the LLC+u controls, please verify the following:

- Both circuit breakers in the panel must be energized with the switches in the UP position (ON).
- LLC+u panels require programming in the field. See programming instructions in this manual.
- Check water makeup selector switch position to verify proper position.
- Confirm the two sensor wires are installed correctly and properly connected at terminal points in the control panel. To properly verify the terminal connection, be sure the terminal connections does not land on the insulation of the sensor wire. Strip back just enough wire insulation so you can see some copper wire exposed assuring a metal-to-metal connection. Additionally, once the terminal connection is tightened on a wire, conduct a pull-test on the wire.
- The sensor wire is a shielded four conductor cable. The red and black wires connect to terminal points +24 and 13. Do not to cut back the shield wire. The shield wire connects to ground to eliminate potential noise for the sensor reading. Improper grounding of the shield wire may result in improper LLC+u operation. Always refer to the as-built wiring diagram on the inside control panel door for current connection points. Tape back the white and green wires that are not used.
- Check that the extension wires are numbered correctly and connections secure.
- If there are issues with sensor readings, moving any external power wiring so that it does not run parallel with the sensor wiring will help to reduce noise. Follow best-practice wiring for power and instrumentation wiring.
- Rotate the HAND-AUTO-OFF selector switch to the HAND position. The solenoid should energize allowing makeup water to flow directly to the cooling tower. The single-pole circuit breaker should be in the UP or ON position to energize the makeup solenoid.

Configuration 1 — Single Cooling Tower LLC — Single WaterGard Unit

Makeup and Low Alarm signal wires from dry contacts connected to a dedicated single WaterGard. Only two pairs of wire (four wires in total) connect to the dedicated single WaterGard. On a single LLC and single WaterGard configuration the makeup solenoid is internal to the WaterGard unit.



Legend

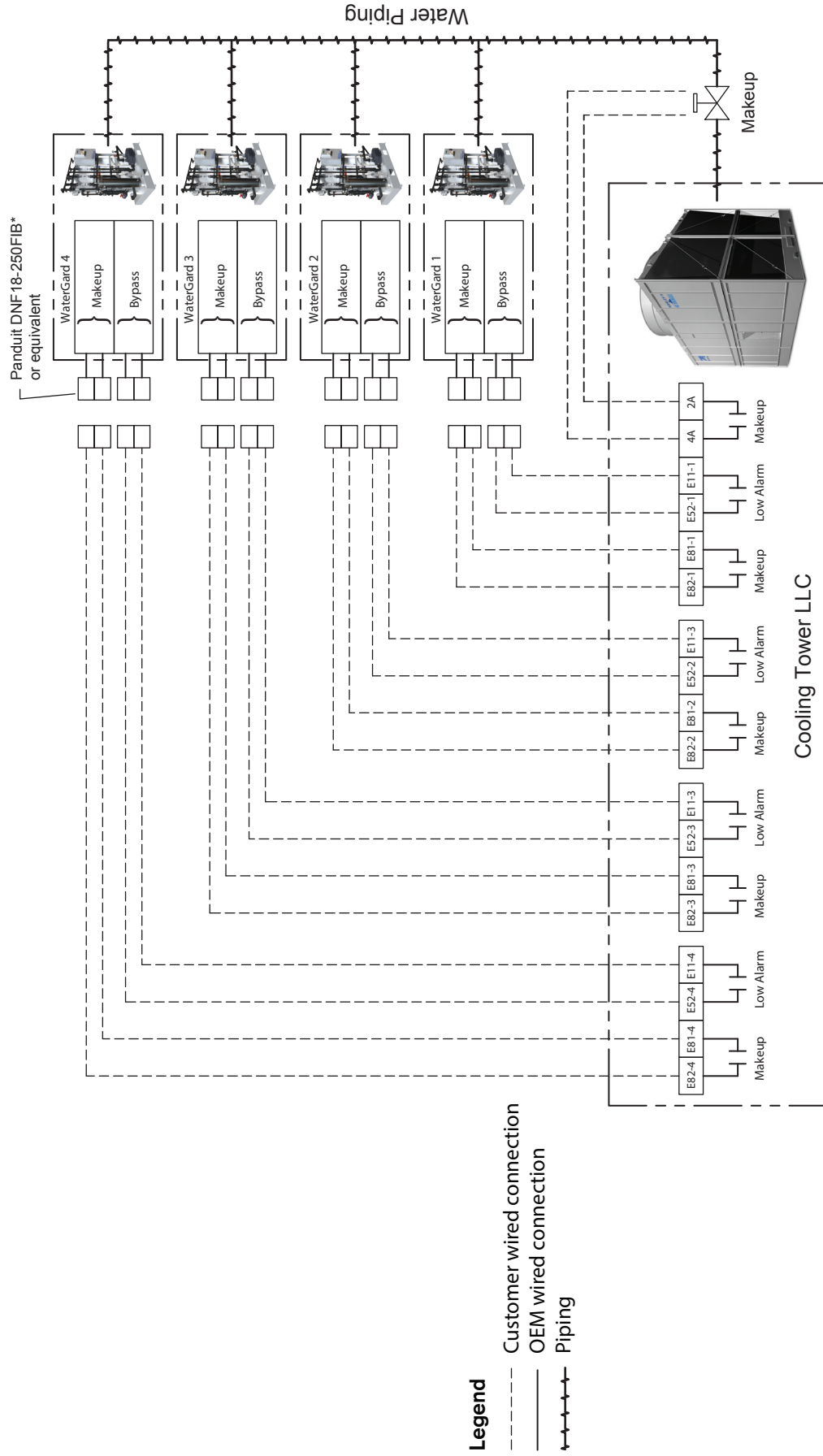
- Customer wired connection
- OEM wired connection
- Piping

Note

- 1 Makeup and Low Alarm relays are shown in a de-energized state. Makeup NO contact will close when makeup water is being requested. Low Alarm NO contact will close when water level is below the Low Alarm water level.

Configuration 2A – Single Cooling Tower LLC – Two to Four WaterGard units

Makeup an Low Alarm signal wires from dry contacts connected directly to each LLC.
 Only two pairs of wire (four wires in total) connect to the each WaterGard unit.
 The basin water makeup solenoid on each LLC must be connected as illustrated for proper operation.

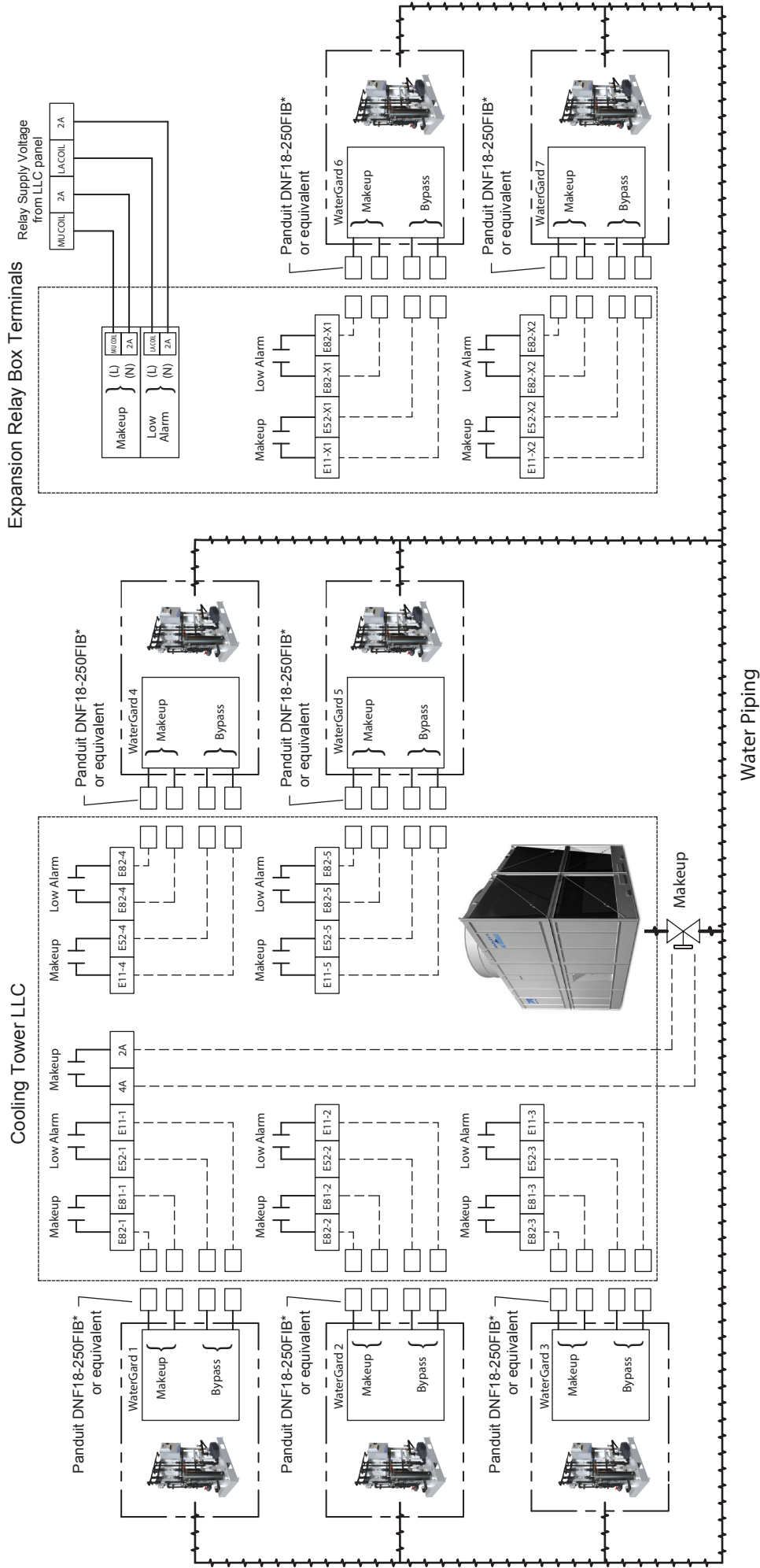


Note

- 1 A water makeup valve is optional at the water makeup connection to the cooling tower in this arrangement.
- 2 Make-up and Low Alarm relays are shown in a de-energized state. Make-up NO contact will close when makeup water is being requested. Low Alarm NO contact will close when water level is below the Low Alarm water level.

Configuration 2B — Single Cooling Tower LLC — Five to Seven WaterGard units with Expansion Relay

Makeup and Low Alarm signal wires from dry contacts in one LLC unit to dry contacts in the next. Only two pairs of wire (four wires in total) connect to the WaterGard unit. The basin makeup solenoid on a single LLC must be connected as illustrated for proper operation.



Legend

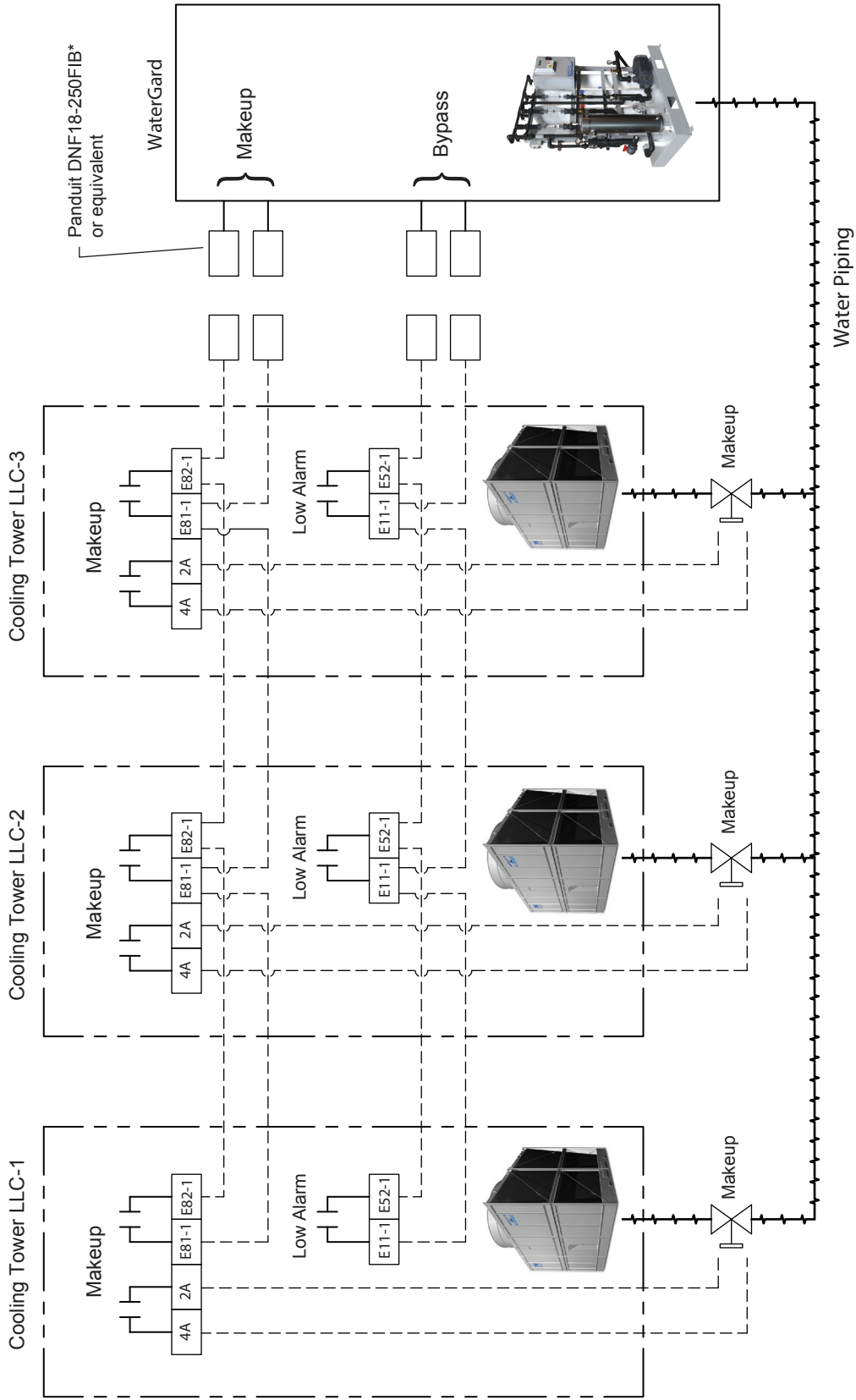
- Customer wired connection
- OEM wired connection
- Piping

Note

- 1 A water makeup valve is optional at the water makeup connection to the cooling tower in this arrangement.
- 2 Makeup and Low Alarm relays are shown in a de-energized state. Makeup NO contact will close when makeup water is being requested. Low Alarm NO contact will close when water level is below the Low Alarm water level.

Configuration 3 — Multiple Cooling Tower LLC units — Single WaterGuard unit

Makeup and Low Alarm signal wires are daisy chained in parallel from dry contacts in one LLC to dry contacts in the next. Only two pairs of wire (four wires in total) connect to the WaterGuard unit. The basin makeup solenoid on each LLC must be connected as illustrated for proper operation.



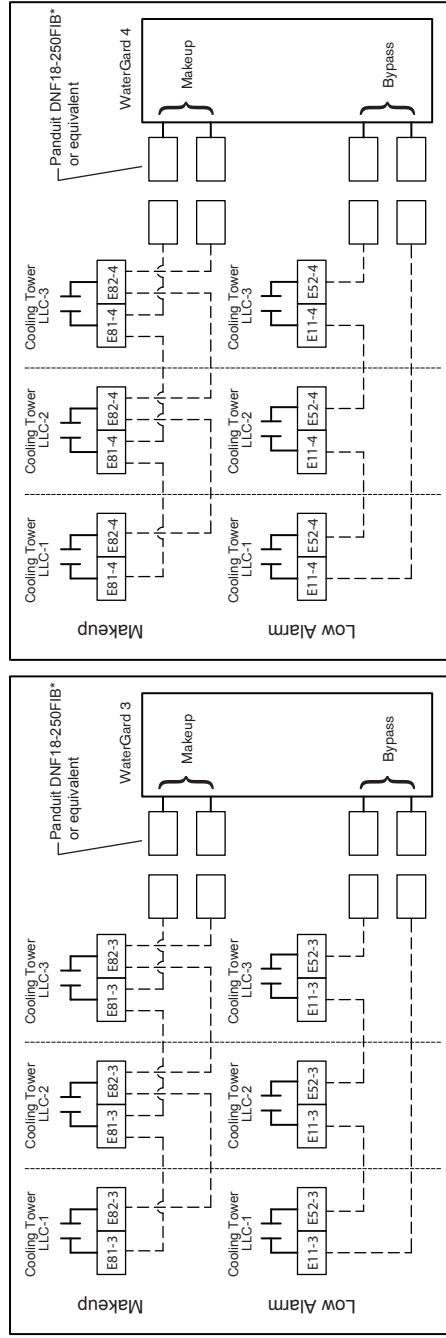
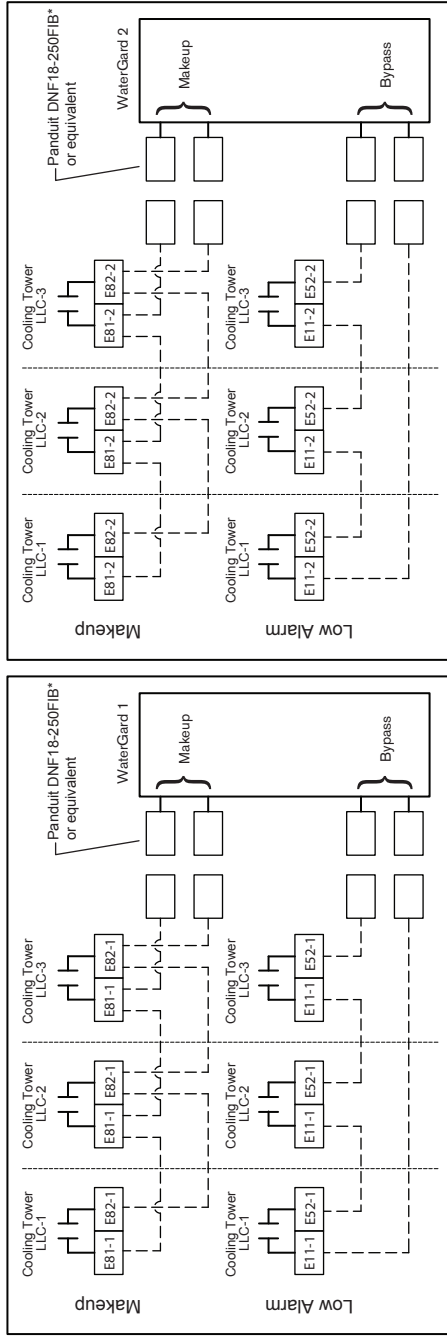
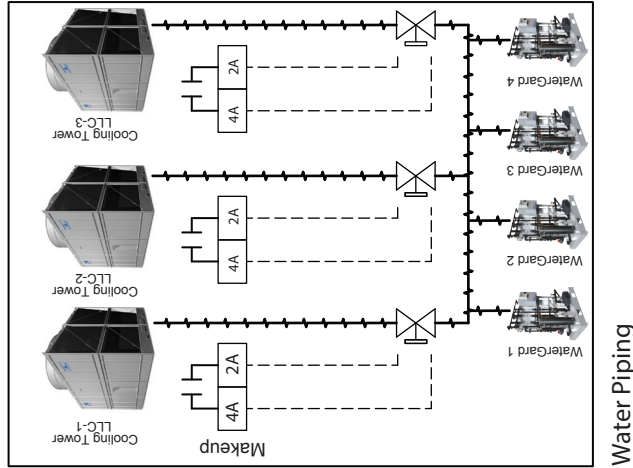
Legend

- Customer wired connection
- OEM wired connection
- +—— Piping

Note

- 1 A water makeup valve is optional at the water makeup connection to the cooling tower in this arrangement.
- 2 Makeup and Low Alarm relays are shown in a de-energized state. Makeup NO contact will close when makeup water is being requested. Low Alarm NO contact will close when water level is below the Low Alarm water level.

Configuration 4A – Multiple Cooling Tower LLC units - Two to Four WaterGard units
 Makeup and Low Alarm signal wires are daisy chained in parallel from dry contacts in one LLC to dry contacts in the next. Only two pairs of wire (four wires in total), connect to the WaterGard. The basin makeup solenoid on each LLC must be connected as illustrated for proper operation.



Electrical Wiring

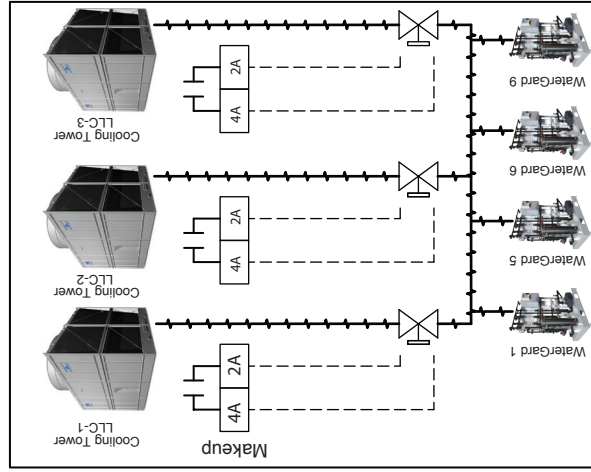
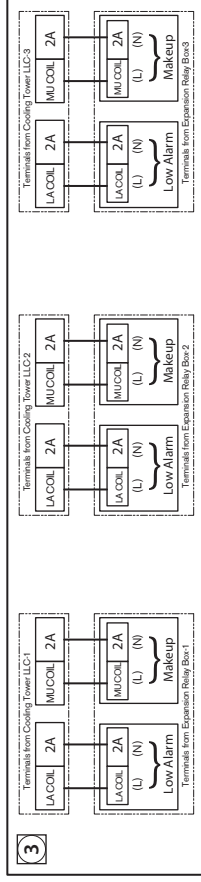
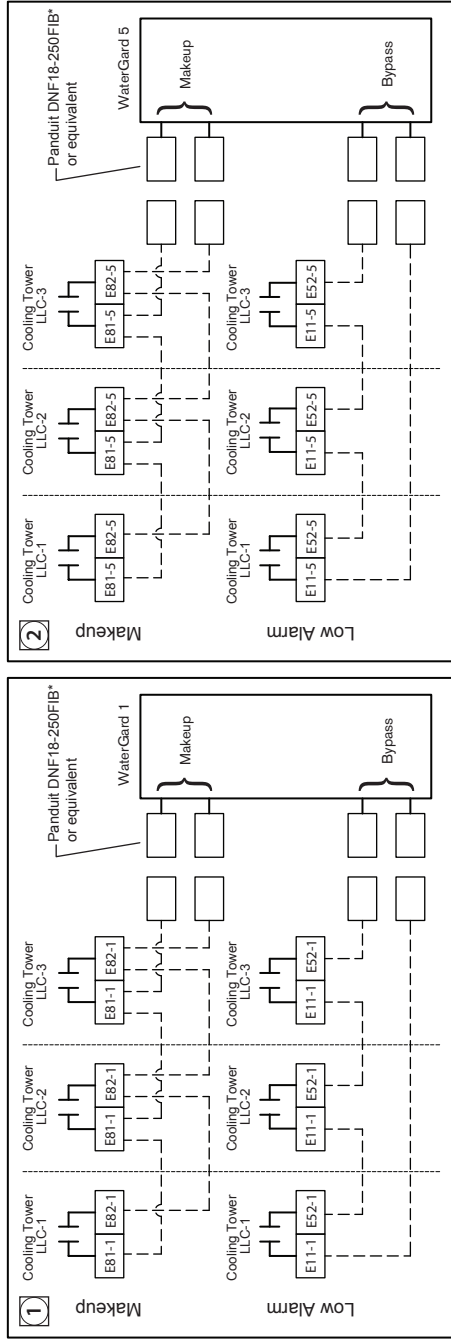
Legend

- Customer wired connection
- OEM wired connection
- +++++ Piping

Note

- 1 A water makeup valve is optional at the water makeup connection to the cooling tower in this arrangement.
- 2 Makeup and Low Alarm relays are shown in a de-energized state. Makeup NO contact will close when makeup water is being requested. Low Alarm NO contact will close when water level is below the Low Alarm water level.

Configuration 4B — Multiple Cooling Tower LLC units - Multiple WaterGard units
 Makeup and Low Alarm signal wires are daisy chained in parallel from dry contacts in one LLC to dry contacts in the next. Only two pairs of wire (four wires in total) connect to the WaterGard. The basin makeup solenoid on each LLC must be connected as illustrated for proper operation.



Water Piping

- Note**
- These sections represent connections from WaterGard 1 and 5, the same connections follow for WaterGard 2, 3 and 4.
 - This section represents the relay coil connections from Cooling Tower LLC to expansion relay box.
 - These sections represent connections from WaterGard 6 and 9, the same connections follow for WaterGard 7 and 8.

Electrical Wiring

Note

- A water makeup valve is optional at the water makeup connection to the cooling tower in this arrangement.
- Makeup and Low Alarm relays are shown in a de-energized state. Makeup NO contact will close when makeup water is being requested. Low Alarm NO contact will close when water level is below the Low Alarm water level.

WaterGard LLC+u water level control

USER MANUAL

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