

Multi-Control Installation Manual P/N 1604009 Rev B (ECN 32745)



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General Safety Instructions for Controls

WARNING

Personal Safety: Through out this manual and on all safety signs, the precautionary statements ("DANGER", "WARNING", "CAUTION" and "NOTICE") can be found, followed by a hazard description and preventative actions to be taken. These precautions are intended for the personal safety of the operator and those within the vicinity of the machinery. Please take time to read these precautions.

	Hazard Severity Panels					
Background Color of Panel	Contrast Color	Meaning/Use	Hazard Severity Panel Illustration			
Red	White	Indicates a hazardous situation, that, if not avoided, will result in death or serious injury.				
Orange	Black	Indicates a hazardous situation, that, if not avoided, could result in death or serious injury.				
Yellow	Black	Indicates a hazardous situation, that, if not avoided, could result in minor or moderate injury.				
Blue	White	Indicates information considered important, but not hazard- related (e.g. messages relating to property damage).	NOTICE			

NOTICE

Machine Integrity: Additional precautionary statements ("**ATTENTION**" and "**IMPORTANT**") are intended for machine integrity and are followed by specific instructions.

ATTENTION: The word **"ATTENTION"** is used to warn the operator of potential machine damage if a certain procedure is not followed.

IMPORTANT: The word **"IMPORTANT"** is used to provide the reader with information necessary to prevent minor machine damage if a certain procedure is not followed.





WARNING

Lock Out/Tag Out: Disconnect all sources of energy and lock out machine before doing any maintenance or repairs to the machine. Proper Lock Out procedures will prevent the energy source from starting the machine or allowing parts to move unexpectedly as well as prevent the machinery from being accidentally turned on or restarted. Shut off and Lock Out all sources of potential or kinetic energy. These may include, but are not limited to, electrical, mechanical or hydro energy sources.

Lock Out is a procedure used for placing an actual locking device on the power source, preventing unexpected start up or accidental release of energy. Lock Out is the preferred method of accident prevention.

Tag Out procedure is used when the power can not be disconnected. Tag Out's do not shut down the power source, Tag Out's only provide a warning about the danger of activating the machine.

Never try to operate machinery that is locked out or tagged out. Never attempt to remove these locks or tags on machinery. Doing so will result in injury to personnel working on the machine. Only the initiator of the Lock Out or Tag Out procedure may remove locks and tags.

WARNING Main Discon

Main Disconnect: The main power disconnect is located at the main service breaker or generator. The disconnect at the panel is not the main disconnect. A fuseable service disconnect device must be placed previous to this panel with the fuses sized for the load being supplied and installed in accordance to NEC codes.

It is important to understand the differences between the Pivot Enable switch (if installed), High Voltage On/Off switch and the service breaker On/Off throw switch.

The power company service disconnect provides the ability to turn off or return full service to the equipment from the power company service line. This switch must be turned off and locked out when performing maintenance and repairs on the system.

The High Voltage On/Off provides the ability to turn off or return power to the equipment from the service disconnect. This switch must be turned off and locked out in conjunction with the service disconnect switch. The High Voltage switch only disconnects the power in the control panel, as energy is still coming in from the main power line.

The Pivot Enable switch (if installed) provides power to the system controls. When enabled, the entire system and the controls will power up. When turned off, the controls and system will not be energized. However, there will be power in the panel circuitry. The Pivot Enable switch is **NOT** a disconnect and should not be treated as such.



WARNING

Training: All individuals involved in the installation, operation or maintenance of this equipment must receive and understand training in the safe and proper methods of performing all duties assigned to them at the time of the initial assignment and at least annually thereafter. Safety messages and appropriate response procedures to emergencies or other situations which may arise should be fully understood.

response procedures to emergencies of other situations which may arise should be fully understood.

WARNING Follow Safety Instructions: Carefully read all safety messages in this manual and safety signs on the machinery. Keep safety signs in legible condition. Replace any missing or damaged safety signs.

Learn how to operate the machine and controls properly. Do not allow anyone to operate the machinery without proper instructions.

Keep the machine in proper working condition. Only have the machine serviced by a trained service technician on a routine basis. Unauthorized modifications to the machine may impair the function and/or safety and reduce the life of the machine.

CAUTION Practice Safe Maintenance: Understand maintenance procedures before doing work.



Always follow proper Lock Out/Tag Out procedures before performing any maintenance.

Never lubricate or service machine while it is moving. Keep hands, feet and loose clothing from power-driven parts. Disengage all power and operator controls to relieve pressure. Allow all heat-generating units to cool.

Keep all parts in good condition. Remove any build up of grease, oil and debris. Ensure that all parts have been properly installed by a certified technician.

Tower alignment, pressure switch adjustment and tower control switch adjustment must be performed by a qualified service technician.

WARNING Electric Shock: Follow these precautions to prevent serious injury or death.

DO NOT allow moisture to enter the main panel. Moisture can allow voltage to conduct across surfaces, creating a shock potential.

Dangerous voltage potential may be present at lightning arrester. Visually inspect arrester before each operation. If lightning arrester shows signs of impairment, contact a Lindsay Dealer.

WARNING Electrical Connections: Keep all sparks and flames away from battery, as gases given off by electrolyte are explosive. Avoid sparks by connecting the ground cable last and disconnecting it first.



WARNING

Inspecting the System Prior to Operation: Always inspect the system before operation. If the system appears impaired, do not operate the machinery and contact a Lindsay Dealer.

CAUTION Area Lighting: The owner shall provide area lighting as may be required.

Repairing the System: In the event that the Zimmatic System needs to be repaired; disconnect the power source, depressurize the system and contact the Lindsay Dealer.

Only a Lindsay Dealer should make necessary repairs to the system.

Ensure that only Genuine Lindsay Parts are used on the system.

WARNING Overhead Maintenance: Overhead maintenance should be performed by a Lindsay Dealer.

Never attempt to climb on an irrigation machine for any reason.

WARNING

Lifting Components: Extreme care is needed for lifting components during installation/ assembly. Only a Lindsay Dealer using the proper lifting equipment may perform this task.

Use caution when lifting heavy objects. Components weighing in excess of 50 lbs. (22.7 kg.) must be lifted with the assistance of another individual or mechanical lifting device.

Do not work or stand under system or components during assembly. Due to the weights involved, severe injury or death can result if components should fall.

WARNING

Dismantling the System: If it is ever necessary to dismantle a Zimmatic System, extreme care must be taken. As with installation and assembly, dismantling must only be performed by a Lindsay Dealer.

Impaired Safety Protection: Do not attempt to operate if protection may be impaired. If the equipment appears to have been changed or operates abnormally, protective devices may be impaired. Do not attempt to operate and have the equipment serviced by a Lindsay Dealer.





WARNING: Do not use this product in a manner not specified in this manual.

The following symbols indicate grounding connections that can be found on irrigation systems.



CAUTION Prepare for Emergencies; Be prepared for any emergency that may occur.

Always wear appropriate Personal Protective Equipment (PPE).

Keep emergency numbers for doctors, hospital, ambulance service and fire department near your telephone.





Section 1- Specifications and Compliance

Requirements for Electrical Service

All electrical equipment shall be installed by a qualified electrician. As a result, a correct installation will allow the irrigation system to protect itself from overloads and ground faults with minimal downtime, or possible damage and hazards.

Refer to ANSI, ASAE Standard S397.2 (latest revision) Electrical Service and Equipment for Irrigation for exact requirements.

Compliance Standards

Federal Communications Commission (FCC) Statement

NOTE: This equipment has been tested and found to comply within the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and radiates radio frequency energy and, if not used in accordance with the manufacturer's instruction manual, may cause harmful interference with radio communications.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- 1. This device may not cause harmful interference.
- 2. This device must accept any interference received, including interference that may cause undesired operation.

These limits are designed to provide reasonable protection against harmful interference. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference with radio or television reception, which can be determined by turning the equipment on and off, try to correct the interference by one or more of the following measures:

- Reorient or relocate the antenna of the radio/television receiver.
- Increase the separation between this equipment and the radio/television receiver.
- Plug the equipment into a different outlet so that the equipment and the radio/television receiver are on different power main branch circuits.
- Consult a representative of Lindsay Corporation for additional suggestions.

Industry Canada Compliance Statement

This Class B digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numerique de la Classe B respecte toutes les exigences du Relement sur le Materiel Brouilleur du Canada.

WEEE Statement

Lindsay Manufacturing, LLC products: D012-007-20 MC Panel; D012-007-11 MC Panel, 2.4 GHz; D012-007-14 MC Expansion Panel; D012-007-22 WS Panel and D012-007-13 WS Panel, 2.4 GHz are sold and distributed in the European Union only by:

Lindsay Europe SAS L'Epinglerie 72 300 La Chapelle d'Aligne France Phone: 33 (0)2 43480205



The WEEE directive places an obligation on all EU-based manufacturers and importers to take back electronic products at the end of the useful life. Lindsay accepts its responsibility to finance the cost of treatment and recovery of redundant WEEE in accordance with the specific WEEE recycling requirements.

The "Do not use regular disposal containers" symbol (shown below) is placed on MC Panels, MC Expansion Panels and WS Panels indicating this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste electrical and electronic equipment by handing it over to an approved re-processor, or by returning it to Lindsay for reprocessing. More information about waste equipment recycling locations is available at local City Government Offices or by contacting Lindsay Europe SAS.

Contact Lindsay Europe SAS with any questions or assistance with returning MC Panels, MC Expansion Panels or WS Panels.

Product Specifications

Regulatory Compliance Standards

United States & Canada UL 61010-1 FCC Part 15

2006/95/EC-LVD

- IEC/EN 61010-1
- IEC/EN 60529: 1991+A1:2000

2004/108/EC-EMCD

- EN 61326-1
- CISPR 22 Class A

1995/5/EC-RTTE

- ETSI EN 301 489-1 V1.8.1 (2008-04)
- ETSI EN 301 489-17 V1.3.2 (2008-04)

2012/19/EU-WEEE

C-TICK

• AS/NZS 3820:2009





Technical Specifications

Multi-Control (MC) Panel

Communication Specifications	3
Radio	900 MHz Digi XBee-PRO® 900 FCC ID: MCQ-XB900HP IC: 1846A-XB900HP 2.4 GHz Digi XBee® DigiMesh® 2.4 FCC ID: OUR-XBEEPRO IC: 4214A-XBEEPRO
Protocol	Proprietary
Operation Frequency (MHz)	900 MHz / 2.4 GHz
Antenna Connector	N-Type Female
General Specifications	
Power Requirement	120/230 ~ 60/50-60 Hz 1.5/0.75 Amps
Input / Output Specifications	
I/O BUS	8 pin Molex mini-fit, 1000 ft / 304.8 m
USB	USB Host Port : Type A / Female
Non-Latching Valve Controls Outputs 1-10 (J1-J5)	24 \sim / 0.5A 50/60 Hz or a total sum output load of 60VA between all outputs
Analog Inputs (J6-J8)	0-6
Digital Inputs (J9-J10)	Dry Contact Closue (Open Circuit Voltage is 5)
Insulation	All Input and Output devices shall have a minimum basic insulation
Antenna Connector	Connector Type: N-Type Female Impedance: 50 Ohms Material (body): Nickel Plated Brass
Mechanical Specifications	
Material	Polycarbonate
Weight	22 lbs / 10 Kg
Dimensions	16 in (H) x 14 in (W) x 8 in (D) / 41 cm (H) x 35.5 cm (W) x 20.5 cm (D)
Mounting	Mounting Flange Kit
Environmental Specifications	
Temperature Range	Operating: -0T 40 Storage: -40T 75
Altitude	2000 meters
IP Rating	IP44
Pollutions Degree	1 with cover closed



Expansion Panel

General Specifications	
Power Requirement	120/230 ~ 60/50-60 Hz 1.5/0.75 Amps
Input / Output Specifications	
BUS	6 pin Molex mini-fit, 1000 ft / 304.8 m
USB	USB Host Port : Type A / Female
Non-Latching Valve Controls Outputs 1-10 (J1-J5)	24 \sim / 0.5A 50/60 Hz or a total sum output load of 60VA between all outputs
Analog Inputs (J6-J8)	0-6 V
Digital Inputs (J9-J10)	Dry Contact Closue (Open Circuit Voltage is 5V)
Insulation	All Input and Output devices shall have a minimum basic insulation
Mechanical Specifications	
Material	Polycarbonate
Weight	22 lbs / 10 Kg
Dimensions	16 in (H) x 14 in (W) x 8 in (D) / 41 cm (H) x 35.5 cm (W) x 20.5 cm (D)
Mounting	Mounting Flange Kit
Environmental Specifications	
Temperature Range	Operating: -0T 40 Storage: -40T 75
Altitude	2000 meters
IP Rating	IP44
Pollutions Degree	1 with cover closed



Wireless Switch (WS)

Communication Specifications	Communication Specifications				
Radio	900 MHz Digi XBee-PRO® 900 FCC ID: MCQ-XB900HP IC: 1846A-XB900HP 2.4 GHz Digi XBee® DigiMesh® 2.4 FCC ID: OUR-XBEEPRO IC: 4214A-XBEEPRO				
Protocol	Proprietary				
Operation Frequency (MHz)	900 MHz / 2.4 GHz				
Antenna Connector	N-Type Female				
General Specifications					
Power Requirement	3.3 1A				
Battery	Lithium Iron Phosphate (LiFePPO4), 3.2V, 10.2 Watt hours				
Input / Output Specifications					
Latching Valve Controls Outputs 1-4	Polarized Momentary (Minimum Valve Resistance of 4Ω) Maximum Voltage of 15 Maximum Current of 3.75 Amps				
Insulation	All Output devices shall have a minimum basic insulation				
Antenna Connector	Connector Type: N-Type Female Impedance: 50 Ohms Material (body): Nickel Plated Brass				
Mechanical Specifications					
Material	Polycarbonate				
Weight	5.1 lbs / 2.3 Kg				
Dimensions	10 in (H) x 8 in (W) x 5 in (D) / 25.4 cm (H) x 20.3 cm (W) x 10.2 cm (D)				
Mounting	Mounting Flange				
Environmental Specifications					
Temperature Range	Operating: -0T 40 Storage: -40T 75				
Altitude	2000 meters				
IP Rating	IP44				
Pollutions Degree	1 with cover closed				



Panels & Panel ID Locations

Micro-Controller Panel





Expansion Panel





Wireless Switch









Service

For locations of the nearest Lindsay Dealer, visit www.zimmatic.com or write:

Service Department Lindsay Manufacturing, LLC 214 East Second Street Lindsay, NE, USA 68644

Zimmatic Customer Service call: (800) 829-5300 (LAN lines require a local country code)

FieldNET Customer Service: 866-MYFIELD (866-693-4353) (local country codes may apply) or email fieldnet@lindsay.com





Section 2 - Introduction

This manual covers installation of the GrowSmart Multi-Control (MC) as well as component information specific to the MC Panel, Expansion Panel and Wireless Switch. System Troubleshooting, Alert definitions and worksheets for noting custom system settings are provided in later sections.

What is Multi-Control (MC)

The microprocessor based GrowSmart Multi-Control (referred to as MC for short) provides the latest technologies in combining distribution network management with control of major components used throughout a micro-irrigation application.

Using both wired and wireless networking, the controller communicates output controls and zone irrigation scheduling. Integrating these components provides the benefits of efficient water and chemical delivery, sensor monitoring, temperature protection, and system awareness.

The Micro-Control allows for establishing multiple irrigation plans and remote control through FieldNET (Lindsay's integrated irrigation management platform, available on the web or on Apple iOS and Google Andriod mobile devices).

A typical Micro-Irrigation System is made up of the following components. The GrowSmart Micro-Control is capable of monitoring all of these system functions.

Typical System layout

- Head System
 - Multi-Control
 - Water Supply
 - System Flow Meter
 - System Pressure Sensor
 - Chemical Injection System
 - Injector Flow Meter
 - Filtration System
 - Post-Filter Pressure Sensor
- Distribution Network
 - Pipes
 - Pipe Fittings
 - Sprinklers and Valves





Multi Control (MC) Panel

The Multi-Control Panel (or MC panel for short) houses all the I/O, cellular or radio communications and powersupply and controllers. It is the core component to the MC system. The following is an explanation of the MC key components.

Key components to the Multi-Control Panel:

- Controller
- System I/O Board
- RTU



Controller

The Controller is an enclosed subassembly attached to the back of the MC Panel inner door, providing the indicators for the MC Status Center.

The Controller monitors and controls the various components and systems through wired and wireless networks.

The Controller manages a wired network for communication with the System I/O Board and Auxiliary I/O Boards.

The Controller manages a Point-to-Multipoint wireless radio network for communication with Wireless Switches. As with most radio networks, it is important Wireless Switch are installed with good line-of-sight and clear of heavy vegetation or buildings.



The following list details the components and which networks they can connect to.

Component	System I/O Board	Auxiliary I/O Board	Wireless Switch
Water Source	\checkmark	\checkmark	
System Pressure	\checkmark		
System Flow	\checkmark		
Injector	\checkmark	\checkmark	
Injector Flow	\checkmark		
Filter Flush Valves	\checkmark	\checkmark	
Post-Filter Pressure	\checkmark		
Temperature Sensor	\checkmark		
pH Sensor	\checkmark		
Rainfall Sensor	\checkmark		
Zone Valves	\checkmark	\checkmark	\checkmark

When opening the inner door, the side of the Controller has LED indicators that display the current state of the Controller functions and features.

	Name	Color	Description
MULTI-CONTROL	POWER	Green	Power is present to Controller.
		- Yellow	Power is Low or High (Warning).
CHANNEL		Red	Power is Below Operating Range (Shutdown).
	FAULT	• OFF	No Warning or Fault.
POWER 4		- Yellow	Warning Exists.
FAULT A			Warning Exists with flashing Warning Code.
\bigcirc		Red	Shutdown Exists.
I/O BUS LINK			Shutdown Exists with flashing Fault Code.
RADIO LINK 🔶	I/O BUS LINK	Green	All Modules on I/O Bus Communicating.
NETWORK		Yellow	One or more Modules on I/O Bus had recent error (Warning).
		Red	One or more Modules on I/O Bus lost communication (Shut- down).
PDE-0144			



Name	Color	Description
RADIO LINK	Green	All Radio links are good.
	- Yellow	One or more Radios has poor signal strength (Warning).
	Red	One or more Radios has lost communication (Shutdown).
NETWORK	Green	Radio Network is asleep.
		Data Communication on Radio Network.
USB	• OFF	USB Flash Drive not connected.
	Green	Action Complete - USB Flash Drive can be removed.
		Action Processing - DO NOT REMOVE USB Flash Drive.
	Red	Action Failed - USB Flash Drive can be removed.
		Action Invalid - USB Flash Drive can be removed.

A portable USB Flash Drive is used to upload firmware upgrades and manual system configurations. It is recommended to have a designated USB Flash Drive with a minimum of 8 MB available.

If the Controller has detected a Warning or Fault, the Status indicator on the Status Center tuns yellow or red and Warning and Fault flash codes are displayed through a series of turning the FAULT indicator on and off. If there are only Warnings, the indicator will flash yellow. If any Faults exist, the indicator will flash red, even for any flash codes that are warnings.

Refer to the "Controller Fault Flash Codes" later in this manual for the Warning and Fault flash codes.

The start of a flash code is indicated with a solid yellow or red for 10 seconds.

Flash codes are broken down into segments for the number of digits in the number. Segments are separatedy by a 3 second pause. Each segment will flash the value of each segment digit except for zero, which flashes 10 times (E.g. 1=1 flash, 5=5 flashes, 0=10 flashes).

For example, a flash code of 106 will be broken down into 3 segments with each segment flashing the value of the digit:

- 10 second solid light
- 1 flash
- 3 second pause
- 10 flashes
- 3 second pause
- 6 flashes
- 3 second pause

If other Warnings or Faults exist, a 10 second solid light followed by the next flash code would be displayed and would continue for each additional flash code.

The cycle will continue to repeat until the condition has cleared.



System I/O The System I/O Board provides the connectors for the various Head System and Distribution Network components as well as Service Mode based control.





A number of LED indicators display the current state of the System I/O Board functions and features.

NAME	COLOR	DESCRIPTION
POWER	Green	12 power is present to I/O Board.
24 VAC	Green	24 \sim is present on the I/O Board.
LINK	Green	Controller BUS link is up.
SELECT	Green	Select button is pressed.
ON/OFF	Green	On/Off button is pressed.
SERVICE	Green	The system is in Service Mode.
STOP	Green	The system is in Stop Mode.
AUTO	Green	The system is in Auto Mode.
OUTPUT 1 - 10	Green	Output is On.
		1 flash - Open Circuit detected, 2 flashes - Short Circuit detected.
FLOW 1		System Flow Meter present – 1 flash per Flow Meter pulse.
FLOW 2		Injector Flow Meter present – 1 flash per Flow Meter pulse.
PRESSURE 1	Green	System Pressure sensor present.
PRESSURE 2	Green	Post-Filter Pressure sensor present.
TEMP/PH	Green	Temperature or pH sensor present.
USB	- Green	When flashing green, a valid upgrade file on the USB flash drive was found and is updating the I/O Board. DO NOT REMOVE .
		When flashing red, an invalid upgrade file on the USB flash drive was found. The USB flash drive can be removed.
	Green	When green and not flashing, the upgrade is complete and the USB flash drive can be removed.
	Red	When red and not flashing, the upgrade failed and the USB flash drive can be removed.
	OFF	When off, no USB flash drive has been inserted.



The System I/O Board illuminates the SERVICE, STOP, and AUTO indicators based on the mode of operation the Low Volume Irrigation Controller is in. Manual operation is possible when in SERVICE Mode by pressing the SE-LECT switch to cycle through the various controls, as shown below, and pressing the ON/OFF switch to toggle the control state. Holding the switch down will select the next option every three seconds. When selecting a control the indicator will flash.



If the control is currently Off the indicator will flash with a short on time and a long off time when selected. If the control is On the indicator will flash with a long on time and a short off time when selected. The selected indicator will stop flashing and cease to be selected five seconds after both buttons have been released.

RTU

A Remote Telemetry Unit (RTU) is required for linking the MC Panel to FieldNET for remote monitoring, control, and reporting.

The RTU is connected to the Controller.

Contact Lindsay Sales for purchasing a compatible RTU.



Expansion Panel

An Expansion Panel is used to expand the communication capabilities of the MC panel.

The expansion panel consists of:

- An Auxiliary I/O Board
- Power Supply



Auxiliary I/O

The Auxiliary I/O Board provides the connectors for additional Head System and Distribution Network components as well as Service Mode based control.

An Auxiliary I/O Board must be connected to the Controller by daisy-chaining to either the System I/O Board or another Auxiliary I/O Board. Connect the 8-pin cable to the CN12 port on the new Auxiliary I/O Board and connect the other end to the CN13 port of the existing System I/O Board or Auxiliary I/O Board. If no additional Expansion Panels are installed, place the terminator on CN13 of the new Auxiliary I/O Board.

The Auxiliary I/O Board is identical to the System I/O Board with the exception of the Inputs being disabled.



Wireless Switch

The Wireless Switch is a wireless remote, microprocessor based, irrigation Zone controller, providing ease of installation and low power constraints. Each controller is capable of controlling up to four Zone valves.

The Wireless Switch panel houses the controller and a rechargeable battery, which is charged by an external Solar Panel.





The latest version of Wireless Switch I/O board is shown below.





A number of LED indicators display the current state of the Wireless Switch I/O Board functions and features.

NAME	COL	OR	DESCRIPTION					
POWER		Green	Solar power is present					
BATTERY		Green	The battery healt	The battery health is good				
RADIO LINK		Green	The radio link to	Controller is up				
SELECT		Green	Select button is p	pressed				
ON/OFF		Green	On/Off button is p	pressed				
SERVICE	•	Yellow	The system is in	Service Mode				
STOP	0	White	The system is in	Stop Mode				
AUTO		Green	The system is in	Auto Mode				
OUTPUT1-4		Green	Zone Valve is On	1				
	*	Green	1 flash - Open Circuit solenoid detected					
SS1		Green	The radio Signal signal at 1 LED a	Strength is disp and all 5 for exce	layed as a mete ellent signal	r illuminating LEDs 1-5 with	poor	
SS2		Green	Poor		Average	Excellent		
SS3		Green						
SS4		Green						
SS5		Green		•	•	•		
ASSOCIATE	*	Green	When flashing gr	When flashing green, the Wireless Swith is synchronizing with Controller				
USB	*	Green	When flashing gr is updating the I/	een, a valid upg O Board. DO NC	rade file on the DT REMOVE .	JSB flash drive was found a	and	
	*	Red	When flashing red, an invalid upgrade file on the USB flash drive was found. The USB flash drive can be removed.					
		Green	When green and can be removed	When green and not flashing, the upgrade is complete and the USB flash drive can be removed				
		Red	When red and no removed	ot flashing, the u	pgrade failed an	d the USB flash drive can b	е	
		OFF	When off, no US	B flash drive has	s been inserted			



The Wireless Switch illuminates the SERVICE, STOP, and AUTO indicators based on the mode of operation the Multi-Control is in. Manual operation is possible when in SERVICE Mode by pressing the SELECT switch to cycle through the various controls, as shown below, and pressing the ON/OFF switch to toggle the control state. Holding the switch down will select the next option every three seconds. When selecting a control the indicator will flash.

While in STOP or AUTO Mode or the Wireless Switch is unable to communicate with the controller, it is possible to temporarily put the Wireless Switch into SERVICE Mode by waking it up (press the SELECT button) and holding the SELECT and ON/OFF buttons for five seconds. This will put the Wireless Switch into SERVICE Mode until the next communication with the controller.



If the control is currently Off the indicator will flash with a short on time and a long off time when selected. If the control is On the indicator will flash with a long on time and a short off time when selected. The selected indicator will stop flashing and cease to be selected five seconds after both buttons have been released.

Solar Panel



The Wireless Switch battery is charged by 2 Watt Solar Panel.

If the Wireless Switch is put into storage, insulate positive and negative battery terminals to avoid short circuit and ensure sufficient clearance between batteries and other surfaces. Store in a dry, cool (below 30°C and above -10°C) and well ventilated area and avoid fire, heat. Elevated temperatures can result in reduced battery life and venting of flammable liquid and gases. Keep batteries away from strong oxidizers and acids.



Parts List

P/N	Name	Description	
PDE-0143	Decal, MC Compliance	MC compliance decal	
PDE-0149	Decal, Wireless Switch Com- pliance	MC compliance decal	
PDE-0151	Decal, Expansion Panel Compliance	Expansion Panel compliance decal	
D012-007-20	Panel, MC Panel	MC Panel assembly	
D012-007-22	Panel, WS Panel	Wireless Switch Panel assembly	
D012-007-14	Panel, MC Expansion Panel	MC Expansion Panel assembly	
D012-007-25	Radio Kit, MC 900 MHz	900 MHz radio kit	
D012-007-26	Radio Kit, MC 2.4 GHz	2.4 GHz radio kit	
D012-007-15	Kit, RTU DIN Mount	RTU DIN Mount Kit for 2G RTU	
D012-007-09	Kit, Solar Panel	2W Solar Panel Kit	
PAN-0017	Antenna, Omni, 900 MHz	900 MHz, 6dbi Omni Directional Antenna with N Female connector	
PAN-0021	Antenna, Omni, 2.4 GHz	2.4 GHz, 8dbi Omni Directional Antenna with N Female connector	
PCE-0094	Cable, Antenna NM-NM 6'.	6 ft. Antenna Cable, LM400, N Male to N Male	
PCE-0096	Cable, Antenna NM-NM 20'	20 ft. Antenna Cable, LM400, N Male to N Male	
PCE-0097	Cable, Antenna NM-NM 30'	30 ft. Antenna Cable, LM400, N Male to N Male	
PCE-0098	Cable, Expansion Panel, 5'	5 ft. Expansion Panel Bus Cable	
PBT-0010	WS Battery	3.2V, 3200mAh, LFP battery for Wireless Switch	





Section 3 - Installation

Tools and Items Needed for Installation

- Worksheets from the FieldNET Configuration manual (1608738), Section 2.
- Blueprints of the irrigation system layout from the system design engineer.
- USB Flash drive (minimum 8 MB capacity).
- 1/4" UNC x 3" lag screws.
- 2 x 4" boards (for spanning wall studs when mounting panel).
- 1" NPT pipe, 6' long, threaded.
- 1" NPT pipe, 8' long, threaded.
- 3/4" NPT pipe, 3' long, threaded.
- 1" to 3/4" pipe reducer.
- 4 x 1" pipe couplers.
- Drill.
- #8 Drill bit.
- Screwdriver Bits (Flat and Phillips).
- Pipe Wrench.
- Vice Grips.
- Pliers.
- Channel Locks.
- Open end and box end wrenches (various sizes).
- Socket wrench and sockets (various sizes).
- Post driver.
- Hammers (mallet, sledge, ballpeen, claw).
- Shovel.
- Wire strippers (14 to 20 AWG).
- · Hack saw.
- Reciprocating saw.
- Tape measure.
- Flat file.
- Ladder.

Additonal items may be needed, based on the installion site, that are not included here. Before installation, assess what tools will be required for installing the Multi-Control system.



Multi-Control Installation



WARNING!

External Locking Disconnect Device Required: An external disconnect device with locking capability is required for proper Lockout/Tagout procedure. The service disconnect is not equipped with a lock device.

System Overview





MC Panel Installation

Typical installation of the Multi-Control Panel requires it to be mounted to an interrior wall. The panel is rated for outdoor use but requires an exterior wall or very sturdy framework. These instructions also apply to the Expansion Panel mounting.

The flanges on the enclosure have holes installed at the factory. Use these hole locations as a template for mounting the Multi-Control Panel or Expansion Panel.

Typical installaiton uses a pair of $2 \times 4^{\circ}$ boards, spanned across the studs in the wall. The 2×4 is lagged into the studs and the panel is lagged into the 2×4 .

If a cleaner look on and interrior wall is needed, one side of the panel can be lagged into the wall studs. The other side is then held to the wall by using plastic drywall expansion anchors.

Any other mounting method will work as long as:

- 1. The panel will not move or fall from the framework.
- 2. The mounting holes provided and the enclosure itself is not penetrated to accommodate mounting.

Connecting Power

All electrical equipment must be installed by a qualified electrician and must meet all local, state and federal wiring codes.

The MC Panel and Expansion Panels can be run off of 120 \sim 60Hz or 230 \sim 50/60Hz power. The provided power needs to be properly protected with circuit breakers and proper grounding via a ground rod.

Mains power shall be supplied to the panels via a separate service disconnect utilizing a 15A breaker to provide overload protection and allow easy serviceability of the panels. The service disconnect must be suitably located so that no obstructions or equipment block its view or access. The service disconnect must be clearly labeled so that it is easy to identify as the disconnect for the MC and/or Expansion Panels.

The mains wiring and Protective Earth ground wire must be 12 AWG and must comply with UL / IEC electrical codes for outdoor use. When wiring mains into the Multi-Control panels, do not allow more than 14" (35 cm) inside the panel between the terminal block and the conduit threshold. When preparing the wires for installation into the terminal blocks, do not strip back individual wires any further than 5/16" (8 mm). Mains wiring must be secured with zip ties using the provided mounting points immediately below the terminal block.

A selector switch is provided to allow the panel to be powered by either 120V or 230V and must be in the correct position prior to powering panel.

The Multi-Control panel must have a ¼ inch braid ground strap connected from the ground lug on the panel to a copper ground rod or equivalent grounding surface.





Connections to the panel should be based on the schematics and power voltage as shown.



Fuse 1 accepts a 5x20mm fuse (PFU-0016) with a rating of 1.250A (time delay). When using 120 \sim 60Hz, Fuse 2 requires a 5x20mm fuse (PFU-0018) with a rating of 0.800A (time delay). When using 230 \sim 50/60Hz, Fuse 2 requires a 5x20mm fuse (PFU-0017) with a rating of 0.630A (time delay).

Radio Antenna Installation

If Wireless Switches are being installed, a radio antenna will be required, on the controller, for communiction between the switches and controller.

Mounting Radio Antenna

It is recommended to install the antenna at least 20 feet high. Use Unistrut[®] for mounting the antenna to the roof of the building or other nearby structure.

- 1. Attach antenna to provided mounting bracket.
- 2. Attach antenna mounting bracket to the Unistrut[®].
- 3. Attach Unistrut[®] to the building or other structure.
- 4. Connect one end of the antenna cable to the antenna.
- 5. Route the other end of the antenna cable through the antenna fitting on the left side of the MC Panel enclosure.
- 6. Connect the antenna cable to the MC Panel antenna connector.
- 7. Connect the antenna cable from the lightning arrestor to the Controller.





System I/O Connections

The Controller has the following connections for I/O installation:

• One (1) Rainfall Sensor.

The System I/O Board has the following connections for I/O installation:

- Up to ten (10) 24 \sim Solenoids for the Water Source, Filter Flush Valves, Zone Valves, or similar devices not exceeding a total load of 60VA.
- Up to two (2) analog Pressure Sensors.
- Up to two (2) digital Flow Meters.
- One (1) analog Temperature Sensor or pH Sensor.

It is recommended that 14-16 AWG cable be used for all outputs. Multi-conductor cable can help provide a well organized installation. A best practices approach would be to use 4 conductor, 16 gauge stranded plenum cable. Additionally, labeling the cable sheath and individual conductors at both ends of the cable will ease tracing the connections.

All 0-5V or 4-20 mA input wires (J6, J7 and J8) shall be shielded with braid and grounded to the backplate via a P-Clamp. The braid must cover the input wire from the conduit threshold to within 1 inch of its respective connector on the I/O Board. To install please cut the length of braid provided with a scissors to the appropriate length for each input wire. Insert the braid covered wire into the P-Clamp and secure the ground by tightening the nut holding the P-Clamp until contact is made around the entire 360 degree surface of the braid.



Wherever a concentration of outputs or sensor inputs are physically located, another best practice is to create a centralized terminal block for the I/O wiring using quick connect DIN terminal blocks on a DIN rail. This allows for running the harnesses from the terminal block to the MC Panel or Expansion Panels to connect to the various I/O connectors.

All wiring of inputs and outputs must be brought to the panel through conduit and must be connected to the I/O Board using shielded cable. Outputs may be distributed from a junction box installed by a qualified electrician and must meet all local, state and federal wiring codes. A best practice is to route the cables through Liquidtight Flexible Metallic Conduit from centralized terminal blocks to the MC Panel or Expansion Panels.



All inputs must be grounded using a P-Clamp immediately upon entry into the MC Panel or Expansion Panels. Be prepared to write down information about each I/O into the appropriate worksheets to record Input and Output information and how they have been connected.



System I/O Wiring Diagrams

24 \sim Solenoid - I/O Board

24 \sim non-latching Solenoids include Water Source, Zone Valves, Filter Flush Valves, Pressure Sustain Valve, and Injector. They are attached to the OUTPUT 1-10 connectors on the System I/O Board or Auxiliary I/O Board.



Pressure Transducer - I/O Board

Pressure Transducers are for the System Pressure and Post-Filter Pressure readings. They are attached to the PRESSURE 1-2 connectors on the System I/O Board.





Flow Meter - I/O Board

Flow Meters are for the System Flow and Injector Flow readings. They are attached to the FLOW 1-2 connectors on the System I/O Board.



Temperature Sensor - I/O Board

The Temperature Sensor is attached to the TEMP connector on the System I/O Board.



pH Sensor - I/O Board

The pH Sensor is attached to the TEMP connector on the System I/O Board.



Rainfall Sensor - Controller

The Rainfall Sensor or Rain Bucket is attached to the RAINFALL connector on the Controller.



Water Source Connection

The MC system is capable of controlling a Pump Station or a Main Valve control interface as the Water Source. A relay interface may need to be installed in order to remotely control the Water Source. Refer to the "24 \sim Solenoid - I/O Board" wiring diagram on the previous page.

If a Variable Frequency Drive (VFD) is used with a Pump Station, review the VFD manual for wiring and configuration for pump speed and remote control.

NOTE: Connecting the VFD directly to the 24 \sim Output relay can damage the VFD. Another relay that connects to the VFD is required to convert the 24 \sim to the proper VFD voltage and parameters.

NOTE: If a primer or other equipment is required to run in tandem with the Pump Station or Main Valve, additional electrical interfaces may need to be designed and implemented to allow for from the same relay coil for remote control.

- 1. Run a cable from the MC Panel to the pump control relay at the Pump Station or Main Valve control interface.
- 2. Connect cable to the relay coil.
- 3. Connect the relay contacts to the control interface.
- 4. Connect cable to the System I/O Board on an open 24 \sim Output connector (OUT 1 OUT 10).
 - While the Water Source Control can be connected to an Auxiliary I/O Board, best practices suggest to connect it to OUT 1 on the System I/O Board.
- 5. Record Output connection on the appropriate worksheet.



Wiring Injector Control

The MC system is capable of controlling an Injector. A relay interface may need to be installed in order to remotely control the Injector.

- 1. Run a cable from the MC Panel to the Injector relay interface.
- 2. Connect cable to the relay coil.
- 3. Connect the relay contacts to the control interface.
- 4. Connect cable to the System I/O Board on an open 24 \sim Output connector (OUT 1 OUT 10).
 - While the Injector can be connected to an Auxiliary I/O Board, best practices suggest to connect it to OUT 2 on the System I/O Board.
- 5. Record Output connection on the appropriate worksheet.



Filter Flush Valve Connection

The Controller is capable of controlling up to 27 Filter Flush Valves and 1 Pressure Sustain Valve (PSV) during a Filter Flush Cycle, which executes a back flush for the set Backflush Duration for each Filter Flush Valve chronologically after the set Dwell Time. Refer to "24 \sim Solenoid - I/O Board" diagram on the previous pages.

The order of the Filter Flush Cycle is determined by assigning the I/O channel to the corresponding Filter Flush Valve 1-27 within FieldNET. A best practice is to connect each Filter Flush Valve in the order of the desired pattern to a contiguous block of available Output (OUT 1-10) connections on the System I/O Board and Auxiliary I/O Boards.

If a Pressure Sustain Valve is installed, connect it to an available Output (OUT 1-10) before or after the contiguous block of Filter Flush Valves. The Pressure Sustain Valve runs continuously during a Filter Flush Cycle to create back pressure for backflushing the filter.

- 1. Wire the Filter Flush Valve solenoids to a centralized terminal block.
- 2. Wire the Pressure Sustain Valve solenoid to the same terminal block.
- 3. Run cable from the MC Panel or Expansion Panel through Liquidtight Flexible Metallic Conduit to the terminal block.
- 4. Connect the cable conductors to the terminal block and label the conductors and cables.
- 5. Attach the cable conductors to the Output connectors on the System I/O Board or Auxiliary I/O Boards.
- 6. Record each Output connection on the appropriate worksheet.





Wiring Pressure Sensors

The System Pressure Sensor and optional Post-Filter Pressure Sensor are connected to PRESSURE 1 and PRESSURE 2 respectively on the System I/O Board. Refer to "Pressure Transducer - I/O Board" wiring diagram on the previous pages.

The connector pin out is:

- PIN 4: Sensor Pressure V+
- PIN 3: Sensor Pressure return
- PIN 2: Sensor pressure signal
- PIN 1: Chassis GND (shield)

The System Pressure Sensor should be installed before the filtration system and placed in a location that will best represent the available pressure from the Water Source.

- 1. Wire the System Pressure Sensor to a centralized terminal block.
- 2. Run cable from the MC Panel through Liquidtight Flexible Metallic Conduit to the terminal block.
- 3. Connect the cable conductors to the terminal block and label the conductors and cables.
- 4. Attach the cable conductors to the PRESSURE 1 Input connector on the System I/O Board.
- 5. Record sensor details on the appropriate worksheet.

Post-Filter Pressure is used for calculating the Pressure Differential from the System Pressure for determining if a Filter Flush Cycle is needed. The Post-Filter Pressure Sensor should be installed after the filtration system and placed in a location that will best represent the pressure available to the Distribution Network.

- 1. Wire the Post-Filter Pressure Sensor to a centralized terminal block.
- 2. Run cable from the MC Panel through Liquidtight Flexible Metallic Conduit to the terminal block.
- 3. Connect the cable conductors to the terminal block and label the conductors and cables.
- 4. Attach the cable conductors to the PRESSURE 2 Input connector on the System I/O Board.
- 5. Record sensor details on the appropriate worksheet.





Wiring Flow Meters

The System Flow Meter and optional Injector Flow Meter are connected to FLOW 1 and FLOW 2 respectively on the System I/O Board. The Flow Meters use digital pulses to provide the volume of water flowing through the pipeline. Refer to "Flow Meter - I/O Board" wiring diagram on the previous pages.

The connector pin out is:

- PIN 5: Sensor V+
- PIN 4: Unassigned
- PIN 3: Unassigned
- PIN 2: Pulse line
- PIN 1: Chassis GND (shield)

Refer to the Flow Meter manual for determining the K-Factor for recording the volume of water per digital pulse. The System Flow Meter should be installed in a location that will best represent system flow.

- 1. Wire the System Flow Meter harness to a centralized terminal block.
- 2. Run cable from the MC Panel through Liquidtight Flexible Metallic Conduit to the terminal block.
- 3. Connect the cable conductors to the terminal block and label the conductors and cables.
- 4. Attach the cable conductors to the FLOW 1 Input connector on the System I/O Board.
- 5. Record sensor details on the appropriate worksheet.

The Injector Flow Meter should be installed on the Injector pipeline and not the system pipeline.

- 1. Wire the Injector Flow Meter harness to a centralized terminal block.
- 2. Run cable from the MC Panel through Liquidtight Flexible Metallic Conduit to the terminal block.
- 3. Connect the cable conductors to the terminal block and label the conductors and cables.
- 4. Attach the cable conductors to the FLOW 2 Input connector on the System I/O Board.
- 5. Record sensor details on the appropriate worksheet.





Wiring Temperature Sensors

The Controller is capable of monitoring an additional analog Input for temperature. It is connected to the TEMP Input on the System I/O Board, which supports resistive type sensors. Refer to "Temperature Sensor - I/O Board" wiring diagram on the previous pages.

The connector pin out is:

- PIN 4: V+ to Transmitter
- PIN 3: <unused>
- PIN 2: Transmitter Return
- PIN 1: Shield

The Temperature Sensor should be installed in a location that best represents air temperature for the crop and should be follow the suggested placement described in the sensor manual. The Temperature Sensor may be used for automatically starting a Temperature Protection Cycle for cooling for freeze protection.

It is generally considered best practice to keep out of direct sunlight and away from asphalt or concrete. Some sensors may come with a radiation shield to provide more accurate readings.

- 1. Wire the Temperature Sensor to a centralized terminal block.
- 2. Run cable from the MC Panel through Liquidtight Flexible Metallic Conduit to the terminal block.
- 3. Connect the cable conductors to the terminal block and label the conductors and cables.
- 4. Attach the cable conductors to the TEMP Input connector on the System I/O Board.
- 5. Record sensor details on the appropriate worksheet.

Wiring pH Sensors

The Controller is capable of monitoring an additional analog Input for pH balance. It is connected to the TEMP Input on the System I/O Board, which supports resistive type sensors. Refer to "pH Sensor - I/O Board" wiring diagram on the previous pages.

The connector pin out is:

- PIN 4: V+ to Transmitter
- PIN 3: <unused>
- PIN 2: Transmitter Return
- PIN 1: Shield

The pH Sensor should be installed into the pipeline in a location that provides the best representation of system water pH balance.

- 1. Wire the pH Sensor to a centralized terminal block.
- 2. Run cable from the MC Panel through Liquidtight Flexible Metallic Conduit to the terminal block.
- 3. Connect the cable conductors to the terminal block and label the conductors and cables.
- 4. Attach the cable conductors to the TEMP Input connector on the System I/O Board.
- 5. Record sensor details on the appropriate worksheet.



Wiring Rainfall Sensors

The Controller is capable of monitoring a digital Input for accumulating rainfall using a Rain Bucket. Typical Rainfall Sensors use a tilting bucket to generate a dry contact closure representing rainfall at a preset resolution. The Rainfall Sensor is connected directly to the Controller instead of the System I/O Board. Refer to "Rainfall Sensor -Controller" wiring diagram on the previous pages.

The connector pin out is:

- PIN 5: PV Cell Input -
- PIN 4: PV Cell Input +
- PIN 3: Chassis GND (shield)
- PIN 2: Sensor Return
- PIN 1: Sensor Pulse Line

The Rainfall Sensor must be connected using a shielded cable with the drain wire landed on the ground lug on the inner panel door. If installing the optional solar panel for maintaining rainfall sensor operation when the system is powered off, the solar panel must be connected using a shielded cable with the drain wire landed on the ground lug on the inner panel door.

The Rainfall Sensor should be installed in a location that best represents rainfall for the crop and should be follow the suggested placement described in the sensor manual. The Rainfall Sensor may be used for shutting down the system if it reaches the set accumulation within a provided time period.

It is generally considered best practice to install the Rainfall Sensor in open areas twice as far from obstacles as they are high and approximately 2 feet off the ground. Refer to the sensor manual for recommended placement.

- 1. Wire the Rainfall Sensor to a centralized terminal block.
- 2. Run cable from the MC Panel through Liquidtight Flexible Metallic Conduit to the terminal block.
- 3. Connect the cable conductors to the terminal block and label the conductors and cables.
- 4. Attach the cable conductors to the digital Input connector on the Controller.
- 5. Record sensor details on the appropriate worksheet.

Expansion Panel Installation

Follow the same installation instructions as the Mult-Control.



Wireless Switch Installaiton

Antenna Mast Installation

The Wireless Switch, Solar Panel, and Radio Antenna are mounted onto a mast that should be installed within close proximity to the valve vault.

1. Construct the mast by using 1" pipe, 6 to 8 feet in length and threaded at both ends. Drive one pipe into the ground until about 1' remains above ground. Use a level to make sure this pipe is straight. Use a 1" NPT coupler and attach the two pipes together.



- 2. Using a 1" to 3/4" reducer, connect this and a pice of 3/4" pipe (threaded), 3 feet long, to the end of the 1" pipe.
- 3. Assemble the Antenna and mounting bracket to the top of the mast, using the 3/4" u-bolts supplied in the mount bracket kit.



4. Route the antenna cable down the mast and secure the cable with cable ties. Do not secure the last 5 feet of antenna cable.



Enclosure Mounting

The Wireless Switch Panel is attached to the mast approximately 5 feet above the ground.

- 1. Attach two 12" sections of Unistrut® across the backside of the Wireless Switch enclosure (top and bottom).
- 2. Attach the top of the Wireless Switch enclosure to the mast, using a set of 1" Unistrut[®] and pipe clips.
- 3. Attach the bottom of the Wireless Switch enclosure to the mast, using another set of 1" Unistrut[®] and pipe clips.
- 4. Tighten the pipe clips and verify enclosure is securely mounted to the mast.



Solar Panel Mounting

The Solar Panel is attached to the mast above the Wireless Switch enclosure. To maximize the efficiency of the solar charge, it is important to orient the Solar Panel towards the recommended direction and angle per geographical location.

It is a best practice to use a location free from daytime shadows, facing the equator at an angle equal to the latitude plus 10 degrees. Refer to the Solar Panel documentation for recommended direction and angle.

- 1. Attach the Solar Panel to the mast, using a set of 1" Unistrut[®] and pipe clips just above the Wireless Switch enclosure.
- 2. Route and secure the Solar Panel power cable, with cable ties, to a wire fitting on the bottom of the Wireless Switch enclosure.
- 3. Connect a two pin connector to the Solar Panel cable.
- 4. Attach the connector to the Solar Panel.
- 5. Orient and tilt the Solar Panel to the recommended direction and angle.



Wire the Antenna

Route the antenna cable through the antenna connector and connect to the radio board.



Wire the I/O Connections

Zone Valves are connected from the valve vault to the Wireless Switch through 3/4" Liquidtight Flexible Metallic Conduit. It is recommended to use 4 conductor, shielded, with drain, wire cables; routed through the conduit.

- 1. Drill a 1/8" hole in the vault box for securing the ground bar.
- 2. Attach the ground bar to the vault box with the provided screw.
- 3. Drill a 25mm hole in the vault box for attaching the conduit.
- 4. Install conduit and connectors from the Wireless Switch enclosure to the valve vault.
- 5. Route cables through the conduit from the Wireless Switch to the valve vault.
- 6. Install a Deutsch DT06-12p or similar connector on the harness in the vault box.
- 7. Connect the green wires, the shields and the drain wires from the shields to the ground block in the valve vault.
- 8. Connect two pin connectors to the Zone Valve pair wires to the Wireless Switch.
- 9. Connect one of the green wires to the lightning arrestor.
- 10. Connect the wire connections to the Wireless Switch.



Wiring Zone Valve Latching Solenoids

NOTE: It is important that the Zone Valve latching solenoid is initially closed, to assure synchronized control with FieldNET. Verify all solenoids are properly wired and the solenoid plunger and actuator have closed the Zone Valve.

Zone Valve hydraulics will vary, based on the types of valves installed. The hydraulic operation of a typical Zone Valve Latching Solenoid Assembly is shown below:







If setting up the Zone Valves requires removal of continuous duty coil and actuators to use the required latching coil and actuators, the following procedure should be done:

- 1. Disconnect wiring from the existing valve assemblies.
- 2. Disconnect the plastic tubing that connect to the continuous duty assembly.
- 3. Remove the continuous duty solenoid actuator assemblies.
- 4. Install the Zone Valve latching solenoid.
- 5. Install the plastic tubing to allow for valve operation.
- 6. Connect valve wiring to the DT06-12s or similar connector.
- 7. Record sensor details on the appropriate worksheet.

If latching coil and actuators are already installed, the following procedure should be done:

- 1. Connect valve wiring to the DT06-12S or similar connector
- 2. Record sensor details on the appropriate worksheet





Installing a Wireless Switch RF Module

1. Attach the strain relief bracket to the module, as shown. Do not tighten the hex nut.



2. Install the module to the Multi-Control board.





3. Tilt the module in order to slip the bottom of the module strain reilef bracket under the ciruit board. Align th pins on the underside of the module with the headers on the board.



- 4. Insert the pins on the radio into the headers on the board. Make sure not the bend the pins, yet ensure a good connection is made.
- 5. Install the screws into the strain relief bracket.



6. Tighten the module hex nut, as shown.





Connecting Power

The low-powered Wireless Switch runs on 12VDC power supplied from a battery, which is charged by the Solar Panel.

WS panels must have a ¼ inch braid ground strap connected from the ground lug on the panel to the mounting pipe. This connection must be as short as possible.

Connect the Solar Panel to the Wireless Switch by the following process:

- 1. Connect the Solar Panel cable onto the Solar Panel connector on the Wireless Switch.
- 2. Uncover the face of the Solar Panel and verify charge.



WARNING!

Observe Proper Battery Use: Do not expose batteries or cells to extreme temperatures or open flame. Do not disassemble, puncture or crush batteries. Do not overcharge or overdischarge batteries. Do not mix batteries of varying compound types or sizes. Do not connect positive and negative terminals or place batteries on conductive metals.

For further information on battery handling, please refer to K2 MSDS document (K2Q-6-460-0010 Rev B.1).



WARNING!

Ruptured or Leaking Battery Cell Handling: In case of battery cell rupture and before handling leaking batteries, wear a self contained- full face respritory mask, safety goggles, rubber apron and Viton rubber gloves for personal protection agains acid corrosion.





FieldNET Configuration

The following information is required prior to configuring the Micro-Irrigation System for FieldNET: Irrigation System Engineer or Designer specifications.

WRIDs.

•

- RTU WRID -sticker on the RTU.
- I/O Board WRIDs sticker on the board.
- Wireless Switch WRIDs sticker on the controller.
- Completed Filtration System Worksheet.
- Completed Wireless Switch Zones Worksheet.
- GPS locations.
 - Multi-Control.
 - Zone Valves.

After acquiring the above information, the equipment can be added to FieldNET following the processes provided in the Multi-Control FieldNET Configuration Manual (P/N 1608738). Before initial operation, the Multi-Control must set Grower specific settings, notifications and reporting through the FieldNET portal [https://app.myfieldnet.com/].

It is important to have the information provided from the Irrigation System Engineer or Designer for configuration of the system.



Section 4 - Start Up

Pre-Initial Startup Checklist

It is important to check the following mechanical and electrical items after installation and prior to starting the system for the first time.

Worksheets

• Verify worksheets have been completed and are accurate for all components installed. Worksheets are found in the Mutli-Control FieldNET Configuration manual (1608738), Section 2.

Mechanical Checks

- Verify the Multi-Control Panel and any Expansion Panels are securely fastened to the wall.
- Verify all cables have been secured with cable ties, where applicable.
- · Verify all cables and conductors have been labeled.
- Verify the Wireless Switch mast is securely placed into the ground.
- Verify the Wireless Switch Solar Panel is oriented in the proper direction and tilt angle.

Electrical Checks

- Verify the voltage selector switch is in the proper position.
- Verify the External Locking Power Disconnect device, at the main panel, is installed and properly working.
- Verify Multi-Control Panel, Expansion Panels, and Wireless Switches are properly grounded.
- · Verify all antenna cables are connected securely and are watertight.
- Verify the Wireless Switch is in the On position.

Initial Startup

Power Up

Turn the power on at the main panel by the External Locking Disconnect Device.

Configure Wireless Switches

- 1. Insert USB Flash Drive into a computer.
- 2. Create new folder "MC".
- 3. Create new folder "Setup" inside the "MC" folder or remove any previous files if folder already exists.
- 4. Safely eject the USB Flash Drive from computer.
- 5. Insert USB Flash Drive into the MC Controller.
- 6. Verify USB LED illuminates flashing green while saving configurations.
- 7. Verify USB LED illuminates solid green when finishing saving configurations.
- 8. Remove USB Flash Drive from MC Controller.
- 9. Repeat the following process for each WS:
 - Insert USB Flash Drive into WS.
 - If the Wireless Switch is sleeping press the SELECT button to wake up the Wireless Switch.
 - Verify USB LEDs illuminates flashing green while saving configurations.
 - USB UP LED2 and USB GREEN indicators will blink while reading and writing configuration.
 - Verify USB LEDs illuminates solid green when finishing saving configurations.
 - USB UP LED2 and USB GREEN indicators will be solid green after configuration is complete.
 - Remove USB Flash Drive from WS.
- 10. Insert USB Flash Drive into the MC Controller.
- 11. Verify USB LED illuminates flashing green while saving configurations.
- 12. Verify USB LED illuminates solid green when finishing saving configurations.
- 13. Remove USB Flash Drive from MC Controller.



- 14. Verify each WS links to MC Controller (this may take a while).
- 15. Verify MC Controller Radio Link LED illuminates green solid or flashing.
- 16. Verify MC Status Center Alert LED illuminates green solid.
- 17. Remove USB Flash Drive.

Test Wireless Switch

- 1. Put the system into SERVICE Mode by pressing the Operation Mode button on the Status Center until the LED blinks yellow.
- 2. Repeat the following process for each WS:
 - Press the SELECT button to wake up the WS.
 - Verify the WS is in SERVICE Mode.
 - Verify the the ASSOCIATE LED blinks for 3 seconds every 60 seconds.
 - This is the default wakeup interval for the WS and may change if necessary for installation.

Test Wireless Switch Zone Valves

- 1. Verify the water source is turned OFF at the Control Panel to test the electronic functionality of Zone Valves.
- 2. While in SERVICE Mode press the SELECT button on the WS momentarily to choose a Zone Valve.
 - Temporarily put WS into SERVICE Mode by pressing the SELECT and ON/OFF buttons for 3 seconds if in a different mode
- 3. Repeat the following process for each Zone Valve:
 - While in SERVICE Mode press the SELECT button momentarily cycle through Zone Valves and press the ON/OFF button to change the valve state.
 - · Verify hearing the relay and valve solenoid "click".
 - The indicator next to the desired Zone Valve will blink quickly if the valve is currently OFF.
 - The indicator next to the desired Zone Valve will blink slowly if the valve is currently ON.
 - Verify the state of the solenoid actuator with the water source turned OFF.
 - The plunger for a latching solenoid will be extended out when the valve is ON to allow for water flow.
 - Remove the coil from the actuator assemble to visually and physically inspect the coil plunger.
 - If the coil plunger is extended, apply a bit of pressure to move it toward the coil.
 - If the coil does not match the extended state, the wires are reversed between the coil and the WS and will need to be reversed at the WS.
 - Reinstall the coil to the actuator.
 - Press the ON/OFF button on the WS to turn the valve OFF.
 - If the coil is not connected back to the actuator, it may not change state as the assembly works with the magnetic field of the coil, spring pressure of the spool and spring pressure of the actuator plate.
- 4. Repeat the above process with the water source turned ON for each Zone Valve to confirm the system is hydraulically plumbed correctly.
 - Turn several valves on at once and turn one off at a time to prevent pressure spikes on the system.
- 5. Turn the water source OFF.



Test FieldNET Monitoring and Control

- 1. Verify the RTU has been properly installed, powered and linked to FieldNET.
- Follow the installation process provided in the RTU documentation.
- 2. Follow the Initial Startup process provided in the Multi-Control FieldNET Configuration Manual (P/N PMN-0003) to address the following:
 - Configuring components.
 - Water Source
 - Injector
 - Filter Flush Valves
 - Pressure Sustain Valve
 - Zone Valves
 - Pressure Sensors
 - Flow Meters
 - Temperature / pH Sensor
 - Rainfall Sensor
 - Test individual component control through Service Mode tool.

Test I/O Board 24 \sim Valves

- 1. Complete FieldNET Initial Startup process.
 - Testing the 24 \sim Valves on the System I/O Board and Auxiliary I/O Boards requires configuring through FieldNET prior to testing in order to enable the I/O Channel.
- 2. Put the system into SERVICE Mode by pressing the Operation Mode button on the Status Center until the LED blinks yellow.
- 3. Verify the water source is turned OFF at the Control Panel to test the electronic functionality of 24 \sim Valves
- 4. Repeat the following process for each 24 \sim Valve:
 - While in SERVICE Mode press the SELECT button momentarily cycle through the valves and press the ON/ OFF button to change the valve state.
 - Verify hearing the relay and valve solenoid "click".
 - The indicator next to the desired valve will blink quickly if the valve is currently OFF.
 - The indicator next to the desired valve will blink slowly if the valve is currently ON.
 - Press the ON/OFF button on the WS to turn the valve OFF.
- 5. Repeat the above process with the water source turned ON for each 24 \sim Valve to confirm the system is hydraulically plumbed correctly.

Test Sensors

- 1. Complete FieldNET Initial Startup process
 - Testing the Sensors on the System I/O Board requires configuring through FieldNET prior to testing in order to enable the Sensor and set parameters.
- 2. Verify Sensor readings against an analog or manual reading:
 - Pressure Transducer: verify with pressure gauge.
 - Flow Meter: verify with a flowmeter with a totalizer display.
 - Temperature Sensor: verify with a thermometer.
 - pH Sensor: verify with pH water sampling kit.
 - Rainfall Sensor: verify by removing the shield of the Rainfall Sensor and toggling the bucket 5 times to force a reading of 0.10 inches or 0.5 millimeters.
 - This assumes the default of 0.02 inches or 0.1 millimeters per toggle.
- 3. Poll the MC from the Dashboard to get the latest readings and verify against the analog or manual readings.





Section 5 - Troubleshooting

This section addresses frequently asked questions and work-arounds.

Controller

How does one clear Warnings or Faults?

Warnings and Faults are triggered when operating conditions meet the criteria for activating the Warning or Fault. There are some Warnings and Faults that are based on user-defined parameters and others are based on hardware reporting a problem.

Warnings and Faults cannot be simply cleared and ignored (overridden). To "clear" a Warning or Fault, the triggering problem must first be addressed and then resume normal operation. Changing operation mode will most likely trigger the same Warning or Fault again and is not a preferred method of clearing out faults.

Wireless Switch

The Wireless Switch does not link to the Controller. What does it take to link successfully?

If a Wireless Switch does not link up, try resetting the Wireless Switch and the Controller. This should cause the radio to synchronize.

To reset the Wireless Switch, turn it off and then back on using the On/Off switch. Then reset the Controller Panel by disconnecting the power connection and wait until the controller indicator LEDs turn off, which may be up to 2 minutes. Reconnect the power to the Controller Panel, which should cause the Wireless Switches to synchronize.

A red indicator illuminates when configuring a Wireless Switch with the USB Flash Drive. What does this mean?

The configuration process is not working. If the Wireless Switch configuration with the USB Flash Drive does not seem to succeed, check if the file "/MC/Setup/setup.rec" was written after saving the configurations from the Controller. The file may need to be uploaded to the USB again.

The Wireless Switch displays a Low Battery Warning or Low Battery Shutdown. Does the battery need to be replaced?

Verify the Solar Panel is installed with the optimal angle and is properly connected to the Wireless Switch. Verify the Battery is properly mounted to the Wireless Switch.

If a Wireless Switch has an alert or a shutdown condition due to low battery voltage, a battery replacement may be necessary. Contact Lindsay Service or Parts for replacing the battery.



Maintenance Schedule

This schedule of basic maintenance should be followed for proper Multi-Control operation and longer component life.

Pre-Season Maintenance

- Check for frayed, loose, or broken wires during pre-season checkup.
- Check for loose or broken cable ties and replace as necessary.
- · Check the Wireless Switch Solar Panel is in the optimum direction and tilt angle.
- Check the Wireless Switch Solar Battery for optimum charging and power retention. Replace if battery cannot hold a charge.
- · Remove debris from inside the Rainfall Sensor.
- Remove debris from the Solar Panel face.

Regular Periodical Maintenance

- Remove debris from inside the Rainfall Sensor.
- Remove debris from the Solar Panel face.
- Check the Wireless Switch Solar Panel direction and tilt angle. Make sure this has not moved.
- Make sure the Wireless Switch Solar battery has not become disconnected to the MC or the solar panel.

Post-Season Maintenance

• Turn off all Wireless Switches by flipping the On/Off switch.

Service

All service requires a trained Lindsay Dealer.

Controller Factory Reset

The Controller can be reset to the factory defaults by the following process:

- 1. Cycle the power to the panel.
- 2. Press and hold the Mode button for 20 seconds while cycling the power.
- 3. The indicators will turn off briefly and all will turn back on to indicate a reboot has occurred.
- 4. Configuration and setup must be re-run after reset.

System I/O Board and Auxiliary I/O Board Factory Reset

The System I/O Board and Auxiliary I/O Boards can be reset to the factory defaults by the following process:

- 1. Cycle the power to the panel.
- 2. Press and hold the SELECT button for 20 seconds upon power up.
- 3. The indicators will turn off briefly and all will turn back on to indicate a reboot has occurred.
- 4. Configuration and setup must be re-run after reset.

Wireless Switch Factory Reset

The Wireless Switch can be reset to the factory defaults by the following process:

- 1. Press down the CONFIG, SELECT and ON/OFF buttons for 10 seconds.
- 2. The Wireless Switch will reboot and all indicators will turn back on to indicate a reboot has occurred.
- 3. Configuration and setup must be re-run after reset.



Alerts

ALERT	DEFAULT LEVEL	DESCRIPTION	
Filter Hardware Error	2 - Medium	One of the Filter Flush Valves is reporting a problem which may impact filter flush cycles.	
Zone Hardware Error	2 - Medium	One of the Wireless Switch Zone Valves is reporting a problem which may impact irrigation plans or temperature protection.	
Irrigating	3 - Low	The Multi-Control is irrigating.	
Chemigating	3 - Low	The Multi-Control is chemigating.	
Plan Paused	3 - Low	The current plan is paused.	
High System Flow Shutdown	1 - High	Shut down due to high System Flow.	
High System Flow Warning	2 - Medium	System Flow is high and nearing possible shutdown.	
Low System Flow Shutdown	1 - High	Shut down due to low System Flow.	
Low System Flow Warning	2 - Medium	System Flow is low and nearing possible shutdown.	
High Flow Disparity Warning	2 - Medium	System Flow is higher than the total of expected running Zone application rates, which could indicate a leak or a broken pipe.	
High Flow Disparity Shutdown	1 - High	Shut down due the high Flow Disparity.	
Low Flow Disparity Warning	2 - Medium	System Flow is lower than the total of expected running Zone application rates, which could indicate a drip tape is plugged or a stuck valve.	
Low Flow Disparity Shutdown	1 - High	Shut down due the low Flow Disparity.	
High System Pressure Shutdown	1 - High	Shut down due the high System Pressure.	
High System Pressure Warning	2 - Medium	System Pressure is high and nearing possible shutdown.	
Low System Pressure Shutdown	1 - High	Shut down due the low System Pressure.	
Low System Pressure Warning	2 - Medium	System Pressure is low and nearing possible shutdown.	
High Post-Filter Pressure Warning	2 - Medium	Post-Filter Pressure is high and nearing possible shut- down.	
Low Post-Filter Pressure Warning	2 - Medium	Post-Filter Pressure is low and nearing possible shut- down.	
High Temperature Shutdown	1 - High	Shut down due the high Temperature.	
High Temperature Warning	2 - Medium	Temperature is high and nearing possible shutdown.	
Low Temperature Shutdown	1 - High	Shut down due the low Temperature.	
Low Temperature Warning	2 - Medium	Temperature is low and nearing shutdown.	
High Injector Flow Shutdown	1 - High	Shut down due to high Injector Flow.	
High Injector Flow Warning	2 - Medium	Injector Flow is high and nearing possible shutdown.	
Low Injector Flow Shutdown	1 - High	Shut down due to low Injector Flow.	
Low Injector Flow Warning	2 - Medium	Injector Flow is low and nearing possible shutdown.	
High Voltage Shutdown	1 - High	Shut down due to high System Voltage.	
High Voltage Warning	2 - Medium	System Voltage is high and nearing possible shutdown.	
Low Voltage Shutdown	1 - High	Shut down due to low System Voltage	
Low Voltage Warning	2 - Medium	System Voltage is low and nearing possible shutdown.	
Wireless Switch Battery Shutdown	1 - High	One of the Wireless Switches shut down due to an issue with the battery	



ALERT	DEFAULT LEVEL	DESCRIPTION	
Wireless Switch Battery Warning	2 - Medium	One of the Wireless Switches is reporting an issue with the battery.	
Wireless Switch Solar Panel Error	1 - High	One of the Wireless Switches shut down due to an issue with the solar panel.	
Filter Flush Cycle Running	3 - Low	A filter flush cycle is running.	
Max Filter Flush Cycles Warning	2 - Medium	The Multi-Control has attempted the maximum number of contiguous filter flush cycles to reduce Differential Pressure.	
Wireless Switch Communication Error	1 - High	One of the Wireless Switches has not communicated after multiple attempts.	
Stopped	2 - Medium	The Multi-Control stopped running.	
Powered Off Normal	3 - Low	The Multi-Control powered off.	
Powered Off While Running Wet	1 - High	The Multi-Control powered off while running.	
Temperature Protection Plan Run- ning	3 - Low	A temperature protection cycle is running.	
Pressure Startup Delay	2 - Medium	Temporarily disregarding System Pressure alert and shut- down conditions due to system pressurizing.	
Flow Delay	2 - Medium	Temporarily disregarding System Flow alert and shutdown conditions due to changes affecting flow.	
Injector Flow Delay	2 - Medium	Temporarily disregarding Injector Flow alert and shutdown conditions due to changes affecting flow.	
Plan Running	3 - Low	The current plan is running.	
Wireless Switch Communication Warning	2 - Medium	One of the Wireless Switches has low signal strength or data loss.	
High Rainfall Shutdown	1 - High	Shut down due to heavy Rainfall.	
High Rainfall Warning	2 - Medium	Rainfall accumulation is high and nearing possible shut- down.	
Communication Warning	2 - Medium	FieldNET can communicate with RTU but not the Multi- Control, which could indicate a loose or cut serial connec- tion.	
Post-Filter Pressure Delay	3 - Low	Temporarily disregarding Post-Filter Pressure alert condi- tion due to system pressurizing.	
Injector Off for Filter Flush Delay	3 - Low	Temporarily stopping chemigation during filter flush cycle.	
Low pH Shutdown	1 - High	Shut down due to low pH.	
High pH Shutdown	1 - High	Shut down due to high pH.	
Low pH Warning	2 - Medium	pH is low and nearing possible shutdown.	
High pH Warning	2 - Medium	pH is high and nearing possible shutdown.	
Hardware Shutdown	1 - High	Shut down due to a hardware failure.	

Controller Fault Flash Codes

The Controller Fault status LED indicator may display a series of flashes for troubleshooting, if the Controller is in a Warning or Shutdown condition. Count the number of flashes and refer to the table below to associate the flash code, cause, and solution.

Code	Warning or Fault	Cause	Solution
10	Max Flush Cycles Warning	The Pressure Differential Filter Flush Cycle has retried the maximum number of cycles without successfully bringing the Pressure Differential back within acceptable range.	Verify the Filtration settings, in Field- NET, are appropriate for this installa- tion (Properties - Filtration). There may be a large obstruction in the filter that is unable to be removed by backwashing. Refer to filter docu- mentation to remove the obstruction. Put system into AUTO Mode by pressing the Operation Mode button or by clicking on the Run button on the Dashboard in FieldNET, which will clear the condition and run the plan as scheduled.
11	Rainfall Shutdown High	The Controller has shut down due to exceeding the allowed accumulation over a period of time.	Verify the Rainfall Sensor settings, in FieldNET, are appropriate for this installation (Properties - System). Put system into AUTO Mode by pressing the Operation Mode button or by clicking on the Run button on the Dashboard in FieldNET, which will clear the condition and run the plan as scheduled.
13	Temperature Shutdown Low	The Controller has shut down	Verify the Temperature Sensor set-
14	Temperature Shutdown High	due to the Temperature being below the Low Shutdown set- ting or above the High Shut- down setting.	tings, in FieldNET, are appropriate for this installation (Properties - System). Put system into AUTO Mode by pressing the Operation Mode button or by clicking on the Run button on the Dashboard in FieldNET, which will clear the condition and run the plan as scheduled.
15	Temperature Warning Low	The Temperature is below the	Verify the Temperature Sensor set-
16	Temperature Warning High	Low Alert setting or above the High Alert setting.	tings, in FieldNET, are appropriate fo this installation (Properties - System)
18	Water Pressure Shutdown Low	The Controller has shut down due to the System Pressure	Verify the System Pressure Sensor settings, in FieldNET, are appropriate for this installation (Properties - Sys- tem). Put system into AUTO Mode by pressing the Operation Mode button or by clicking on the Run button on the Dashboard in FieldNET, which will clear the condition and run the plan as scheduled.
19	Water Pressure Shutdown High	being below the Low Shut- down setting or above the High Shutdown setting.	



Code	Warning or Fault	Cause	Solution	
20	Water Pressure Warning Low	The System Pressure is below the Low Alert setting or above	Verify the System Pressure Sensor settings, in FieldNET, are appropriate for this installation (Properties - Sys- tem).	
21	Water Pressure Warning High	the High Alert setting.		
23	Water Flow Shutdown Low	The Controller has shut down	Verify the System Flow Meter set-	
24	Water Flow Shutdown High	due to the System Flow being below the Low Shutdown set- ting or above the High Shut- down setting.	tings, in FieldNET, are appropriate for this installation (Properties - System). Put system into AUTO Mode by pressing the Operation Mode button or by clicking on the Run button on the Dashboard in FieldNET, which will clear the condition and run the plan as scheduled.	
25	Water Flow Warning Low	The System Flow is below the	Verify the System Flow Meter set- tings, in FieldNET, are appropriate for this installation (Properties - System).	
26	Water Flow Warning High	Low Alert setting or above the High Alert setting.		
27	Flow Disparity Shutdown Low	The Controller has shut down due to a Flow Disparity that	Verify the System Flow Meter set- tings, in FieldNET, are appropriate for this installation (Properties - System). Put system into AUTO Mode by pressing the Operation Mode button or by clicking on the Run button on the Dashboard in FieldNET, which will clear the condition and run the plan as scheduled.	
28	Flow Disparity Shutdown High	exceeds the Flow Disparity Shutdown setting. Flow Dispar- ity is calculated by subtracting the Target Flow for the active Zones from the System Flow. Flow Disparity is considered high if the difference is nega- tive and low if positive.		
29	Flow Disparity Warning Low	Flow Disparity is below the	Verify the System Flow Meter set-	
30	Flow Disparity Warning High	Low Alert setting or above the High Alert setting.	tings, in FieldNET, are appropriate for this installation (Properties - System).	



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