

## WaterGard™ - LLC+u water level control

INSTALLATION - OPERATION

10000022849\_A ISSUED 8/2024

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 ready LLC+u controls. Carefully read the manual before installation or operation and follow all instructions. Save this manual for future reference.***

Description .....	4
Programming.....	6
Operation.....	9
WaterGard and LLC+u Time Delay Feature .....	9
Water Makeup Function .....	9
HAND-OFF-AUTO Switch.....	9
WaterGard System.....	10
Configuration 1: Single WaterGard Unit, Single LLC .....	10
Configuration 2A: Two to Five WaterGard Units, Single LLC .....	11
Configuration 2B: Six to Thirteen WaterGard Units, Single LLC .....	12
Configuration 3: Single WaterGard Unit, Multiple LLCs .....	14
Configuration 4A: Two to Five WaterGard Units, Multiple LLCs .....	15
Configuration 4B: Six to Thirteen WaterGard Units, Multiple LLCs.....	16
Troubleshooting.....	17
Configuration Schematics .....	18

***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:***

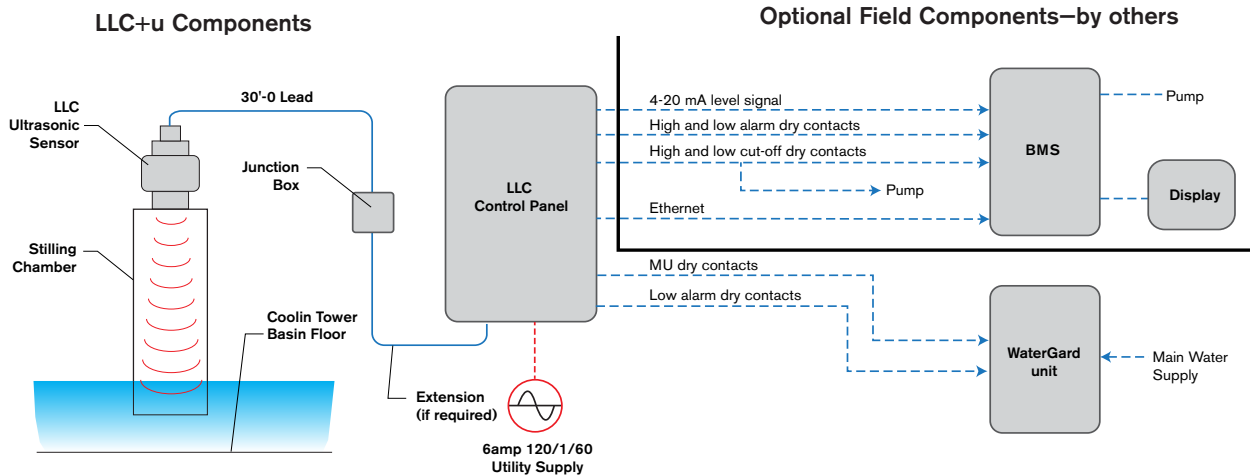
- Access to and from the control panel (including the customer supplied main disconnect/branch circuit protection)
- Proper grounding of electrical control circuits
- Sizing and protection of branch circuits feeding the control panel
- Qualification of persons who will install, maintain and service the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

The Marley LLC+u ultrasonic system integrated with the Marley WaterGard inlet filtration system maintains healthy cooling tower water conditions by removing dissolved solids in the makeup. The Marley LLC+u control panel enclosure is constructed out of fiberglass and rated NEMA 4X.

## description

### CONTROL 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 which provides 120VAC 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.



# programming

## SCREEN LAYOUT



Boxes highlighted in red indicate the relay inside the control panel has been energized.

LEVEL IN INCHES—real time readout of water level in the water collection basin  
GO TO 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



Main circuit breaker powers the control panel

Feeder breaker powers the remote solenoid

## CIRCUIT PROTECTION

### HAND-OFF-AUTO SELECTOR SWITCH OPTION



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

HAND = LLC calls for makeup water

OFF = The makeup system is disabled

AUTO = Makeup will operate depending on water level

---

# 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 makeup solenoid valve is Open and WaterGard is called for makeup



OFF = This mode turns the LLC controller to the OFF state

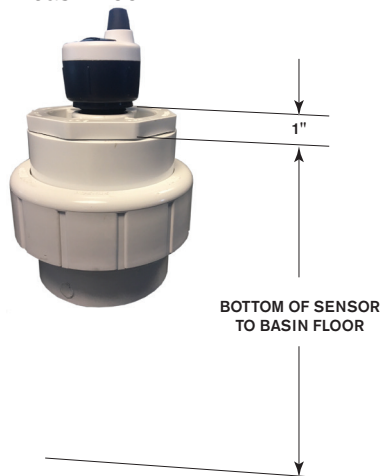


AUTO = Makeup operates based on water level pre-programmed setpoints

## PROGRAMMING STEPS

Marley LLC+u ultrasonic system is programmed following these steps:

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



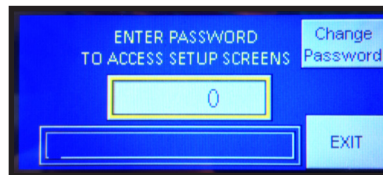
2. Power ON the control panel circuits by switching both circuit breakers to the up position.



## programming



3. Enter the setup sequence by pressing GO TO SETUP.



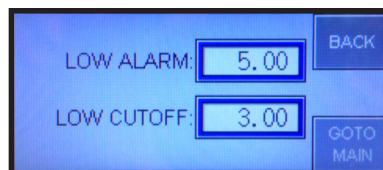
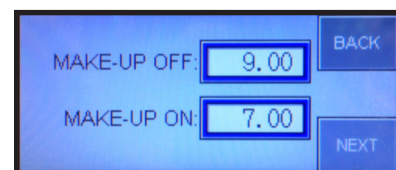
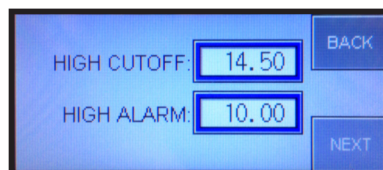
4. Enter password 1492.



5. When prompted enter the measured sensor height distance.



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



7. When finished tap 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 (liquid level controller) system consists of an ultrasonic sensor 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. 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. Cutoff set point may be used to shut off a circulating pump. A 4-20mA output is provided for BMS remote monitoring of water level.

---

### WaterGard and LLC+u Time Delay Feature

The LLC provides a Bypass command to the WaterGard system once Low Alarm is initiated and maintains Bypass mode for 20 second after the water level is above Low Alarm. This technique allows WaterGard to accomplish rapid water replacement in the basin. Once the time delay expires the Bypass Mode discontinues and the WaterGard system will provide makeup water until it reaches Makeup Off setpoint.

---

### Water Makeup Function

The LLC+u control panel provides an independent circuit breaker for direct connection to a 120VAC water solenoid valve when one exists between the WaterGard unit and the cooling tower basin. This added feature allows installation without an additional power circuit to energize the solenoid. A solenoid between the WaterGard unit(s) and the cooling tower basin is not necessary when one only one basin is receiving the filtered water as in Configurations 1 and 2. The makeup solenoid should be connected to terminals 2A and 4A as represented on the wiring diagram.



---

### Purpose and Function of the HAND-OFF-AUTO Switch

The HAND-OFF-AUTO 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



---

## installation

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 provided by the LLC+u control panel. For normal tower operation without the need for manual operation the switch must be in the AUTO position.

---

### WaterGard System

WaterGard is a membrane-based dissolved-solids rejection unit. The factory assembled skid consist of a controller, pump, sediment filter, membrane filters and an optional granular activated carbon (GAC) fluidized bed for pre-treatment. The WaterGard system controller function is integrated with the 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 on the LLC control panel are clearly marked terminal block points for easy connection. When the WaterGard system is integrated with LLC, WaterGard takes control of makeup water and the LLC controls are no longer directly connected to the water makeup solenoid. All makeup water is initiated through the WaterGard system.

When the LLC generates a water makeup signal, the WaterGard system activates the makeup solenoid and activates its internal pump to filter makeup water. If the LLC 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.

Another configuration of WaterGard integration with the LLC system is when the LLC is integrated into multi-function controls like the Marley All in One (AIO), the non PLC type CoolBoost, a Single Point Power Connection (SPPC) or other controls arrangements that have more functionality than stand-alone LLC+u controls. When WaterGard with LLC controllers are incorporated into multi-function controls, the control panel enclosure environmental rating will be the same as the multi-function control.

### Configuration 1—Single WaterGard Unit - Single LLC

**Principle of operation:** When a single LLC is connected to a single WaterGard unit, water makeup is controlled by the WaterGard system. Two sets of dry contacts are present in the LLC control panel, one connection for makeup status to the WaterGard, and a second connection for Low Alarm/ Bypass status to the WaterGard if low alarm is activated. In a single cooling tower arrangement a makeup solenoid will not be required in the water piping between the LLC and WaterGard.

#### Single Cooling Tower LLC – Single WaterGard Unit

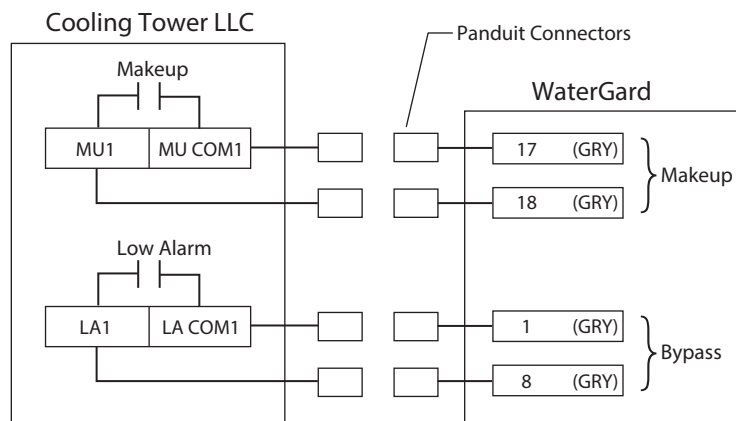


Figure 1

**Wiring and plumbing connections:** Refer to the **Configuration 1** schematic at the end of this manual.

#### Note

**The solenoid terminals in the LLC control panel will not be connected. The water basin supply piping is directly connected to the WaterGard outlet.**

#### Note

**Refer to Figure 1 for all Configuration terminal designations.**

### Configuration 2A—Two to Five WaterGard Units - Single LLC

**Principle of operation:** When a LLC is connected to a multiple (five or less) WaterGard units, water makeup is provided by all WaterGard units at the same time. Up to five sets of dry contacts are present in the LLC control panel. Each of these sets from the LLC panel will connect with the corresponding points in one of the WaterGard units. This technique will allow for five sets of contacts for makeup and five sets for low level alarm. In this arrangement the tower basin makeup solenoid will not be required in the water piping between the LLC and WaterGard units.



## 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				
MU1	↔ Makeup			
MU COM1	↔ Makeup			
LA1	↔ Bypass			
LA COM1	↔ Bypass			
MU2	↔	→ Makeup		
MU COM2	↔	→ Makeup		
LA2	↔	→ Bypass		
LA COM2	↔	→ Bypass		
MU3	↔		→ Makeup	
MU COM3	↔		→ Makeup	
LA3	↔		→ Bypass	
LA COM3	↔		→ Bypass	
MU4	↔			→ Makeup
MU COM4	↔			→ Makeup
LA4	↔			→ Bypass
LA COM4	↔			→ Bypass

**Table 1**

**Wiring and plumbing connections:** Refer to **Table 1** and **Configuration 2A** schematic at the end of the manual.

This connection pattern can be duplicated for up to five WaterGard units. The water basin supply is directly connected to the WaterGard outlet.

### **Configuration 2B—Six to Thirteen WaterGard Units - Single LLC with Expansion Relay**

**Principle of operation:** When a LLC controller is connected to multiple (more than five) WaterGard units, water makeup is provided by all WaterGard units at the same time. Five sets of dry contacts are present in each LLC panel and an expansion relay box is available that can be powered from the primary LLC controller to support an additional four WaterGard units. Should it be necessary to control more than ten WaterGard units, a total of two (2) additional relay boxes can be added. Each additional external relay box allows for the control of up to four additional WaterGard units. Consult your Marley Sales representative if a system requires more than thirteen WaterGard units are to be powered from a single LLC. In this arrangement a basin makeup solenoid valve will not be required in the water piping between the LLC and WaterGard.

## 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								
MU1	↔ Makeup							
MU COM1	↔ Makeup							
LA1	↔ Bypass							
LA COM1	↔ Bypass							
MU2	↔	→ Makeup						
MU COM2	↔	→ Makeup						
LA2	↔	→ Bypass						
LA COM2	↔	→ Bypass						
MU3	↔		→ Makeup					
MU COM3	↔		→ Makeup					
LA3	↔		→ Bypass					
LA COM3	↔		→ Bypass					
MU4	↔			→ Makeup				
MU COM4	↔			→ Makeup				
LA4	↔			→ Bypass				
LA COM4	↔			→ Bypass				
MU5	↔				→ Makeup			
MU COM5	↔				→ Makeup			
LA5	↔				→ Bypass			
LA COM5	↔				→ Bypass			
LA COIL	↔					→ LA COIL		
2A	↔					→ 2A		
MU COIL	↔					→ MU COIL		
2A	↔					→ 2A		
						MUX1	↔ Makeup	
						MU COMX1	↔ Makeup	
						LAX1	↔ Bypass	
						LA COMX1	↔ Bypass	
						MUX2	↔	→ Makeup
						MU COMX2	↔	→ Makeup
						LAX2	↔	→ Bypass
						LA COMX2	↔	→ Bypass

**Table 2**

**Wiring and plumbing connections:** Refer to **Table 2** and **Configuration 2B** schematic at the end of this manual.

Water basin supply is directly connected to WaterGard outlet.



## installation

### Configuration 3—Single WaterGard Unit - Multiple LLCs

**Principle of operation:** When multiple cooling towers each have an individual LLC connected to a single WaterGard unit, the individual cooling tower's water makeup solenoid will control the flow of makeup water into the cooling tower basin from the WaterGard header pipe at each individual cell. Makeup and low alarm/bypass status are connected in a daisy chain method to activate demand for makeup water. Both connections will route through the closest cooling tower LLC to the WaterGard unit.

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			
MU1	←→ MU1	←→ MU1	→ Makeup
MU COM1	←→ MU COM1	→ MU COM1	→ Makeup
LA1	←→ LA1	→ LA1	→ Bypass
LA COM1	←→ LA COM1	→ LA COM1	→ Bypass

**Table 3**

**Wiring and plumbing connections:** Refer to **Table 3** and **Configuration 3** schematic at the end of this manual.

## installation

### Configuration 4A—Two to Five WaterGard Units - Multiple LLCs

**Table 4** shows three LLC+u units and four WaterGard units. This scheme can be repeated for up to five WaterGard units in the system.

LLC+u 1 Terminal	LLC+u 2 Terminal	LLC+u 3 Terminal	WaterGard 1 Terminal	WaterGard 2 Terminal	WaterGard 3 Terminal	WaterGard 4 Terminal
Double end arrows indicate the connection between the two terminal blocks						
MU1	←→ MU1	←→ MU1	→ Makeup			
MU COM1	←→ MU COM1	←→ MU COM1	→ Makeup			
LA1	←→ LA1	←→ LA1	→ Bypass			
LA COM1	←→ LA COM1	←→ LA COM1	→ Bypass			
MU2	←→ MU2	←→ MU2		→ Makeup		
MU COM2	←→ MU COM2	←→ MU COM2		→ Makeup		
LA2	←→ LA2	←→ LA2		→ Bypass		
LA COM2	←→ LA COM2	←→ LA COM2		→ Bypass		
MU3	←→ MU3	←→ MU3			→ Makeup	
MU COM3	←→ MU COM3	←→ MU COM3			→ Makeup	
LA3	←→ LA3	←→ LA3			→ Bypass	
LA COM3	←→ LA COM3	←→ LA COM3			→ Bypass	
MU4	←→ MU4	←→ MU4				→ Makeup
MU COM4	←→ MU COM4	←→ MU COM4				→ Makeup
LA4	←→ LA4	←→ LA4				→ Bypass
LA COM4	←→ LA COM4	←→ LA COM4				→ Bypass

**Wiring and plumbing connections:** Refer to **Table 4** and **Configuration 4A** schematic at the end of this manual.

**Table 4**



# installation

## Configuration 4B—Six to Thirteen WaterGard Units - Multiple LLCs

Table 5 shows three LLC units and nine WaterGard units.

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	Expansion Relay Box 1	Expansion Relay Box 2	Expansion Relay Box 3	WG 6 Terminal	WG 7 Terminal
Double end arrow indicates the connection between the two terminal blocks												
LA COIL								LA COIL				
2A								2A				
MU COIL								MU COIL				
2A								2A				
	LA COIL								LA COIL			
	2A								2A			
	MU COIL								MU COIL			
	2A								2A			
		LA COIL								LA COIL		
		2A								2A		
		MU COIL								MU COIL		
		2A								2A		
MU1	↔ MU1	↔ MU1	↔ Makeup									
MU COM1	↔ MU COM1	↔ MU COM1	↔ Makeup									
LA1	↔ LA1	↔ LA1	↔ Bypass									
LA COM1	↔ LA COM1	↔ LA COM1	↔ Bypass									
MU2	↔ MU2	↔ MU2	↔ Makeup									
MU COM2	↔ MU COM2	↔ MU COM2	↔ Makeup									
LA2	↔ LA2	↔ LA2	↔ Bypass									
LA COM2	↔ LA COM2	↔ LA COM2	↔ Bypass									
MU3	↔ MU3	↔ MU3				↔ Makeup						
MU COM3	↔ MU COM3	↔ MU COM3				↔ Makeup						
LA3	↔ LA3	↔ LA3				↔ Bypass						
LA COM3	↔ LA COM3	↔ LA COM3				↔ Bypass						
MU4	↔ MU4	↔ MU4				↔ Makeup						
MU COM4	↔ MU COM4	↔ MU COM4				↔ Makeup						
LA4	↔ LA4	↔ LA4				↔ Bypass						
LA COM4	↔ LA COM4	↔ LA COM4				↔ Bypass						
MU5	↔ MU5	↔ MU5					↔ Makeup					
MU COM5	↔ MU COM5	↔ MU COM5					↔ Makeup					
LA5	↔ LA5	↔ LA5					↔ Bypass					
LA COM5	↔ LA COM5	↔ LA COM5					↔ Bypass					
								MUX1	↔ MUX1	↔ MUX1	↔ Makeup	
								MU COMX1	↔ MU COMX1	↔ MU COMX1	↔ Makeup	
								LAX1	↔ LAX1	↔ LAX1	↔ Bypass	
								LA COMX1	↔ LA COMX1	↔ LA COMX1	↔ Bypass	
								MUX4	↔ MUX4	↔ MUX4		↔ Makeup
								MU COMX4	↔ MU COMX4	↔ MU COMX4		↔ Makeup
								LAX4	↔ LAX4	↔ LAX4		↔ Bypass
								LA COMX4	↔ LA COMX4	↔ LA COMX4		↔ Bypass

Wiring and plumbing connections: Refer to Table 5 and Configuration 4B schematic at the end of this manual.

Table 5

---

# installation

---

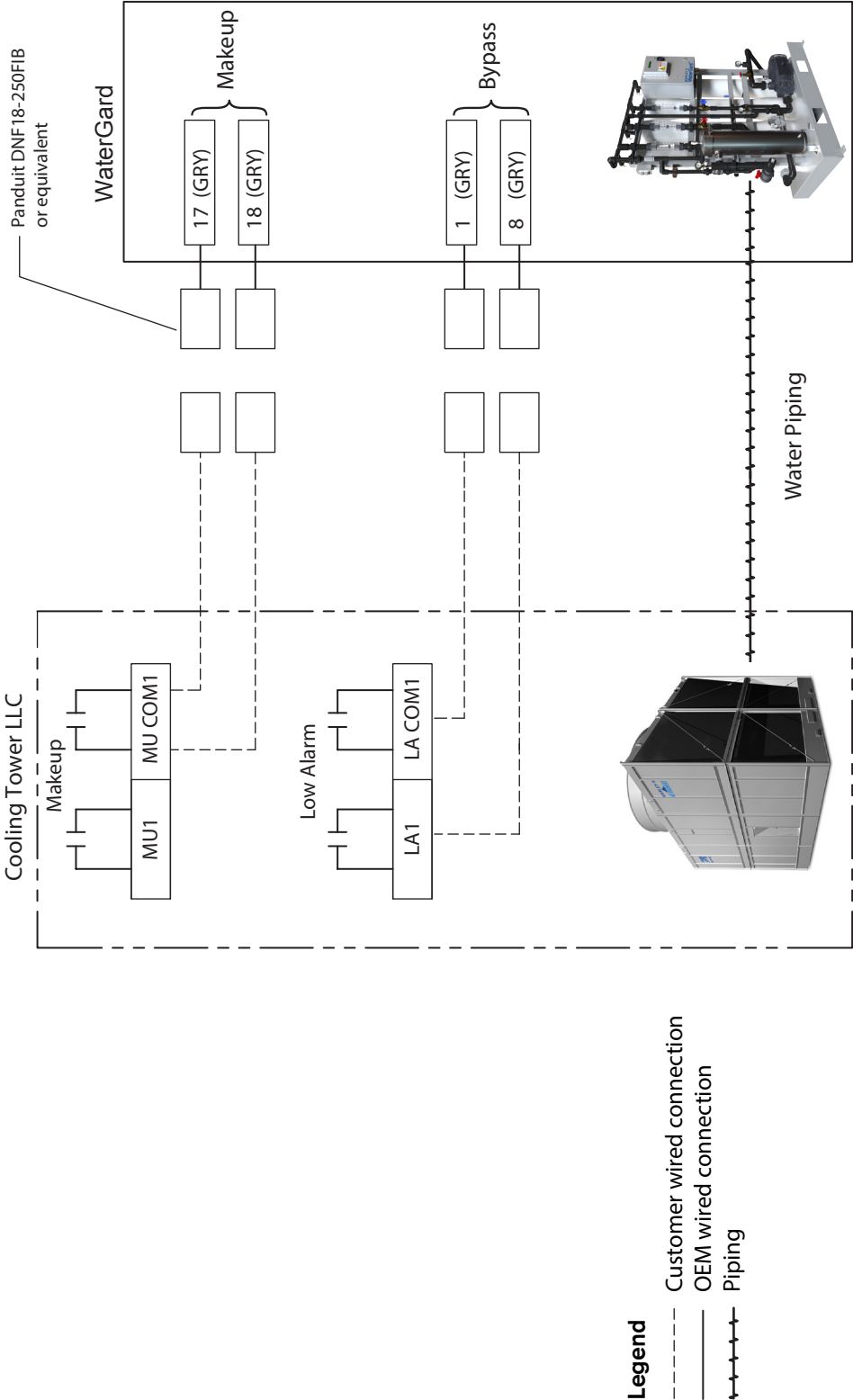
## Troubleshooting

LLC+u controls are factory tested 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 controls require field programming. Refer to the programming instructions in this manual.
- Check the HAND-OFF-AUTO 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 operation. Always refer to the as-built wiring diagram on the inside of the 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-OFF-AUTO 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. The basin makeup solenoid is internal on the WaterGard unit.



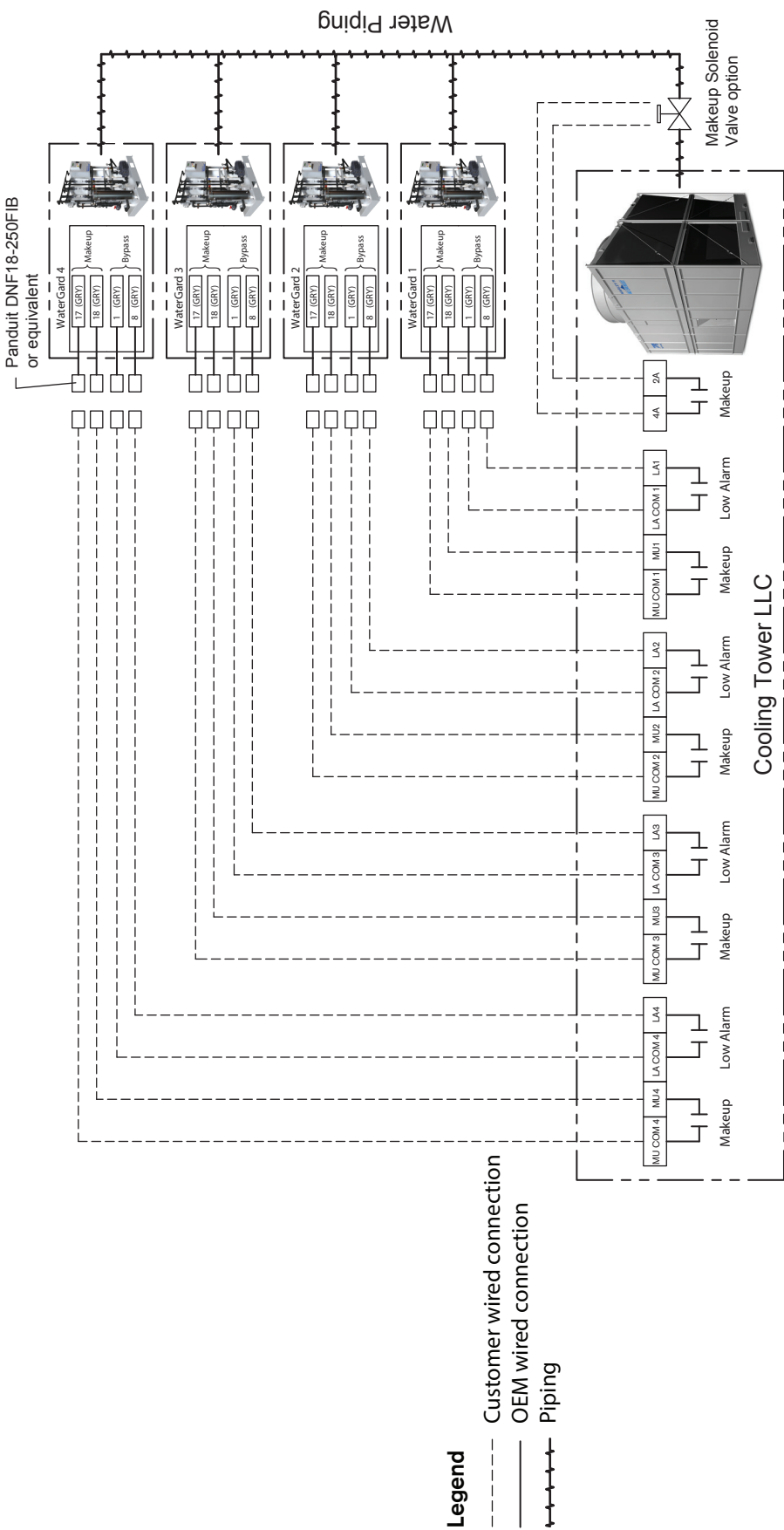
**Note**

- 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 Five WaterGuard units

Makeup and 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 WaterGuard unit.  
An optional basin water makeup solenoid valve may be included.

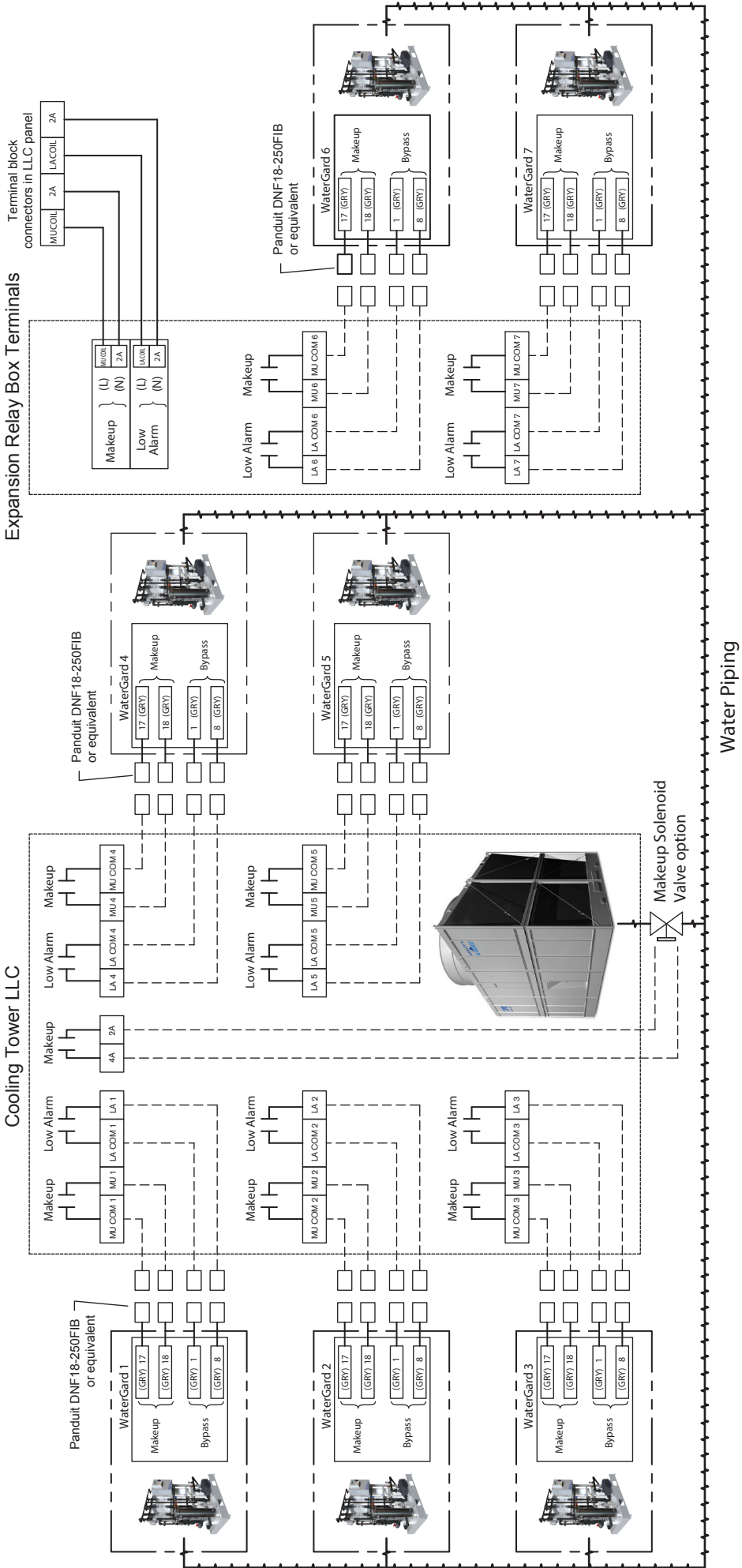


**Note**

- 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 2B** — Single Cooling Tower LLC — Six to Thirteen WaterGard units with Expansion Relay

Makeup and Low Alarm signal wires from dry contacts in one LLC unit to dry contacts in the next LLC unit. Only two pairs of wire (four wires in total) connect to the WaterGard unit. An optional basin water makeup solenoid valve may be included.

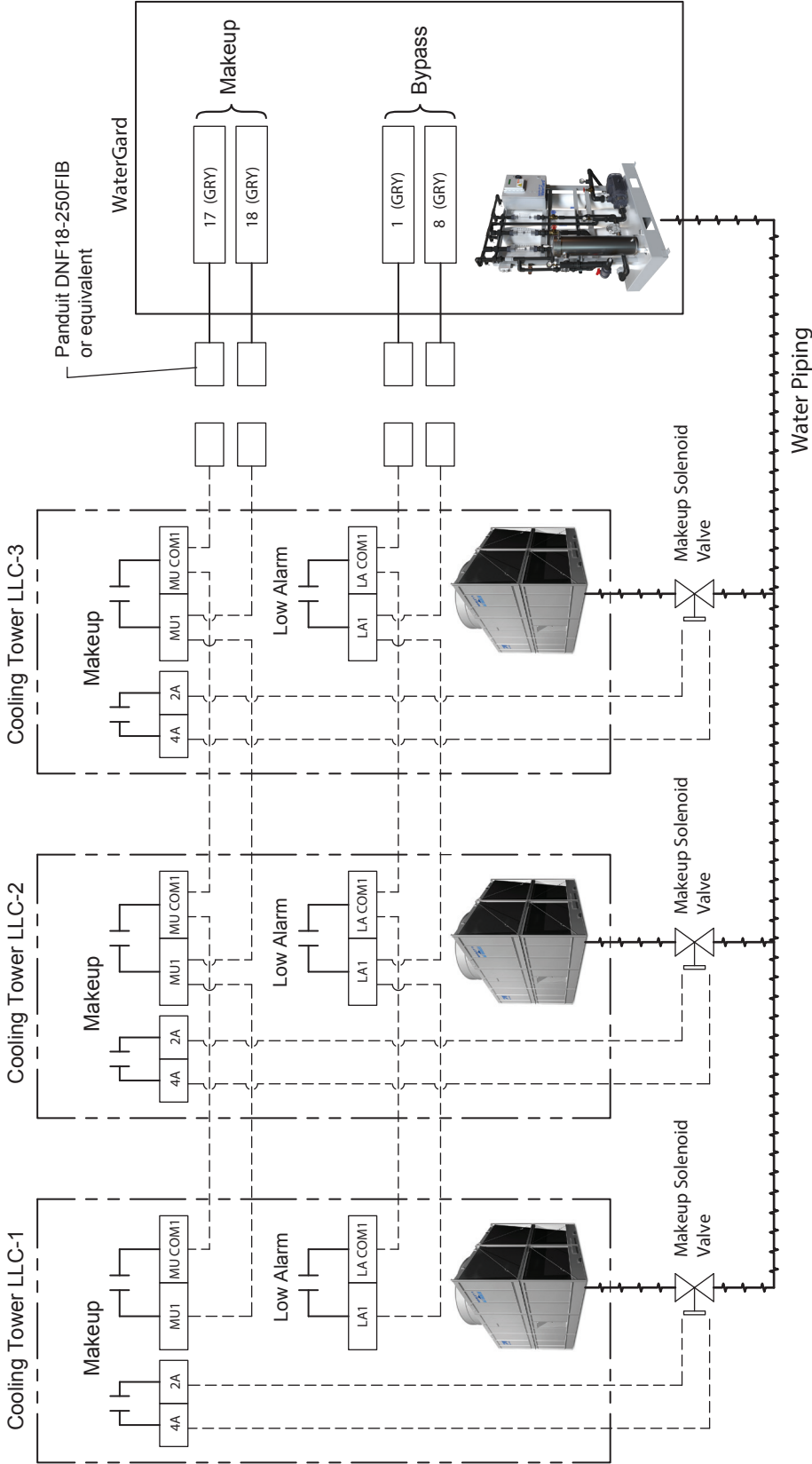


**Legend**

**Note**

**Configuration 3** – Multiple Cooling Tower LLC units – Single WaterGard unit

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



**Legend**

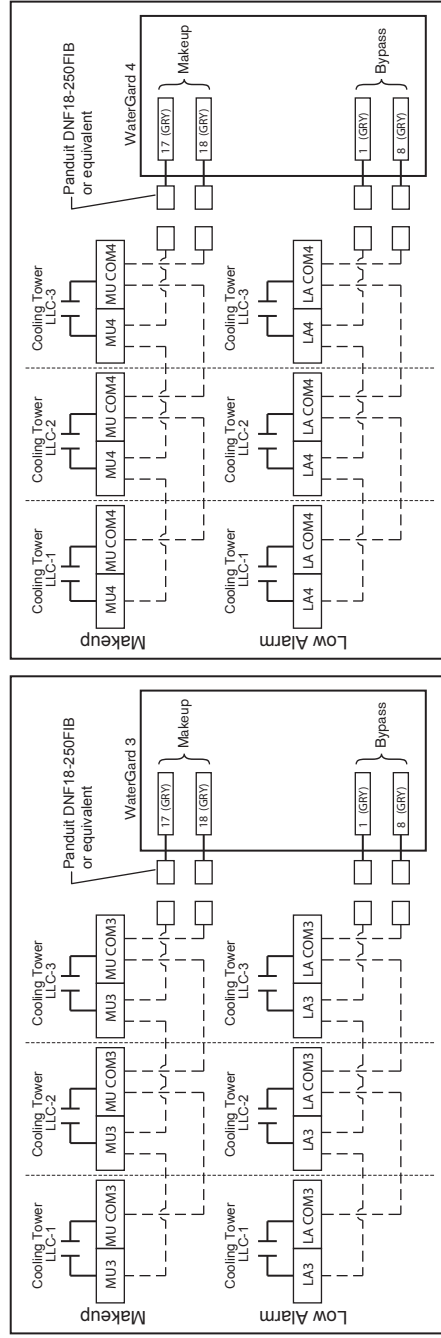
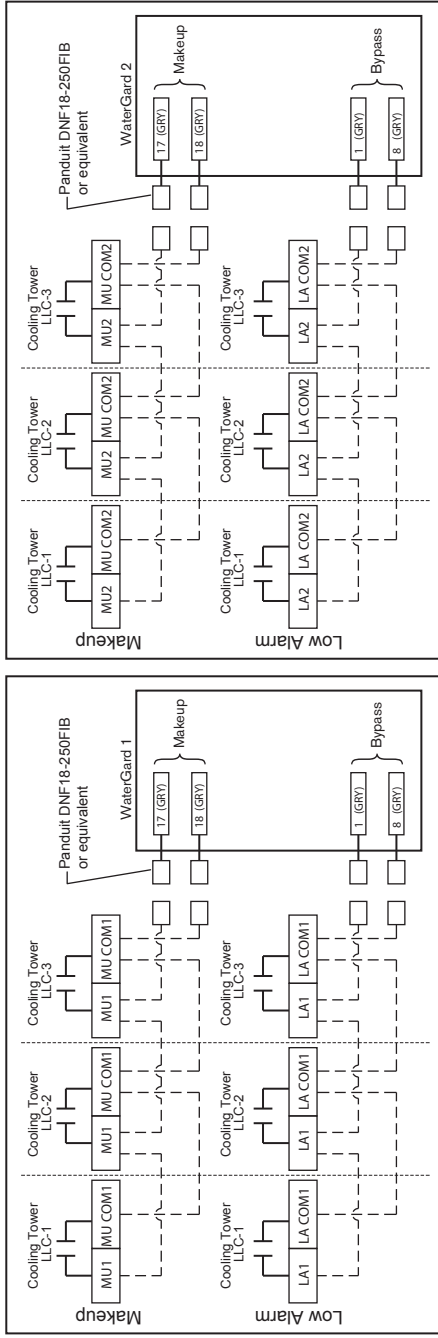
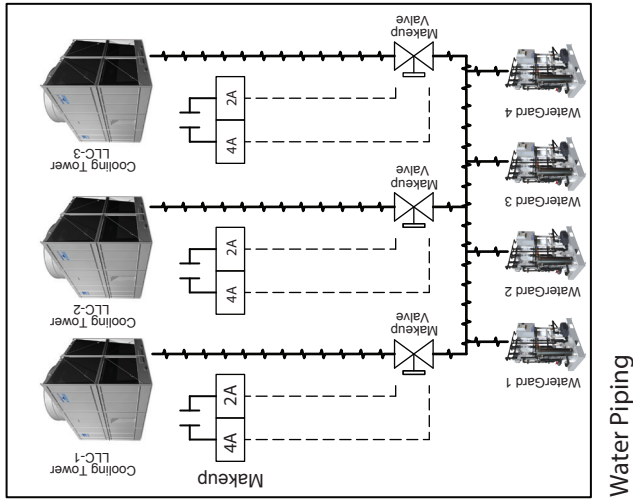
- Customer wired connection
- OEM wired connection
- Piping

**Note**

- 1 A water makeup valve is required 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 Five WaterGard units

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



### Electrical Wiring

#### Legend

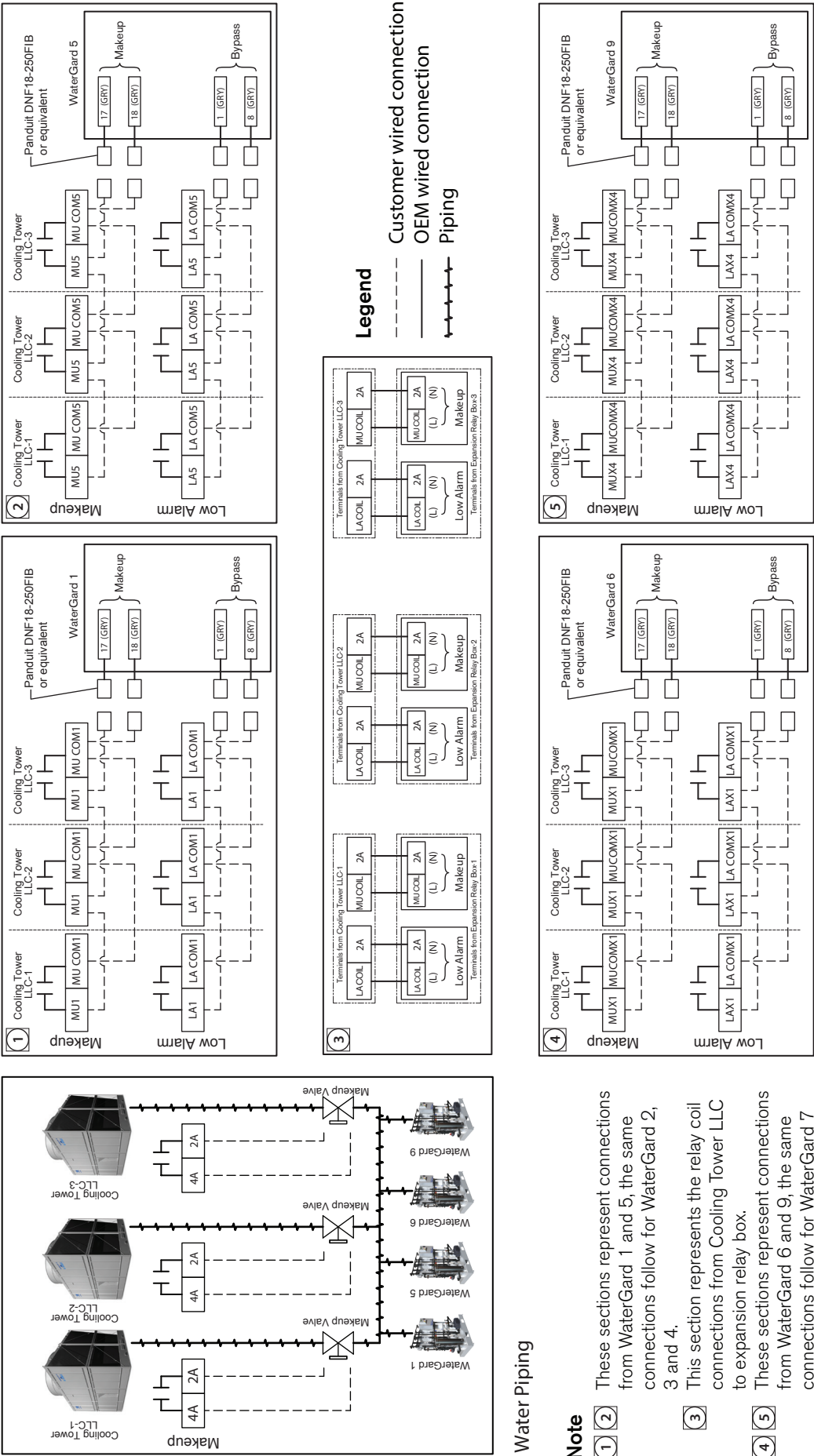
- Customer wired connection
- OEM wired connection
- +++++ Piping

#### Note

- 1 A water makeup valve is required 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 - Six to Thirteen WaterGard units

Makeup and Low Alarm signal wires are daisy chained in parallel from dry contacts in one LLC unit to dry contacts in the next LLC unit. 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.



**Note**

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

**Note**

- 1 A water makeup valve is required 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.



# WaterGard - LLC+u water level control

USER MANUAL

---

## SPX COOLING TECH, LLC

7401 WEST 129 STREET  
OVERLAND PARK, KS 66213 USA  
913 664 7400 | [spxcooling@spx.com](mailto:spxcooling@spx.com)  
[spxcooling.com](http://spxcooling.com)

10000022849\_A | ISSUED 11/2024

©2023-2024 SPX COOLING TECH, LLC | ALL RIGHTS RESERVED

In the interest of technological progress, all products are subject to design and/or material change without notice.

