

WATER DIVERSION IRRIGATION SYSTEM Construction and Installation Notes

Introduction

The goal of this test pilot project is to reduce the offsite disposal of contaminated waste water by diverting it on site to a lined lagoon planted with a cover crop. The waste water will be stored in holding tanks and used to irrigate the crop planted in the lined lagoon. The lagoon will offer an opportunity for the water to evaporate and the plants will uptake the water, convert it to organic form, and transpire water through natural processes.

The clay lined lagoon will have a perimeter berm and ditch on the east side which will slope to a lower sump area to drain the plot and provide some storage capacity. The lagoon will be filled with 0.5M of soil. The berm have gravel packed access points for farming equipment and personnel. The berm will have a 3:1 slope and will be planted with a stabilizing cover crop. Adjacent to the ditch will be a raised distribution manifold of UV stable HDPE pipe on blocks which will water to flow past into the ditch. The blocks will also mark the 2M row spacing and connection points to irrigation drip lines.

The lagoon soil will be prepared and seeded prior to the installation of the drip irrigation lines and any field sensors. The field crop will be managed throughout the growing period with daily inspections and an irrigation controller. The proposed crop is expected to mature in 100 days with planting sometime in May. Prior to harvesting in around August-September, the irrigation drip lines are to be blown out, disconnected and stored away on the racking in the shed.

The irrigation controller will be set up for daily watering but also take into account, existing soil moisture, rainfall, sump pit water levels, temperature, and crop conditions. The greatest draw of power will be the irrigation pump which is expected to operate for a maximum of 1 hour per day. Factors that will reduce the pump time include such things as: precipitation, saturated soil, and crop sensitivity (younger crops require less moisture).

The current target for crop watering is 15cm (6") over a 100 day growing period. In periods of high rain, excess water in the sump pit (which will be monitored) may be pumped into storage tanks to reduce problems that may arise from soil oversaturation.

The lagoon test site is in a remote area of the site without power nearby. The Irrigation system will be powered by solar panels and/or wind turbines. The power system will use 12V batteries for storage which will be inverted to 110V to run pumps and other devices. The system will be based on the need to provide up to two (2) acre inch of water per month, operate the monitoring and control systems, and general use requirements.



Irrigation System Concept Design Specifications – REFER TO DRAWINGS LP-01, LP02, LP03

Test plot Size	1.2 acre (70M x 70M)
Water vol. target - Acre inch	2" per month (15cm (6 inches)/100 days)
	Acre inch = 100,00 liters (25,000 gallons)
Total Target Water Usage	70M x 70M x 0.15M = 735 cuM
	735 cubic meters (735,000 liters)
Proposed Water Storage	160,000 liters (2 Tanks)
Drip Line length	8000 ft
Emitters spacing	24" (2 ft)
Emitter flow rate	0.4 GPH
Emitters total number	4000
Flow rate	0.4 x 4000 = 1600 gallons per hour
Total time for 1 acre inch	1600 gph/25,000 = 15.6 hours (max 31.2 hours per month)
Utility Pumps (2)	VersaJet Series Shallow Well JetPump110V10AMP
Filtration	Cartridge Filters-SpecTBD dependent on water
	analysis
Connectors	System blowdown and quick connect capacity disconnect
Monitoring	WIFI enabled, remote camera
Irrigation Controller – TBD	
	 Pump Control (vs valve control)
	Moisture Sensor
	Rain Sensor
	Sump Pit Sensor
	Timer
	• WIFI
Power System	Battery Power Solar/Wind System
	• 600W
	• 875 amps
	 2 - 330W Solar panels
	Wind Turbine TBD
	110V Inverter
	 Hybrid Power Controller (to accept both Solar and Wind
	energy)



Shed Cooling

The shed is likely to experience periods of extreme heating which may affect the system controls. Traditional AC systems would require a significant amount of energy and cost and therefore discouraged. Louvred ducts are proposed in the shed to provide ventilation and the end wall doors could have the option of including screens. Earth sheltering could reduce the heat gain to the structure. Some cooling could also be provided with earth tubes buried in the ground under the berms circulated into the shed.

Monitoring

It is intended that remote monitoring be managed via WIFI connection.

Water Usage

Total Target Water Usage 735,000

Operations

The scope of this work is limited to the development of the test plot. Standard operating procedure (SOP) will be developed and executed by Miller plant personnel. Remote performance monitoring will be performed by the Engineering study team.

The planting and harvesting of the crop material is will be performed by agricultural professionals (local area farmers).

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Data Metrics

Water flow rates	On applicatio
Soil moisture	Weekly
Growth rate	Weekly
Plant analysis	On harvest
Odour logging	Daily
Soil analysis	Monthly

OWNER'S MANUAL

Franklin Electric

English

EN)

VersaJet Series Shallow Well Jet Pump

The VersaJet Series is designed for shallow well applications and is capable of raising water from a depth of 25 feet. All mechanical parts, motor, impeller, electrical controls, etc., are above ground within easy reach.

The VersaJet line is capable of a wide range of pressures and flows, but this may require replacing the standard factory installed jet nozzle with one of the other provided nozzles.

This product is covered by a Limited Warranty for a period of 24 months from the date of original purchase by the consumer. For complete warranty information, refer to <u>www.FranklinWater.com</u>.



Specifications

Pump Type	Discharge	Suction	HP Range	
VersaJet Series	1.00"	1.25"	All	

SAFETY INSTRUCTIONS Before Getting Started

This equipment should be installed and serviced by technically qualified personnel who are familiar with the correct selection and use of appropriate tools, equipment, and procedures. Failure to comply with national and local electrical and plumbing codes and within Franklin Electric recommendations may result in electrical shock or fire hazard, unsatisfactory performance, or equipment failure.

Know the product's application, limitations, and potential hazards. Read and follow instructions carefully to avoid injury and property damage. Do not disassemble or repair unit unless described in this manual.

Failure to follow installation or operation procedures and all applicable codes may result in the following hazards:

A DANGER

Risk of death, personal injury, or property damage due to explosion, fire, or electric shock.

- Do not use to pump flammable or explosive fluids such as gasoline, fuel oil, kerosene, etc.
- Do not use in explosive atmospheres or hazardous locations as classified by the NEC, ANSI/NFPA70.
- Do not handle a pump or pump motor with wet hands or when standing on a wet or damp surface, or in water.
- When a pump is in its application, do not touch the motor, pipes, or water until the unit is unplugged or electrically disconnected.
- If the power disconnect is out of sight, lock it in the open position and tag it to prevent unexpected application of power.
- If the disconnect panel is not accessible, contact the electric company to stop service.

HDL-CV

Increase drip system efficiency with pressure compensation, flow indication stripes, and a 6' check height.

· Color-coded stripes provide easy

· Stretch-wrapped coils stay intact and

make installation quick and easy

· Superior grit tolerance provided by

proprietary emitter design with

multiple inlet filters, a wide turbulent labyrinth, and a full-size outlet pool

identification of flow

longevity

KEY BENEFITS

- Pressure-compensating emitters for consistent flow and uniform coverage
- · Non-draining check valve (CV) prevents · UV resistance facilitates product low-point pooling and allows all emitters to open/close at the same time for greater system efficiency
- · Check height of 6' minimizes system drainage and runoff
- Anti-siphon feature prevents debris from entering emitter at system shutdown

PRODUCT SPECIFICATIONS

- Available flow rates: 0.4, 0.6, 0.9 GPH
- Available emitter spacing: 12", 18", 24"
- Tubing dimensions: 0.660" x 0.560" (outside/inside diameter)
- Available without emitter (HDL-BLNK)

OPERATING SPECIFICATIONS

- · Operating range: 15 to 60 PSI
- Minimum filtration: 120 mesh (125 microns)
- · Warranty period: 5 years (plus 2 additional years for environmental stress cracking)



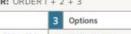
HDL-CV



Coil with Stretch Wrap

HDL-CV - SPECIFICATION BUILDER: ORDER 1 + 2 + 3 + 4 1 Model 2 Spacing 3 Length 4 Options HDL-04 = 0.4 GPH flow 12 = 12" 100 = 100' CV = Pressure-compensating with check valve HDL-06 = 0.6 GPH flow 18 = 18" 250 = 250' 500 = 500' HDL-09 = 0.9 GPH flow 24 = 24" 1K =1,000' Example: HDL-06-12-250-CV = 0.6 GPH, 12" emitter spacing, 250" coil with check valve HDL-BLNK - SPECIFICATION BUILDER: ORDER1 + 2 + 3







	STRIPE COLOR 0.9 GPH - Black	HDL-CV - Dark brown tubing.
0	0.6 GPH - Gray	pressure-compensating with
0	0.4 GPH - Tan	check valvé

Example: HDL-BLNK-250 = No emitters, 250° coil

MAXIMUM RUN LENGTHS

HDL-CV - 0.4 GPH			HDL-CV - 0.6 GPH				HDL-CV - 0.9 GPH				
Pressure Emitter Spacing (in.)			Pressure Emitter Spacing (in.)			Pressure Emitter Spacing (m.)			ig (in.)		
(PSI)	12	18	24	(PSI)	12	18	24	(PSI)	12	18	24
15	205	289	367	15	171	239	304	15	117	164	211
20	289	404	513	20	239	336	426	20	164	233	292
25	339	479	604	25	280	398	501	25	192	273	348
30	380	535	679	30	314	441	560	30	217	307	389
40	438	623	788	40	363	516	653	40	251	355	451
50	489	691	872	50	404	570	722	50	280	395	501
60	529	747	947	60	438	619	784	60	302	429	541

Hunter^{*} 156

Visit hunterindustries.com

Current EPA WaterSense Approved Smart Controllers

Commercial



ESP-LXME/F Modular Controllers Conventionally wired commercial controller for up to 48 stations.

How to Specify

Controller ESP-8LXME: 8-station base ESP-12LXMEF: 12-station base with Flow Smart Module

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Modules ESPLXMSM8: 8-Station ESPLXMSM12: 12-Station FSM-LXME: Flow Smart Module

Module IQ FSCLXME: IQ Connection Module



ESP-LXD Series 2-Wire Decoder Controllers

Advanced commercial control for up to 200 stations.

Models

Controller ESP-LXD: 50-station base with Flow Smart Module Modules ESPLXD-SM75: 75-station module IQCM-LX2W: IQ Connection Module



ESP-LXIVM Series 2-Wire Decoder Controllers

Revolutionary 2-Wire Design with Integrated Valve Module (IVM)

Models

 Controller
 Modules

 ESPLXIVM:
 IQCM-LX2W:

 60 Stations with
 IQ Connection Module

 10 independent programs
 ESPLXIVMP:

 240 Stations with
 40 independent programs



IQ" Platform

Central command and control from a desktop, enterprise server, or the cloud.

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IQ Cartridge Models IQNCCRS: RS232 Cartridge

Ige Models

IQ4G-USA: Cellular Cartridge IQNCCEN: Ethernet Cartridge

LNK2 WiFi Module

WiFi Mobile Application

The LNK2 WiFi Module shall allow users to connect remotely to a Rain Bird ESP-ME3, ESP-Me, ESP-TM2, or ESP-RZXe Irrigation Controller through a plug-in accessory and using an Apple iOS or Android compatible mobile device with access to the Internet.

Easy to Install Hardware

The LNK2 WiFi Module shall connect directly to the accessory port featured on compatible controllers.

Mobile Application

A mobile application with user interface shall install on the user's smart device and allow remote configuration of multiple Irrigation Controllers. Options for irrigation scheduling shall be provided as well as access to current weather conditions.

Supported Mobile Devices

The LNK2 WiFi Module Mobile Application shall be available for devices running the following operating systems:

- iOS 8.0 or later
- · Android 6.0 (Marshmallow) or later

WiFi Networking

The LNK2 WiFi Module shall provide direct wireless communication to compatible smart devices through a WiFi Access Point

Connecting to the Rain Bird Cloud Server shall allow the server to send a daily seasonal adjustment once per day based upon the Controller's ZIP code

Push notifications shall be available through Google Cloud Messaging or Apple Push Notification Service

A multi-color LED light on the LNK2 WiFi Module shall indicate status of the Access Point and Internet connections

WiFi Connection Security

The LNK2 WiFi Module shall automatically detect the appropriate WiFi security mode using a user-provided network SSID and network key.

The following security modes are supported:

- WPA2-TKIP
- OpenWEP
- WPA-TKIP
 WPA2-AES-TKIP

WPA2-AES

WPA-AES

Mobile App Features

<u>Controller View</u> shall display an image of the Controller with name, station or zone list and local weather report

Expanded View shall allow remote programming of irrigation schedules including a Manual Watering feature

General Information View shall display the selected Controller by name, location by ZIP code and a notifications list

<u>Calendar View</u> shall show a graphical representation of the selected Controller's irrigation schedule

Remote Control View shall provide instant access to manual operation for each station or zone

<u>Program View</u> shall provide access to all irrigation scheduled parameters for program based Controllers

Add Controller View shall provide access to a setup wizard for adding one or more controllers to the mobile app home screen

<u>Controller Settings</u> View shall provide configuration and editing of Controller information, network settings and notification preferences

App Settings View shall provide access the mobile app version, help screens, enable or disable of push notifications, and access to group controllers



Operating Specifications

- Operating Temperature: 14°F (-10°C) to 149°F (65°C)
- Storage Temperature: -40°F (-40°C) to 150°F (66°C)
- Operating Humidity: 95% max @ 50°F to 120°F (10°C to 49°C) non-condensing environment

Electrical Specifications

24VAC(RMS) 50/60Hz; 55mA max

Certifications

 UL, cUL, CE, CSA, FCC Part 15b, WEEE, S-Mark, IP30, IFETEL

Dimensions

- Width: 1.13"
- Height: 1.83"
- Depth: 0.48"

How To Specify:

Models LNK2WIFI

RAIN BIRD

Landscape Drip Control Zone Components

Large-Capacity Filters

Large-Capacity high flow and low maintenance with a solid build

Features

- Provides extra large filtration capacity for residential, commercial, and municipal applications
- Durable filters can be easily removed for cleaning, significantly reducing cleaning time
- · Disc filters can decompress for easy cleaning
- Auxiliary connection with a threaded cap can be drilled to allow draining or depressurization

Operating Range

- 1" Model: Maximum flow: Up to 26 gpm (6 m³/hr)
 Filtering surface (disc): 28 in² (180cm²)
- 1.5" Models: Maximum flow: Up to 62 gpm (14 m3/hr)
- Filtering surface (disc): 48 in² (310 cm²)
- Filtering surface (screen): 42 in² (270 cm²)
- · 2" Models: Maximum flow: Up to 110 gpm (25 m3/hr)
- Filtering surface (disc): 81 in² (525 cm²)
- Filtering surface (screen): 75 in² (485 cm²)
- Maximum Pressure: 116 psi (8 bar)
- Maximum Temperature: Up to 140° F (60° C)

Models

- LCRBY100D 1"Large-Capacity Disc Filter
- LCRBY150S 1.5" Large-Capacity Screen Filter
- LCRBY150D 1.5"Large-Capacity Disc Filter
- LCRBY200S 2" Large-Capacity Screen Filter
- LCRBY200D 2"Large-Capacity Disc Filter

Specifications

- Inlet / Outlet Size:
- 1" Models: 1" NPT
- 1.5" Models: 1.5" NPT
- 2"Models: 2"NPT

Dimensions

- 1": (6.8" H x 7.5" W x 3.3" D)
- 1.5": (9.5"H x 10.3"W x 5.7" D)
- 2": (9.7"H x 10.6" W x 5.7"D)
- Filtration
- Stainless Steel Screen Filter: 120 Mesh (130 Micron)*
- · Plastic Filter Discs: 120 Mesh (130 Micron)
- * Screen not available in 1" model





Disc & Screen Filters

Pressure Loss Characteristics - Disc Filter

Flow R	ate	1" Filter		1.5" Filter		2" Filter	
gpm	l/m	psi	bar	psi	bar	psi	bar
5	18.93	0.60	0.04	0.08	0.01	0.10	0.01
11	41.67	1.16	0.08	0.18	0.01	0.10	0.01
22	83.33	2.61	0.18	0.40	0.03	0.10	0.01
33	125.0	4.35	0.30	0.73	0.05	0.24	0.02
44	166.67	-	_	1.05	0.07	0.40	0.03
55	208.33	_	_	1.50	0.10	0.60	0.04
66	250.00	_	_	2.18	0.15	0.82	0.06
77	291.67	-	_	3.10	0.21	1.10	0.08
88	333.33	_	_	3.95	0.27	1.60	0.11
99	375.00	_	_	-	_	2.03	0.14
110	416.67	_	_	_	_	2.47	0.17

Pressure Loss Characteristics - Screen Filter

Flow R	Flow Rate		1" Filter		1.5" Filter		2" Filter	
gpm	l/m	psi	bar	psi	bar	psi	bar	
5	18.93	0.80	0.06	0.00	0.00	0.00	0.00	
11	41.67	1.74	0.12	0.00	0.00	0.00	0.00	
22	83.33	2.90	0.20	0.50	0.03	0.20	0.01	
33	125.0	4.06	0.28	0.95	0.07	0.25	0.02	
44	166.67	_	_	1.45	0.10	0.44	0.03	
55	208.33	-	_	1.89	0.13	0.60	0.04	
66	250.00	_	_	2.32	0.16	0.87	0.06	
77	291.67	_	_	2.76	0.19	1.16	0.08	
88	333.33	-	_	3.19	0.22	1.45	0.10	
99	375.00	_	_	_	_	1.89	0.13	
110	416.67	_	_	_	_	2.32	0.16	

Note: Body dimensions are available on the Rain Bird website.

Note: Filter must be installed downstream of the valve, to prevent the filter from being under constant pressure.

samlexamerica

DC-AC Inverter

Model PST-3000-12 12 VDC- 120 VAC PST-3000-24 24 VDC- 120 VAC

Design Features

- High efficiency & low RF emissions
- Can be hard wired
- 2x Surge
 Wide DC input range
- Dual GFCI Protected Outlets
- Wide temperature operating range -20 to +40°C / -4 to +104°F
- Temperature controlled cooling fan
- Low idle power draw
- Remote Input Use to turn inverter ON or OFF with ignition start or any other Remote ON/OFF switch
- Optional LCD remote control, model RC-300
- UPC Universal Protection Circuit: low voltage, over voltage, over temperature, over load and short circuit
- Safety certified to UL & CSA standards, FCC compliant

Clean and reliable AC Power
identical to household electricity.
Commercial grade design suitable
for heavy duty loads & long periods
of continuous operation.

3 YEAR LIMITED WARRANTY

	MODEL NO.	PST-3000-12	PST-3000-24	
	OUTPUT VOLTAGE	120 VAC ± 3%	120 VAC ± 3%	
OUTPUT	MAXIMUM OUTPUT CURRENT	25A	25A	
	OUTPUT FREQUENCY	60 Hz ± 1%	60 Hz ± 1%	
	TYPE OF OUTPUT WAVEFORM	Pure Sine Wave	Pure Sine Wave	
	TOTAL HARMONIC DISTORTION OF OUTPUT WAVEFORM	< 3%	< 3%	
	CONTINUOUS OUTPUT POWER (At Power Factor = 1)	3000 Watts	3000 Watts	
	SURGE OUTPUT POWER	6000 Watts (< 8 ms)	6000 Watts (< 8 ms)	
	PEAK EFFICIENCY	> 85%	> 88%	
	AC OUTPUT CONNECTIONS	NEMA5-20R GFCI Duplex Outlets, Terminal Block for hardwiring	NEMA5-20R GFCI Duplex Outlets, Terminal Block for hardwiring	
	NOMINAL DC INPUT VOLTAGE	12V	24V	
	DC INPUT VOLTAGE RANGE	10.7 - 16.5 VDC	21.4 - 33 VDC	
INPUT	MAXIMUM INPUT CURRENT	360A	180A	
INPUT	DC INPUT CURRENT AT NO LOAD	< 1.6A	< 1.0A	
	DC INPUT CONNECTIONS	Bolt & Nut: 5/16" x 18 TPI	Bolt & Nut: 5/16" x 18 TPI	
	DC INPUT FUSES (INTERNAL)	12 X 30A = 360A (Each Type ATC, 32V, 30A	12 x 15A = 180A (Each Type ATC, 32V, 15	
DISPLAY	LED	Power, Overload, Over Temperature	Power, Overload, Over Temperature	
	LOW DC INPUT VOLTAGE ALARM	10.7V ± 0.1V	21.4V ± 0.2V	
	LOW DC INPUT VOLTAGE SHUTDOWN	10V ± 0.1V ; Auto-reset: 11.5V ± 0.3V	20V ± 0.2V ; Auto-reset: 23V ± 0.5V	
	HIGH DC INPUT VOLTAGE SHUTDOWN	16.5V ; Auto-reset: < 16.5V	33V; Auto-reset: < 33V	
PROTECTIONS	SHORT CIRCUIT SHUTDOWN	When output voltage drops to 80VAC or lower for 1 to 1.5 sec		
PROTECTIONS	OVERLOAD SHUTDOWN	At overload of 110% to 115% for 2 to	2.5 sec	
	GROUND FAULT SHUTDOWN	Only on GFCI outlets (5 to 6 mA leaka	ge)	
	OVER TEMPERATURE SHUTDOWN	90°C ± 5°C (Sensed at Transformer T3) ; Auto-reset at 65°C ± 5°C		
	REVERSE POLARITY ON DC INPUT SIDE	External / internal DC sides fuses will b	low	
CONTROL	WIRED REMOTE CONTROL WITH LED / LED DISPLAY WIRED ON / OFF CONTROL	RC-300 (sold separately) with 25' cabl (i) By switching external contact (ii) B	y switching external 12V/24V signal	
COOLING	FORCED AIR COOLING	Temperature controlled fan (Sensed a Fan ON at 55°C ± 3°C; Fan OFF at 45°C	st Transformer T6) C ± 3℃	
COMPLIANCE	SAFETY	FETY Intertek - ETL Listed. Conforms to UL Standard 458 and certified to CSA Std. C22.2 No. 107.1		
	EMI/EMC	FCC Part 15(B), Class A		
ENVIRONMENT	OPERATING TEMPERATURE RANGE	Operating temperature -20 to 40°C / Storage temperature -30 to 70°C / -22 90% relative humidity non-condensing	2 to 158°F	
Distance in the second	(W X D X H), MM	263 x 456.5 x 145	263 x 456.5 x 145	
DIMENSIONS	(W X D X H), INCHES	10.35 x 17.97 x 5.71	10.35 x 17.97 x 5.71	
A REAL PROPERTY.	KG	9.8	9.8	
WEIGHT	LBS	21.6	21.6	

NOTE: Specifications are subject to change without notice

12001-PST-3000-12-24-1221