



[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

**PUMP STATION QUOTE**

Project Information	Job Name:	Jack Allen Softball	Date:	[REDACTED]
	Job Country:	USA	Distributor Name:	FIS Outdoor
	Job State/Province:	AL	Distributor Contact:	[REDACTED]
	Job City:	Decatur	Dist. Contact Email:	[REDACTED]
	Rain Bird Rep.:	[REDACTED]	Dist. Contact Phone:	[REDACTED]

Station Details	Pump Platform:	H1X040Y1N10008SFX8	Power Requirement:	480/3/60
	Inlet Pressure from City (PSI):	70	Station Type:	Suction Lift / Boost
	Suction Lift (ft)	6'	Main Disconnect Switch:	125 A
	Discharge Pressure (PSI):	110	Full Load Amps:	89 A
	Maximum Flow Rate (GPM)	430		
	Minimum Flow Rate (GPM)	20		

Site Conditions	Water Source:	Wet well / City Intake Line	Site Elevation:	10'
	Water Quality:	Average	Intake Pipe Dia.:	4"/6"
			Discharge Pipe Dia.:	6"
			Slab Dimensions:	TBD

**Pump Station Pricing**

Base Price:	[REDACTED]	The GRAND TOTAL includes the base pump station price, the total price of all selected options, one day of Authorized Service Provider start-up and training assistance, and freight to the job site.
Option Pricing:	[REDACTED]	
Freight:	[REDACTED]	
ASP Startup Assistance :	[REDACTED]	
<b>GRAND TOTAL:</b>	[REDACTED]	

Prices valid for thirty (30) days from the date of this proposal.

**Lead Time to Shipment**

[REDACTED]	From receipt of all documents below: Purchase Order Signed Quote Signed Approval Drawing	Pump Stations are included in Rain Bird's Pump Station Professional Customer Satisfaction Policy.
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All reasonable efforts will be made to meet the requested shipment date after the receipt of a signed contract however, Rain Bird Corporation will not be liable for delays in shipment or delivery.

## Pump Station Details

### Main Pump

Quantity	Type	Description
1	40 HP MOTOR	Horizontal close coupled main motor, 3450RPM, TEFC, NEMA B, Class F insulation, 1.15 SF, Cont. duty rated - Motor is VFD Started
1	PUMP	Horizontal single stage end-suction main pump with cast iron discharge head and bronze impeller, includes silent check valve and isolation valve

### Intermediate/Booster Pump

Quantity	Type	Description
1	10 HP MOTOR	Vertical intermediate motor, 3450RPM, ODP/TEFC, NEMA B, Class F insulation, 1.15 SF, Cont. duty rated
1	PUMP	Vertical multistage inline intermediate pump with cast iron discharge head, SS impellers, SS chamber, and SS outer sleeve.

All main pump motors are VFD started only.

Intermediate pump to be VFD started only.

## System Details

This quote is for a pre-fabricated pumping station designed to produce the rated discharge pressure from the Minimum Design Flow Rate up to the Maximum Design Flow Rate as per the Pump Station Details listed on this quote. Pumps for this application are designed for use in flooded suction, suction lift and boosting applications only. The main pumps of this packaged system are of a horizontal single stage end-suction centrifugal type and are designed for indoor applications or installed within an enclosure protected from the elements and properly ventilated

## Mechanical System

### Description

- Variable Frequency Drive [VFD]
- Programmable Logic Controller [PLC]
- Color touchscreen operator interface [HMI]
- Circuit breaker motor protection
- Dual mechanically and electrically interlocked contactors for main pump motors
- NEMA 4 electrical enclosure with interior panel light
- Heat exchanger for closed loop cooling of the electrical enclosure
- ANSI lugged station intake and discharge isolation valves
- Individual pump silent check valves and isolation valves
- Flow Sensor
- Pressure relief valve with butterfly isolation valve
- Stainless Steel Pressure Transducer
- Low water level safety float switch to protect against loss of prime (flooded suction and suction lift applications only)
- Re-Prime Kit for suction lift applications
- Hose bib connection for wash down
- Liquid filled suction and discharge pressure gauges
- Complete skid and piping steel grit blasted and powder coated for maximum corrosion resistance

**Control System**

Description

- Automatic alternation of main motors to equalize run time
- Automatic pressure ramp-up capability
- Electrical overload shutdown safety
- VFD fault shutdown
- Automatic system diagnostic utility
- Automatic low water level shutdown safety (flooded suction and suction lift applications only)
- Individual pump lighted HOA switches
- High pressure and low pressure discharge safeties
- PLC or VFD emergency bypass - Manual mode
- Main power line phase monitoring
- Individual motor overload protection safeties
- Single phase and three phase surge protection safeties

**Pump Station Options**

**Mechanical Options**

Quantity / Type	Cost	Options
1	Included	Individual intake lines for each pump
1	Included	4" electric butterfly valve (on/off) located on the intake line of the 10HP pump for city water. The 10HP pump is to also act as a booster pump for the city water if the water level in the well gets to low. This includes an extra check valve on the intake so water doesn't dump into the wet well.
0	\$1,060	Intake Z Pipe for Main pump (includes 1, 2 in. blow port): dimensional requirements must be provided
0	\$585	Intake Z Pipe for 10HP pump (includes 1, 2 in. blow port): dimensional requirements must be provided
1	\$1,112	6" passive intake screen with foot valve assembly for main pump intake line
1	\$1,050	4" passive intake screen with foot valve assembly for 10HP pump intake line
1	\$5,466	Magnetic flow meter upgrade with optical isolator for fertigation inputs

**Control Options**

Quantity / Type	Cost	Options
0	\$3,635	3KVA Power Zone Transformer 115V/230V single phase with load center
1	\$2,934	Rain Bird MCA (Monitor-Control-Alert) pre-installed remote communication hardware plus three year pre-paid data plan
1	\$437	Lake level control circuit: lake level floats

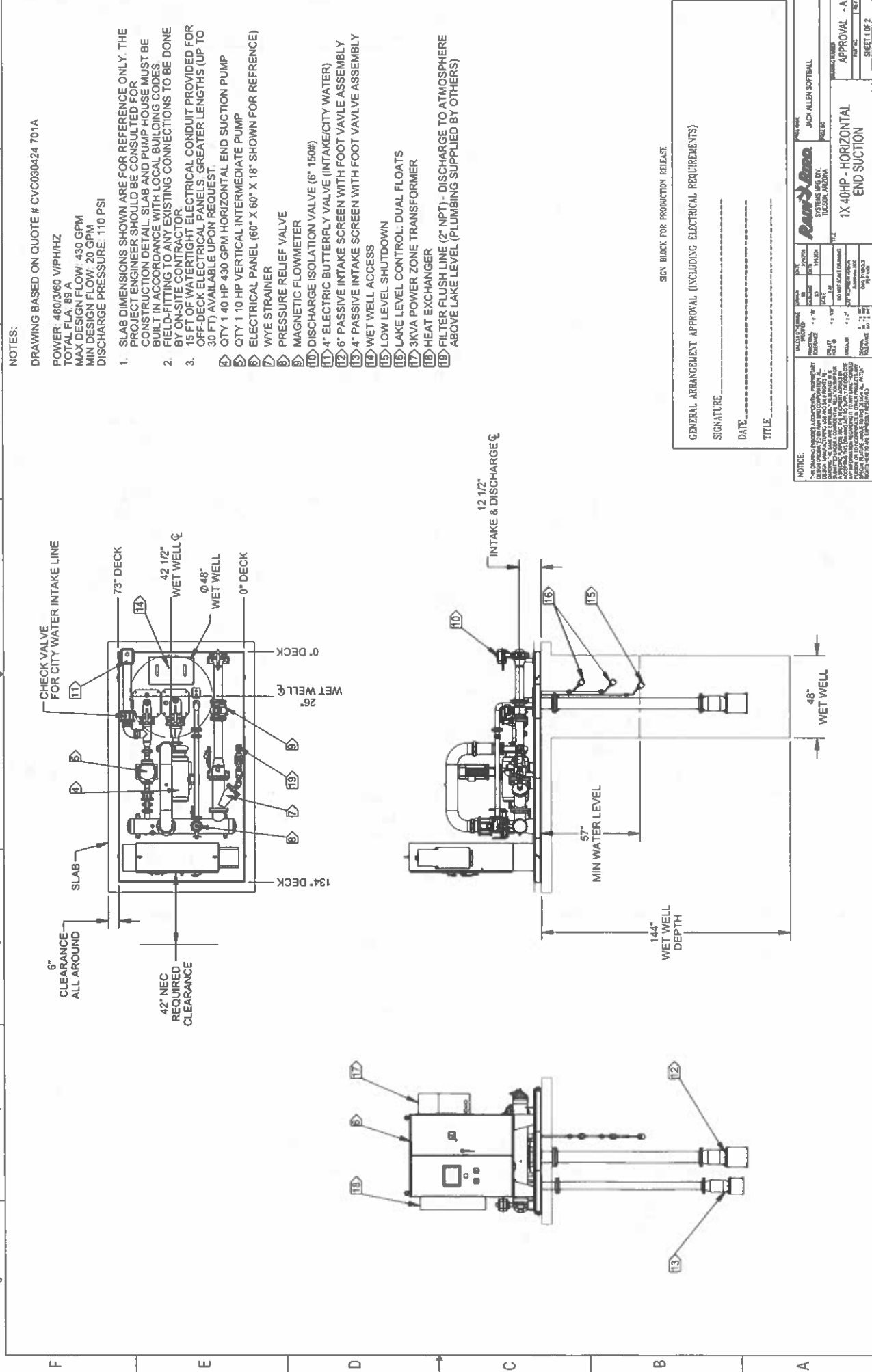
**Filtration Options**

Quantity / Type	Cost	Options
1	\$1,946	6" auto-flush wye strainer with 1/8 in. perforated screen

**Pump Station Professional Customer Satisfaction Policy**

Quantity / Type	Cost	Options
3 year	Included	Rain Bird guarantees that its pump station will be free of manufacturer defects for three years from the date of start-up but not beyond forty months from the date of purchase by the original customer with a copy of the seller's invoice required for coverage under this Policy. Labor costs associated with repair or replacement of parts will be covered for no more than one year from date of start-up. Refer to the Rain Bird Pump Station Professional Customer Satisfaction Policy Terms and Conditions for details.

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NOTES:

DRAWING BASED ON QUOTE # CVC030424 701A

POWER: 480/3/60 V/PH/Hz  
 TOTAL FLA: 89 A  
 MAX DESIGN FLOW: 430 GPM  
 MIN DESIGN FLOW: 20 GPM  
 DISCHARGE PRESSURE: 110 PSI

1. SLAB DIMENSIONS SHOWN ARE FOR REFERENCE ONLY. THE PROJECT ENGINEER SHOULD BE CONSULTED FOR CONSTRUCTION DETAIL. SLAB AND PUMP HOUSE MUST BE BUILT IN ACCORDANCE WITH LOCAL BUILDING CODES. FIELD-FITTING TO ANY EXISTING CONNECTIONS TO BE DONE BY ON-SITE CONTRACTOR.

2. 15 FT OF WATERTIGHT ELECTRICAL CONDUIT PROVIDED FOR OFF-DECK ELECTRICAL PANELS. GREATER LENGTHS (UP TO 30 FT) AVAILABLE UPON REQUEST.

3. QTY 1 10 HP VERTICAL INTERMEDIATE PUMP

4. ELECTRICAL PANEL (60" X 60" X 18" SHOWN FOR REFERENCE)

5. WYE STRAINER

6. PRESSURE RELIEF VALVE

7. MAGNETIC FLOWMETER

8. DISCHARGE ISOLATION VALVE (6" 150#)

9. 4" ELECTRIC BUTTERFLY VALVE (INTAKE/CITY WATER)

10. 6" PASSIVE INTAKE SCREEN WITH FOOT VALVE ASSEMBLY

11. 4" PASSIVE INTAKE SCREEN WITH FOOT VALVE ASSEMBLY

12. WET WELL ACCESS

13. LOW LEVEL SHUTDOWN

14. LAKE LEVEL CONTROL: DUAL FLOATS

15. 3KVA POWER ZONE TRANSFORMER

16. HEAT EXCHANGER

17. FILTER FLUSH LINE (2" NPT) - DISCHARGE TO ATMOSPHERE ABOVE LAKE LEVEL (PLUMBING SUPPLIED BY OTHERS)

6" CLEARANCE ALL AROUND

42" NEC REQUIRED CLEARANCE

CHECK VALVE FOR CITY WATER INTAKE LINE

73" DECK

26" WET WELL

0" DECK

0" DECK

42 1/2" WET WELL

0" DECK

0" DECK

SLAB

134" DECK

MIN WATER LEVEL

57" DECK

144" WET WELL DEPTH

12 1/2" INTAKE & DISCHARGE

48" WET WELL

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GENERAL ARRANGEMENT APPROVAL (INCLUDING ELECTRICAL REQUIREMENTS)

SIGNATURE \_\_\_\_\_

DATE \_\_\_\_\_

TITLE \_\_\_\_\_

SICX BLOCK FOR PRODUCTION RELEASE

JACK ALLEN SOFTBALL  
 RAIN-X  
 SYSTEMS, INC.  
 TUCSON, ARIZONA

1X 40HP - HORIZONTAL  
 END SUCTION

APPROVAL - A

DATE

SHEET 1 OF 2

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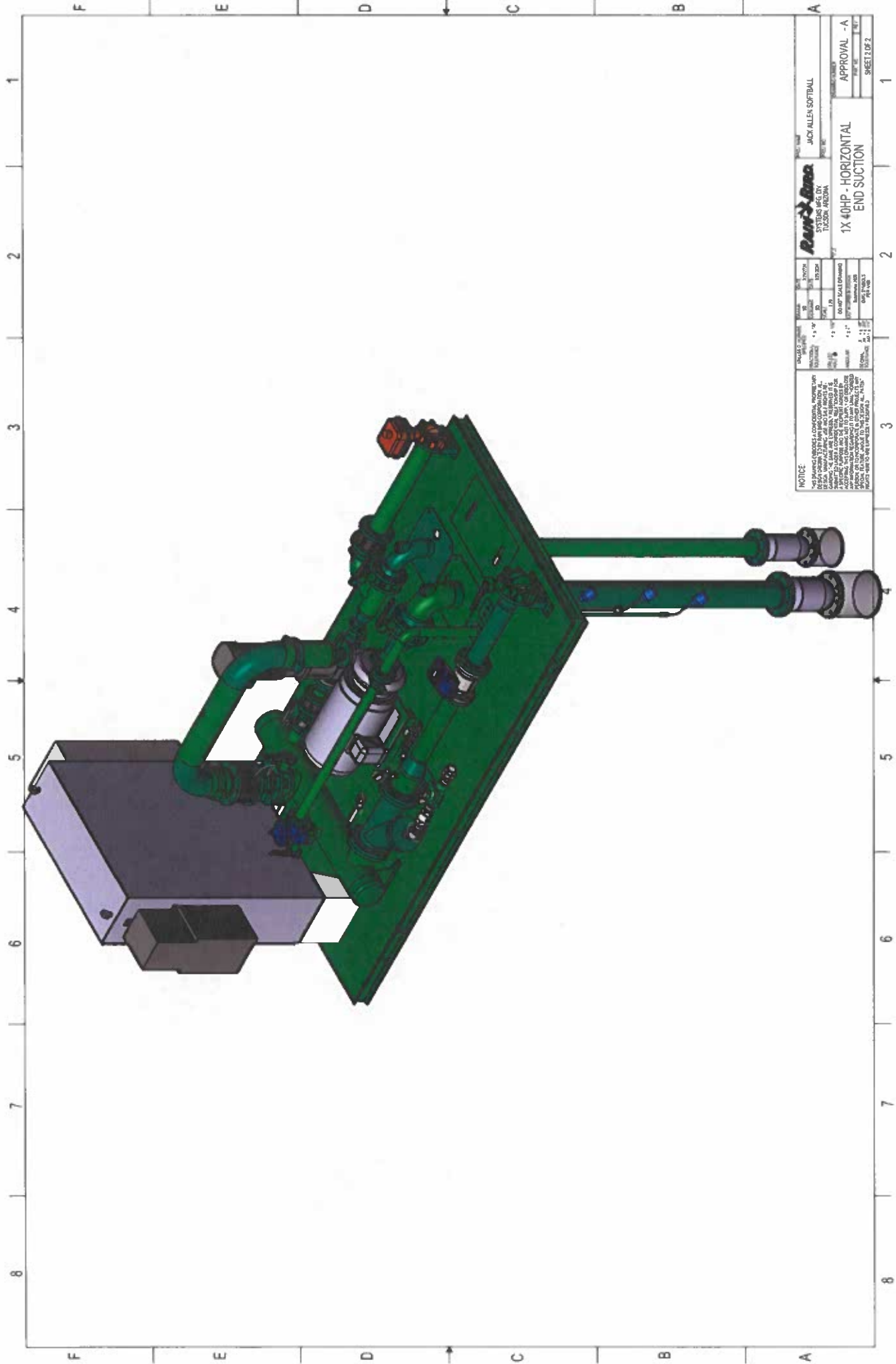
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PROJECT NO.	370770
DATE	03/20/24
SCALE	AS SHOWN
DESIGNER	JAC
CHECKER	JAC
APPROVED	JAC
DATE	03/20/24
PROJECT	00 HP 40HP (Horizontal)
DESCRIPTION	1X 40HP - HORIZONTAL END SUCTION
REV	01
DATE	03/20/24
BY	JAC
CHK	JAC
APP	JAC

**Rayson**  
 SYSTEMS INC. DIV.  
 TUCSON, ARIZONA

JACK ALLEN SOFTWARE

APPROVAL - A

SHEET 2 OF 2



**HORIZONTAL END SUCTION VARIABLE SPEED PUMP STATION SPECIFICATION**

<b>DATE:</b>	<b>3/19/2024</b>
<b>PROJECT NAME:</b>	<b>Jack Allen Softball</b>
<b>PROJECT LOCATION:</b>	<b>AL, Decatur</b>
<b>PUMP STATION MODEL NUMBER:</b>	<b>H1X040Y1N10008SFX8</b>
<b>DESIGN FLOW RATE:</b>	<b>430</b>
<b>DISCHARGE PRESSURE:</b>	<b>110</b>
<b>POWER:</b>	<b>480 VAC, 3 Phase, 60 Hz</b>

	<b>QUANTITY</b>	<b>HORSEPOWER</b>
<b>MAIN PUMPS:</b>	<b>1</b>	<b>40</b>
<b>INTERMEDIATE PUMP:</b>	<b>1</b>	<b>10</b>
<b>PRESSURE MAINTENANCE PUMP:</b>		

**Note:** In the event of any discrepancy between this document and the Pump Station Quote and associated Customer Approval Drawing, the Pump Station Quote and associated Customer Approval Drawing shall prevail. This document is to serve as support documentation to the quotation only.

**SCOPE OF WORK**

This specification describes a prefabricated, skid mounted, variable speed horizontal end suction pump station. Design, manufacture, and testing are the sole responsibility of the pump station manufacturer. The pump station is to provide water to the irrigation system while simultaneously maintaining a constant discharge pressure by using a prefabricated pump station with variable frequency drive (VFD) pumps for pressure regulation, under varying flow conditions up to the maximum specified capacity.

**1.0 MANUFACTURER**

The pump station shall be of the type manufactured by **Rain Bird Corporation**, at the facility in Tucson, Arizona, or approved equal. Submissions for consideration of equal must be submitted in writing prior to the bid closing and contain the capacities described in the technical specifications.

The following information must be furnished by the contractor or manufacturer's representative:

- A complete specification for the pump station including name of all manufacturers of all components to be supplied for the specific application.
- A pump station proposal drawing illustrating complete pump station detail and layout with dimensions and including pump curves and technical specifications for all components.
- UL file number for the manufacturer (for packaged Pump Station and Control Panel – UL-508A).



- To ensure full system compatibility and single point responsibility for complete irrigation system upgrades or new installations, the irrigation central control and pump station shall be supplied by the same manufacturer.

The pumping station shall conform to all of the following specifications in all respects.

The prefabricated pump station is to have, at the station discharge isolation valve, the volumetric flow rate and pressure stated in the technical specifications.

The station shall be completely wired, piped, hydraulically, electrically, and flow tested to full station capacity at factory prior to shipment to job site. Construction shall include a fabricated steel plate and skid assembly to support all components during shipping and to serve as the installation mounting base.

It is the sole decision of the owner's representative and the irrigation designer as to whether proposed equals are accepted by the owner. An approved equal shall provide the following documentation:

- Complete specification with submittal information on all major components of the pumping system.
- Pump system drawing including top and elevation views and location and size of all major components.
- Electrical schematic
- Certification from the manufacturer that the substituted packaged pump station meets all the requirements in this specification
- Copy of the manufacturer's certificate of insurance for a minimum of \$1,000,000 coverage
- The individual components and entire packaged pump station will be UL Listed.

## 2.0 MECHANICAL

### 2.1 Base Construction

The pump base will be manufactured out of carbon steel with channel construction to provide proper structural support for all equipment mounted on the base during reasonable and competent transportation, loading and off-loading, installation and operation.

- **Pump and Deck Plate** The plating under the pumps and pump heads shall be composed of 3/8" steel, supported by 4" and/or 6" structural frame support underneath. The main structural support will be provided by the channel construction and sufficiently sized for weight and wear. The plate and channel construction shall be designed so as to be structurally sound and sufficiently rugged to withstand potential damage caused by wear or vibration. All deck plating shall be smooth steel, not diamond decked, to minimize wear points and surface area and provide superior corrosion resistance.
- **Handling hooks** for loading, off-loading and installation of the station will be provided.
- **Hardware** Easy-to-access bolt hardware shall be used to facilitate easy installation and servicing. Stainless Steel, Zinc, or Cad-plated hardware will be used to retard corrosion.
- **Welding** all deck and pump plates shall be 100% complete seam-welded. No skip welding allowed.

### 2.2 Piping Requirements



Pipe and fittings will meet ASTM A-53 Grade B steel pipe specifications. Flanges will be ANSI 150 psi-rated. Pipe will be schedule 40 or heavier.

- **Intake Manifold Pumps** shall be fed from an oversized pipe inlet manifold to minimize friction losses and eliminate air build-up. Manifold shall be sized not to exceed a speed of 7 FPS based on full flow.
- **Minimum connections** at the intake manifold shall include an inlet flange, 3/4" hose bib connection, pump inlet entrances and pressure gauge port.
- **Discharge Manifold Pumps** shall discharge into an oversized pipe discharge manifold to minimize friction losses and eliminate air build-up. Manifold shall be sized not to exceed a speed of 8 FPS based on full flow.
- **Minimum connections** at the discharge manifold shall include a 3/4" hose bib connection, pump discharge entrances, discharge flange, pressure relief valve, and pressure gauge port.
- **Fitting Pressure Rating** Threaded-type fittings welded into the piping will be rated at more than 150 PSIG working pressure.
- **Inlet and Discharge** The inlet and outlet of the system shall have an ANSI 150 PSI flange for connection to the irrigation system.
- **Pump discharge connections** to the discharge manifold will be via grooved fitting when applicable to allow for ease of pump fit-up and adjustment.

### 2.3 Powder Coating

The pump station base, all piping and supports shall be finished with a polyester powder coat paint application according to the following specifications. For normal pump station applications, polyester powder coating is the only acceptable method of paint application to ensure long life and superior corrosion resistance. Deck skids include a Zinc powder coat primer for added corrosion resistance.

- Deck skid, piping and base shall be sandblasted with garnet to a white metal finish immediately prior to paint application.
- Base, pipe, and fittings (not motors, pumps, or electrical panel) will be powder-painted with Fence Green Powder PGS8-C0651 as supplied by **Sherwin Williams**. The powder coat shall be solid in color to facilitate easy touch-ups and color matching in the field. Coating shall be applied in a single homogenous layer following the paint manufacturer's specifications with thickness of 5-7 mils. A touch up kit shall be available from the manufacturer for "touch-up" requirements in the field.
- Powder coating shall be applied to the inside of all piping 6" diameter and larger where practical, that is mounted on the pump station base to increase corrosion resistance.
- When requested, the manufacturer shall submit results of salt spray testing on a representative paint sample, as conducted by an independent third party. The coating must receive a test score of 10 out of 10 based on a 1,400 hour duration salt spray test, with no degree of rusting or blistering, as reported by the third party test facility. The testing shall follow ASTM tests, D1654, D610 and D717 per ASTM B117.

### 2.4 Valves and Gauges

- **Check valves** shall be mounted on discharge side of each pump between the discharge head and the isolation valve. They shall be of the wafer-style, silent-operating type, or as required by application, dual disk. Check valves shall pass 100% of the pump volume. They will begin to close as velocity decreases and fully close at zero velocity.





This will prevent reversal of flow. The valves shall be as manufactured by Val-Matic or equivalent. Standard construction shall be a cast iron body, Resicoat R4-ES fusion bonded epoxy coated, with a bronze disk.

- **Butterfly isolation valves** (lugged style) shall be utilized for pump isolation (inlet and discharge). Valves will be rated for 200 PSI and sized according to the manufacturer's technical specification sheet. Lever-operation shall be employed for valves 8" and smaller. Gear-operation shall be employed for valves 10" and larger. The valves shall be as manufactured by Kitz or equivalent. Standard construction shall be an epoxy coated ductile iron body, ductile iron disk, stainless steel shaft and Buna-N (or EPDM) seat and seals.
- **Discharge Isolation** A pump station discharge isolation valve (lug style) will be installed on the pump station discharge to isolate the pump station from the irrigation system. The valve will be equipped with a ten-position locking lever or gear operator. The valves will be rated at 200 PSI. The valve will be equipped with a ten-position locking lever or gear operator if 8" or larger. The valves shall be as manufactured by Kitz or equivalent. Standard construction shall be an epoxy coated ductile iron body, ductile iron disk, stainless steel shaft and Buna-N (or EPDM) seat and seals.
- **Pressure Gauges** All pressure gauges shall be mounted with an isolation valve. Gauges shall be glycerin or silicon filled and 2.5" in diameter. The gauge shall be selected so that the maximum expected operating pressure shall not exceed 75% of gauge range.

**2.5 Pressure Relief Valve** A pilot operated modulating pressure relief valve shall be installed downstream of the pump station pumps and sized per the technical data sheet.

- The valve is designed to relieve excess pressure at a designated pressure in excess of the normal operating system pressure. The valve shall be quick opening and slow closing to minimize pressure surges.
- The pressure relief valve shall not be used as an integral part of normal irrigation pressure control. The pressure relief valve shall work hydraulically and shall not be operated or opened from any electrical external source or control.
- The valve shall be factory set 15 PSI above system operating pressure (but not over any rating of a Pump Station component) and will relieve back to the wet well (or back to the lake, based on specification) when the inlet pressure exceeds spring setting on pilot.
- The valve will seal by means of a corrosion-resistant seat and resilient, rectangular seat disc.
- The valve body shall be ductile iron with 125 LB inlet and outlet flanges, and shall be rated for 250 PSI.
- A wye-strainer shall be installed in the inlet side of the valve body to provide clean water to the CRL pilot.
- A lug style butterfly valve shall be installed on the inlet of the relief valve for maintenance purposes. Specifications for this isolation valve will be the same as for the station isolation valve also found in this specification.
- It will be operational and hydrodynamically tested prior to shipping.
- Pressure relief valve shall be as manufactured by CLA-VAL.

### 3.0 ELECTRICAL



All electrical controls shall be U.L. listed. Manufacturer shall provide U.L. file number upon request. The entire panel shall be labeled as a complete U.L. listed assembly with manufacturer's label applied to the station.

### **3.1 Pump Station Electrical Enclosure and Associated Penetrations**

- The pumping station electrical controls are to be mounted in a lockable NEMA 4 steel enclosure, fabricated of 12 gauge steel, designed and built per UL 508 specifications.
- Door gaskets seals will be close-cell neoprene sufficient to protect interior components from weather and dust.
- All wiring within and interconnecting the panel and pump will be complete. Wiring troughs and cable raceways will be self-contained within the enclosure. A complete wiring circuit diagram showing all components, terminals and wiring shall be supplied. All components shall be labeled and wires shall be numbered to correspond with the wiring diagram.
- Enclosure internal components shall be mounted on a removable back panel. Component mounting screws shall not be tapped into the enclosure wall.
- Installation of water lines inside the control panel are not permitted.
- An air-to-water heat exchanger unit or air conditioner is to be utilized to cool the enclosure and remove VFD-generated heat.
- Open cooling systems that penetrate the enclosure and could allow introduction of foreign material into the enclosure are not permitted.

### **3.2 Main Electrical Disconnect**

A three-pole main electrical disconnect is to be installed inside the electrical enclosure to secure all power to the electrical panel.

- The main disconnect is to be non-fused and sized as per the manufacturer's technical data sheet.
- The main disconnect is to be interlocked with the panel door to prevent entry while disconnect is in the ON position.

### **3.3 Control Transformer (120 VAC)**

A control transformer is to provide 120V power to the pump station controls. The control transformer shall be protected on primary and secondary sides with appropriately sized circuit breakers. No load other than the pump controls shall be supplied by the control transformer.

### **3.4 Surge Suppression**

#### **3.4.1 Three Phase Surge Suppression**

Surge suppressor is to meet or exceed the following criteria and must comply with U.L. 1449 – 4<sup>th</sup> Edition:

- Maximum Discharge Current: 40,000A
- Short Circuit Current Rating (SCCR) 200KA
- Voltage protection rating at 460V, 3 Phase: L-G 2,500 V, L-L 2500V @ 3KA
- Voltage protection rating at 230V, 3 Phase: L-G 1,800 V, L-L 1800V @ 3KA
- Response time: <20 $\mu$ s

Suppressors are to be constructed of solid-state components and operate bi-directionally.

#### **3.4.2 Single Phase (120VAC) Surge Suppression**



Surge suppressor is to meet or exceed the following criteria and must comply to UL 1449 – 4<sup>th</sup> Edition:

- Surge current rating: 50,000A
- Voltage protection rating at 120V, 1 phase: L-G 700 V, L-N 700V, N-G 1500V.
- Response time: <1ns

Suppressors are to be constructed of solid-state components and operate bi-directionally.

### **3.5 Secondary Control Circuit (24VDC)**

Appropriately rated single-pole secondary distribution circuit breakers are to supply power to the 24 VDC control transformer for powering PLC inputs and outputs as well as the pressure transducer, and any other 24 VDC circuits as specified.

### **3.6 Motor Protection**

Motors are to be protected from an over-current condition via the use of industrial grade circuit breakers of the type manufactured by ABB or equivalent.

- The circuit breakers will be fast acting, low peak, current limiting, and meet (A.I.C.) as required by UL.
- The utilization of fuses for main motor protection is not permitted.
- Bi-metallic thermal overloads will be utilized for motor protection.
- Phase and voltage imbalance as well as phase loss conditions shall be monitored and alarmed by devices listed in section 3.8 below.

### **3.7 Motor Starting**

Motors that are started across the line shall use industrial grade IEC rated motor starters sized equal to or larger than the rated motor load (per manufacturers data sheet) and will be of the type manufactured by Mitsubishi or equivalent. Motor starters shall have a mechanical endurance rating of 5 million operations for loads over 40 amps and 10 million operations for loads under 40 amps. Temperature rating shall be from -20 to +55 °C. Non-reversing contactor designs shall include mechanical and electrical interlocking capability.

Motors that are started by VFD shall use parameters as described in Section 4 below.

### **3.8 Main Line Power and Phase Monitor**

The incoming power will be monitored by a phase loss/low voltage system relay to de-energize the pump station control circuit or motor contactor if a phase failure, phase reversal or low voltage condition occurs.

- If the maximum number of attempted automatic re-starts is reached and the phase failure/low voltage alarm condition remains, the alarm will be required to be manually reset.
- Individual motor overloads will also act as phase monitors for each motor.

### **3.9 Electrical Power**

Pump station electrical wiring is to conform to NEC Standards. All wiring from control panels to motors is to use UL listed, water tight, flexible conduit with copper conductors rated not less than 600 volts. Wires are properly sized to carry the full load amperage of the motors without exceeding 70% capacity of the conductor. A grounding cable sized to NEC requirements shall be included in the flexible conduit. There shall be no splices between the motor starters and the motor connection boxes.



## 4.0 CONTROLS

### 4.1 Programmable Logic Controller

The Programmable Logic Controller (PLC) shall handle all control logic in the pump station. Control software is to be parameter driven and allow user to easily change ALL operational parameters via HMI. The PLC shall be of the type manufactured by Mitsubishi, or an approved equal, and meet the following specifications:

- **Program memory:** EEPROM memory
- **Setting switch:** RUN/PRG selector switch
- **LED indication:** POWER, RUN, ERROR, BATTERY, LED, I/O

### 4.2 Variable Frequency Drive (VFD)

#### 4.2.1 VFD Manufacturer

- The Variable Frequency Drive shall be as manufactured by Mitsubishi Electric Automation, Inc. or Delta
- The VFD control technique shall employ pulse width modulated (PWM) control.
- Private labeled products are not permitted.

#### 4.2.2 VFD Environmental Ratings

- The VFD shall be designed to operate in the following Ambient Temperature range:  
Non-freezing.
  - Variable Torque and Constant Torque loads: -10C to +50C (14 to 122F).
- The storage temperature shall be -20C to +65C (-4 to 149F), non-condensing. Applicable for short periods, such as during transit.
- The maximum relative humidity shall be 90% at 50C (122F), non-condensing.
- The VFD shall be rated to operate at altitudes less than or equal to 1,000m (3,280ft).
- For altitudes above 1,000m (3,280ft) the VFD shall be de-rated as follows:
  - All sizes: Reduce the rated output current (Amperes) by 3% for every 500m (1640ft), up to 2,500m (8,200ft) maximum (91% of rated).
  - Consult factory for higher altitudes.

#### 4.2.3 VFD Ratings

The VFD shall be designed for operation with the following input voltages.

- 1Hp to 75Hp using nominal 230VAC input voltage.
  - 170-242Vac 50HZ
  - 170-264Vac 60Hz
  - 200-240Vac (+10%/-15%)
- 1Hp to 800Hp using nominal 480VAC input voltage.
  - 323-528Vac 50/60Hz
  - 380-480Vac (+10%/-15%)
- The input voltage frequency range shall be 47.5 to 63 Hz.
- The displacement power factor shall not be less than 0.93 with optional DC line reactor at 100% load factor. (DC reactor shall be standard for VFD's of 100HP and above.)
- The efficiency of the VFD at 100% speed and load shall be not less than 95%.

#### 4.2.4 VFD Protection



- The VFD shall be U.L. 508C-Listed for use on distribution systems with 65kA rms available fault current, based upon the UL short-circuit test.
- The VFD shall be protected against short circuits between the output phases & ground and the logic & analog outputs.
- Once operational, monitoring shall continually take place and an abnormality will result in an alarm.
- For a fault condition other than an internal fault, an auto restart function shall provide up to 10 programmable restart attempts. The programmable time delay before each restart shall range from 0 to 10 seconds.
- The deceleration ramp of the VFD shall be programmable for normal and fault conditions.
- The VFD shall include Metal Oxide Varistors (MOVs) wired to the incoming AC terminals.
- The VFD shall be insensitive to input power phase sequence.
- The VFD shall monitor the main circuit capacitors, control circuit capacitor, in-rush suppression circuit, and cooling fan and shall provide a pre-alarm so that maintenance can be scheduled.
- The VFD shall include parameter selectable input and output phase loss protection.

#### **4.2.5 VFD Adjustments and Configurations**

- The VFD shall store the last eight (8) alarm faults and data at time of fault. The data shall include output frequency, output current, output voltage and VFD operation time at fault occurrence.
- The VFD shall have selectable settings for accel/decel times, torque boost, base frequency, stall prevention frequency and current, and output frequency detection functions.
- The VFD shall be able to limit motor rotation to only one direction.
- The VFD shall have current detection functions which are able to trigger individual alarms.
- High output current detection.

#### **4.3 Main Motors – VFD Start Selection**

This section refers to the VFD start selection protocol to start the main motors. An intermediate pump shall have a separate dedicated VFD if quoted. VFD's shall be used to start the main motors in one of two following methods, as specified by the irrigation designer. The technical specifications at the end of the document shall be considered as accurate if any question regarding the approved method for this station.

##### **4.3.1 Single VFD**

One single VFD shall be employed to start the main motors. The VFD shall start the lead motor and all subsequent motors will be started with direct across-the-line power. After each irrigation event is complete, the next motor in line will be designated by the control software as the lead motor. It shall be started with the VFD and the remaining motors will be started with direct across-the-line power. This process will continue with each successive irrigation event, alternating the lead motor to maintain consistent motor/pump operation times. In systems with more than two main motors, the following protocol shall be followed:

- a) The lead motor will be started with the VFD. Accumulated operating hours of the remaining motors will be evaluated and the motor with the lowest operating hours shall become the next lead motor to be started during the next irrigation event.



- b) Accumulated operating hours for the main motors are to be maintained with +/- 8 hours of each other.

#### **4.3.1. Dedicated VFD for each Motor**

If specified, the manufacturer shall design the pump station with a separate, dedicated VFD for each motor on the station. The "VFD per motor" option is employed for improved motor operation in locations with poor or inconsistent power quality, reducing the surge on pump starts, increased motor protection, reducing motor starting current, and extending motor life.

With VFD per motor, the lead motor will be started by the VFD and ramped up based on demand. When the lead motor is at full speed, the next motor in the sequence will be started via its dedicated VFD and will become the lead motor. The lead motor will continue to be ramped to full speed based on demand. If more than two main motors, the remaining motors will be started via dedicated VFD's in this same manner, with the lead motor adjusting to maintain pressure and the following motors running at full speed on the VFD(s). After each irrigation event, the motor with the lowest hours will become the lead motor started by its dedicated VFD. The following motors will also be started via dedicated VFD's in the same manner based on run time. In systems with more than two main motors, the following protocol shall be followed:

- a) The lead motor will be started with the VFD. Accumulated operating hours of the remaining motors will be evaluated and the motor/pump with the lowest operating hours shall become the next lead motor to be started during the next irrigation event.
- b) Accumulated operating hours for the main motors are to be maintained with +/- 8 hours of each other.

#### **4.4 Alarms**

Standard alarm features that shall be included as a minimum are as follows:

- Emergency Stop
- Low discharge pressure
- High discharge pressure (attempts restart)
- Low water level (attempts restart)
- Phase loss (attempts restart)
- Low voltage (attempts restart)
- VFD fault (shutdown VFD pump only and attempts restart)
- Flow meter fault
- Motor over temperature (optional)
- High Flow
- Excessive pump starts (shut down pump if any user selectable limit is exceeded)

All alarms will be indicated on the touch screen operator interface. Specific alarm conditions will be displayed in English on the touch screen operator interface. Pilot light indicators shall not be acceptable.

#### **4.5 Color Touch Screen Operator Interface (HMI)**

The Color Touch Screen Operator Interface also commonly known as Human Machine Interface (HMI) is to be a full-color 8.4 inch NEMA 4 rated touch-screen unit. It shall be mounted in the enclosure door. The HMI shall be able to access all pump information,



including but not limited to logging, alarm, and current status readings. It shall have a minimum data storage capacity of 4.0 GB of memory with a USB connection on the front panel for data accessibility. The HMI shall be able to select and change all pump and pressure settings while protecting the system from accidental programming errors by password protecting sensitive set up readings.

The use of a text display operator is not permitted.

The HMI shall be multilingual (English, Spanish, French (Canadian), Chinese (Mandarin), German and Swedish) and shall show the following information on a default screen:

- Current PSI actual and set point
- VFD Speed %
- Volumetric Flow Rate
- Fault conditions
- Pump selected for VFD operation
- Pump operation select position (Manual/Off/Auto)
- Pumps operating

PLC bypass switches shall be mounted on the front of the NEMA 4 electrical panel to allow the user to manually operate pumps should the PLC experience a failure.

- Individual Auto / Off / Manual switches for each pump.
- The three position Auto/ Off / Manual switches are illuminated when pump is activated.

An Emergency Stop button shall be mounted on the front of the NEMA 4 electrical panel to enable the user to shut the pump station down in an emergency situation.

#### **4.6 HMI Operation**

The HMI shall have the following capabilities.

- Individual pumps including the PM Pump can be enabled or disabled. The display will indicate color-coded operation as follows:
  - Ready to Start Automatically (Yellow)
  - Off (Grey)
  - Running across-the-line (or at full speed) (Green)
  - Running utilizing VFD (Blue)
  - Alarm (Red)
  - Enabled but not in Auto (Purple)
- Alarm and Alarm Reset
- Password Protection
- Trends Screens
  - Flow Graph
  - Pressure Graph
  - Running Pumps Graph
  - VFD Speed Graph
  - Backup abilities to external flash drive
  - User definable maximum values trends adjustment
- Preset Pressure: Setpoint pressure shall be adjustable based on specification. Also with automatic adjustment per operating pump increasing or decreasing up to 10 psi upon each pump start. Each pump start allows station setpoint adjustment from -99 to 99 psi upon start. Allows user to maintain a lower setpoint when not operating the



pumping station for irrigation use and to variably increase as demanded flow increases. Additional external signal setpoint increase or decrease of 10 psi shall be provided.

- Main Pump Start and Stop Pressure Settings: The HMI shall allow for user defined start and stop margins and delays for both small and large under or over pressure setpoints and delays. The interface shall have a user-defined delay for a second pump start to prevent cycling a pump on and off that is not required for the demand flow.
- PM Pump Adjustments: The HMI shall allow for user defined start and stop margins and delays for both small and large under or over pressure setpoints and delays. Additionally, flow values for when the PM pump is active (or not) shall be used if the system is equipped with a Flow Meter.
- Flow Meter Adjustments: The HMI shall allow for flow meter operational settings for managing lead pump on / off control.
- Soft Starting (line re-pressurization) Adjustments: The HMI shall allow the station to ramp up system pressure upon falling below a user-defined setpoint. This pressure ramp up feature shall allow for a pressure rise over a user-defined time interval. Note: The intended function of this program is to refill lines during re-pressurization, not initial fill of lines during an event like spring start-up or initial fill which should be done with direct supervision.
- VFD Bypass: The HMI shall allow for all main pumps to be operated Across the Line (ATL) without use of the VFD. This may be used for emergency operation upon VFD failure on systems with single main motor VFD's and with non-reversing contactors.
- Filter Flushing Adjustments: The pumping station shall be capable of flushing up to 8 filters periodically per user-defined time interval. It shall provide a user-defined flush mode, differential pressure adjustment up to 7 PSI, and an adjustable flushing time per element. A flushing counter shall be provided with reset abilities. The HMI must allow for manual flush operation.

#### **4.7 Pressure Transducer**

A solid state pressure transducer shall be used to provide all pressure signals for the pump station control logic.

- The transducer shall provide a noise free, linear output proportional to discharge pressure.
- The transducer shall be solid-state, strain gauge type with integral voltage regulation and output accuracy not less than 0.25%.
- The pressure transducer is to be constructed of stainless steel and rated for system pressure.
- Plastic pressure transducers are not permitted.

#### **4.8 Flow Meter:**

A flow meter is to be installed for providing the pump station flow rate and total flow through the operator interface. Optionally, one of two different meters may be specified, as indicated below. If not clarified, the technical data sheet at the end of the document shall be considered as accurate.

##### **4.8.2 Magnetic Flow Meter**

A magnetic flow meter shall be installed for providing the pump station flow rate and total flow through the operator interface. Meter must be installed with at least 5 upstream and 2





downstream pipe diameters of straight uninterrupted flow to yield the accuracies listed below. The magnetic flow meter shall meet the following specifications:

<b>Flow Range:</b>	0.8 - 40 fps (0.24-12 m/s)
<b>Minimum Conductivity:</b>	5 micro siemens/cm
<b>Accuracy:</b>	± 0.55% or better with velocity between 6-40 fps. ± 0.65% or better with velocity between 1.6-6.0 fps.
<b>Electrode Materials:</b>	Standard material shall be Hastelloy® C
<b>Pressure Limits:</b>	Upper pressure limit, unless specified otherwise, shall be 150 psi (10Bar)
<b>Coil Power:</b>	DC power shall be supplied to the meter
<b>Ambient Temperature:</b>	-20°F to 149°F, (-28°C to 65°C)
<b>Meter Housing Material:</b>	Carbon Steel welded
<b>Flanges:</b>	Carbon Steel - Standard (ANSI B16.5 Class 150 RF)
<b>Meter Enclosure Classification:</b>	NEMA 4

## 5.0 PUMP AND MOTOR ASSEMBLIES

The pump station manufacturer will adhere to the following specifications in all areas.

### 5.1 Main Irrigation Pumps

- All main irrigation pumps are to be supplied from the same manufacturer and manufactured according to Hydraulic Institute standards and per ANSI Specification No. B58.1. The pump manufacturer will have a network of worldwide service centers, which will have spare parts and service technicians to address service, repair and warranty issues.
- The main pump(s) shall be designed for continuous operating service and constructed as follows to meet the intended service.

The horizontal close coupled end suction centrifugal pump shall be directly coupled to the motor. The keyed straight bore impeller shall be mounted directly to the motor shaft. The pump and motor shall be connected by an ASTM A48 Class 30 close grain Grey Iron bracket with machined registers to assure proper alignment.

The pump casing shall be tangential discharge of back pullout design allowing for removal of rotating element without disturbing piping connections. The casing shall be constructed of close grain Cast Iron of ASTM A48 Class 30. All casing sections shall have heavy wall thickness to provide long life under abrasive and corrosive operating conditions. All mating surfaces shall have register fits to ensure proper alignment. Piping connections shall be ANSI 125# flat face drilled flange.

The impeller shall be constructed of ASTM B584 Silicon Bronze, designed and machined to optimize performance and operating efficiencies. Internal vane edges shall be well rounded to optimize smooth flow. Impeller shall have a straight non-tapered bore, be dynamically balanced, keyed to the shaft and further secured with a Stainless Steel washer and a Stainless Steel impeller lock-screw. The impeller shall be fixed at location with no expected or required adjustment.



The Type 21 mechanical seal shall be constructed with 18-8 SS metal parts, "Buna N" rubber bellows, ceramic stationary face and carbon rotating face.

The shaft shall be of high strength Alloy Steel. The shaft shall be accurately machined and polished and of sufficient size to transmit full driver output without excessive flexure or stressing. All steps in the shaft shall be radiused to reduce stress concentrations. Shaft shall be protected by a renewable AISI 303 SS shaft sleeve.

- **Operating Speed:** The main pumps are to operate at 3500 RPM for 60 Hz applications. (2950 RPM for 50 Hz applications).
- **Pump Thermal Switch:** The pump system shall fault and shut down in the event the pump volute exceeds 120 degrees F.

### **5.2 Pressure Maintenance Pump**

The pump shall be of the vertical multi-stage centrifugal design. The pump shall be furnished as shown on the plans and installed in accordance with the recommendations of the manufacturer. The pump suction/discharge chamber, motor stool and pump shaft coupling shall be constructed of cast iron. The impellers, pump shaft, diffuser chambers, outer discharge sleeve, impeller seal rings and seal ring retainers shall be constructed of stainless steel. The pump impellers shall be secured directly to the pump shaft by means of a splined shaft arrangement. The shaft journal and chamber bearings shall be Tungsten Carbide and Ceramic. The pumps shall be equipped with a high temperature mechanical seal assembly with Tungsten Carbide/Carbon or Tungsten Carbide seal faces mounted in stainless steel components.

- The PMP shall be sized to prevent main pump cycling.
- The PMP shall perform as specified in the Technical Specifications.

### **MOTORS**

**5.3** The motor is to be of the type manufactured by Baldor, U.S. Motor, or approved equivalent. All motors furnished are to be designed, manufactured, and tested in accordance with the latest applicable standards of NEMA, ANSI, IEEE, and ASTM. As a minimum requirement, all motors shall conform to the latest applicable sections of NEMA Standard No. MG-1. Motors shall include the following features:

- Motors shall be designed for continuous duty operation, NEMA design B with a 1.15 Service Factor.
- Totally Enclosed Fan Cooled (TEFC) Motors are to be furnished with class "F" or "H" insulation. Open Drip Proof (ODP) Motors are to be furnished with class "F" or "H" insulation.
- Motor nameplate shall be mounted on enclosure with stainless steel fastening pins. Nameplate shall have, as a minimum, all information as described in NEMA Standard MG 1-20.40.1.
- Motors shall have a NEMA T frame with NEMA F1 assembly for horizontal mounting.
- Enclosures shall be rolled steel band or cast iron.

**5.4** The pressure maintenance motor shall have a NEMA C face and shall operate at a nominal 3500 RPM (2950 RPM for 50 Hz applications).with a minimum service factor of



1.15. Drive-end motor bearings shall be designed to absorb thrust and shall be adequately sized to ensure long motor life.

## **6.0 REMOTE MONITORING AND CONTROL PACKAGE**

Pump station manufacturer shall provide the following remote monitoring system. Remote monitoring and control software shall have been developed internally by the pump system manufacturer and shall operate within the Windows® operating platform.

### **6.1 Remote Pump Station Control and Monitoring.**

Pump station monitoring software shall be included with the pump station. The software shall be 100% compatible with the Microsoft Windows operating system. Software shall be graphical in nature with full (point and click) mouse control. The monitoring system shall be capable of communicating via an Ethernet IPv4 connection. The pump station software shall be field configurable for hardwired Ethernet extenders or 900MHz Ethernet enabled radios.

The software shall include functionality in flow rate units of GPM, m<sup>3</sup>/hr, l/s. The software shall allow pressure units of psi or bars. The software shall include the following languages: English, Swedish, German, French, Spanish, or Portuguese. The software shall have user defined logging abilities of Alarms, Data, and Events. The software shall allow user defined maximum values for pressure and flow trends. The software shall allow up to 10 individual pump stations to be monitored and controlled.

The software shall enable users to locally and/or remotely access (the same or multiple) pump stations simultaneously. All require hardware at the pump station (other than computer, monitor screen, and direct burial cable) shall be supplied by pump station manufacturer.

Pump Manager 2 software shall be included. The following parameters can be monitored by the user on a remote computer:

- Individual pump operating status. The status shall be color-coded as:
  - Enabled – Yellow.
  - Disabled – Gray.
  - Running – Green.
  - Alarm – Red.
- Preset Operating Pressure can be viewed and adjusted remotely.
- Actual discharge pressure and flow rate can be viewed remotely
- Graphical display of historic discharge pressure and flow rate.
- VFD controlled Pump speed can be viewed remotely.
- Active alarms or faults can be viewed remotely and adjusted or reset.
- Communication connectivity status can be viewed remotely.

Manufacturer shall provide the capability to monitor and control the pump system from a remote location. The following equipment shall be supplied by owner. Pump Monitor software program shall require:

- PC with Intel Core I5 – 10600 @ 3.3 Ghz processor, 12MB Cache or better
- Microsoft Windows 10 Pro OR Windows Server Essentials 2019 operating system
- 16 GB or RAM minimum



- Hard disk space required: 1 TB
- CD-ROM drive
- 6 Serial (RS232/Com) ports, 1 parallel port
- Ethernet port, a second port may be necessary to create two networks. One network for standard Internet access and the other network for pump station access.

Monitoring software shall be user configurable. Communications shall be capable of the following basic modes but as specified in the technical information and specifications section:

- **Rain Bird MCA** - The Pump Station will communicate to the cloud with a cellular modem kit that is pre-configured and managed by Rain Bird. Customer to verify adequate cellular signal at pump house.

### **7.0 TESTING REQUIREMENTS**

The pump station manufacturer shall have on their premises a complete hydraulic flow testing facility, capable of testing pump stations to 100% of pump station design capacity with all pumps fully engaged.

Prior to shipment, the pump station shall be fully assembled at the manufacturing facility, including the assembly and mounting of pump shafts, pump heads and motors. The station shall be hydraulically flow tested to design capacity across a full range of operating parameters to ensure that all components are operational and in proper working order. Any required calibrations will be performed during this factory test. All electrical Amperage draw measurements and calibration / control adjustments and settings will be recorded in the operation manual test section.

The complete pumping system shall operate without undue vibration throughout the range of operating conditions. The unit shall be given a running test of normal start and stop conditions under load. Any defects shall be corrected and adjustments made at the expense of the manufacturer. Test shall be repeated until satisfactory results are obtained and operation is deemed satisfactory.

### **8.0 ON-SITE PUMP INSTALLATION**

Off-loading and installation of the pump station shall be the responsibility of the customer or designated representative, unless specifically agreed upon in writing between the interested parties. The equipment utilized to off-load and install the pump station shall be provided by the customer or his/her designated representative unless specifically agreed upon in writing between the interested parties.

Following the installation of the pump station, the complete pumping system shall be given a complete test across the full range of operation.

### **9.0 TRAINING REQUIREMENTS**



The pumping system manufacturer shall provide training for the end user on proper operation of the pumping system. The training will be performed on the actual installed equipment after such time as installation, startup, and calibration have been completed.

**10.0 WARRANTY**

Rain Bird guarantees that its pump station will be free of manufacturer defects for three years from the date of start-up but not beyond forty months from the date of purchase by the original customer with a copy of the seller's invoice required for coverage under this Policy. Rain Bird's Professional Customer Satisfaction Policy is attached at the end of this document for additional reference.

**11.0 OPTIONAL EQUIPMENT**

The following optional equipment can be provided by the pump station manufacturer per customer request. If specified, the equipment will be listed in the Technical Specifications.

- 1) Fabricated steel intake z-pipes for main and booster pump
- 2) 4" electric butterfly valve (on/off) located on the intake line of the 10HP pump for city water. The 10HP pump is to also act as a booster pump for the city water if the water level in the well gets too low. This includes an extra check valve on the intake, so water doesn't dump into the wet well.
- 3) 6" passive intake screen with foot valve assembly for main pump intake line
- 4) 4" passive intake screen with foot valve assembly for 10HP pump intake line
- 5) Lake level control circuit: lake level floats
- 6) 3KVA Power Zone Transformer 115V/230V single phase with load center
- 7) 6" auto-flush wye strainer with 1/8 in. perforated screen

**12.0 TECHNICAL INFORMATION**

**Total Pump Station Design Requirements**

Irrigation Zone	Design Flow Rate (GPM)	Design Pressure (PSI)
1	430	110

**Required Incoming Power**

	Voltage	Amperage	Phase	Hertz
Service Entrance	480	89	3	60

**Pump Station Main Disconnect**

	Amps	Volts
Service Entrance	125	480

**Variable Frequency Drive**

Ambient Temperature	-10 °C to +50°C (non-freezing)
Ambient Humidity	90% relative humidity (non-condensing)



<b>Maximum Efficiency</b>	96% full load
<b>Frequency Rating</b>	100% at rated load, 120% OL / 1 min, 150% OL / 3 sec

**Standard Safeties**

Incoming Phase Failure, Phase Reversal, Low Voltage, and High Voltage Safety
Individual motor over load protection
High and Low Discharge Pressure Fault Alarm
Low Water Level Safety
High Flow Fault Alarm

**Motor and Pump Data**

	<b>PMP</b>	<b>Intermediate Pump</b>	<b>Main Pumps</b>	<b>Units</b>
<b>Motor Power</b>	NA	10	40	HP
<b>Motor And Pump Speed</b>	NA	3600	3600	RPM
<b>Motor Service Factor (Sine Wave Power)</b>	NA	1.15	1.15	-
<b>Motor Type</b>	NA	TEFC	TEFC	-
<b>Motor Full Load Amperage</b>	NA	11.5	45	Amps
<b>Motor Protector Setting</b>	NA	14	52	AMPS
<b>Motor Circuit Breaker Rated Operational Current</b>	NA	20	80	AMPS
<b>Motor Circuit Breaker SCCR Rating</b>	NA	25,000	25,000	AMPS
<b>Motor Starter Type</b>	NA	VFD	VFD	-
<b>Altitude De-rating Factor For Main Motors</b>	NA	0%	0%	%
<b>Individual Motor Exhaust Fan Requirements</b>	NA	170	680	CFM
<b>Total Station Exhaust Requirements</b>	850			CFM
<b>Individual Pump Flow Rates</b>	NA	80	350	GPM
<b>Individual Pump Total Dynamic Head</b>	NA	285	285	FEET



<b>Pump Efficiency at Design Flow Rate</b>	NA	72.5	73.6	%
<b>Maximum Pump Shut Off Head</b>	NA	320	300	FEET
<b>Pump Discharge Size</b>	NA	4"	2.5"	INCHES
<b>Check Valve Size</b>	NA	4"	6"	INCHES
<b>Check Valve Maximum Pressure Rating</b>	NA	200	200	PSI
<b>Check Valve Pressure Loss at Design Flow Rate</b>	NA	.9	1.4	PSI
<b>Pump Isolation Valve Size</b>	NA	4	6	INCHES
<b>Pump Isolation Valve Maximum Pressure Rating</b>	NA	200	200	PSI
<b>Pressure Relief Valve Size</b>	2			INCHES
<b>Station Isolation Valve Size</b>	6			INCHES
<b>Station Isolation Valve Maximum Pressure Rating</b>	200			PSI

All Motors to be VFD rated, Motor Starting Code G, Design B, and Class F or H Insulation

**Pump Seals**

<b>Mechanical Seal</b>	X
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**Pump Station Discharge Information**

Zone	Isolation Valve	Meter Run Size	Meter Type
1	6"	4"	Mag

**Power Zone**

<b>Size</b>
3KVA

**Remote Interface & Alarm Notification**

<b>Ethernet Extender Modem</b>		<b>Ethernet Radios</b>		<b>Rain Bird MCA</b>	X
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**Fertigation System Interface**

Optical Isolator	X	Run Relay	X
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**Panel Cooling**

Air Conditioner		Heat Exchanger	X
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**Lake Level Control Circuit**

Floats	X	Transducer - Analog	
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**Boost and Suction Lift Parameters**

Lift Height	6'
Inlet Pressure	70 PSI (10HP pump only)
Discharge Pressure	110

**Rain Bird Pump Station Professional Customer Satisfaction Policy Terms and Conditions**

Rain Bird guarantees that its pump station will be free of manufacturer defects for three years from the date of start-up but not beyond forty months from the date of purchase by the original customer with a copy of the seller's invoice required for coverage under this Policy. Start-up or service by anyone other than a Rain Bird authorized representative, when required, will void these terms and conditions.

Provided that all installation, start-up, operation responsibilities, and recommended maintenance procedures have been properly executed and performed by authorized Rain Bird representatives, when required, Rain Bird will replace or repair, at Rain Bird's option, any Rain Bird part found to be defective under normal recommended use during the effective period of this Policy, such evaluation to be solely determined by Rain Bird. Rain Bird's only obligation and customer's exclusive remedy under this Policy is limited to repair or replacement, at Rain Bird's option, of the parts or the products the defects of which are reported to Rain Bird within the applicable Policy period, which prove to be defective and such evaluation will be solely determined by Rain Bird.

In no case will Rain Bird cover labor costs associated with repair or replacement of parts beyond one year from date of start-up. Repairs performed and parts used at Rain Bird's expense must be authorized by Rain Bird, in writing, prior to repairs being performed. Product repairs or replacement under this Policy will not extend this Policy. Coverage for repaired or replaced product shall end when this Policy terminates. Rain Bird's sole obligation and customer's exclusive remedy under this Policy shall be limited to such repair or replacement.

Upon request, Rain Bird may provide advice on trouble-shooting a defect during the effective period of this Customer Satisfaction Policy. Repair service must be performed by a





Rain Bird authorized representative regardless of whether the labor is covered by Rain Bird or is at the owner's expense during the effective period of this Policy. However, no service, replacement or repair under this Customer Satisfaction Policy will be rendered while the customer is in default of any payments due to Rain Bird

Rain Bird will not accept responsibility for costs associated with the removal, replacement or repair of equipment in difficult-to-access locations and such evaluation will be solely determined by Rain Bird. Difficult-to-access locations include (but are not limited to) locations where any of the following are required:

- 1) Cranes larger than 15 tons
- 2) Divers
- 3) Barges
- 4) Helicopters
- 5) Dredging
- 6) Roof removal or other such construction/reconstruction requirements
- 7) Any other unusual means or requirements

Such extraordinary cost associated with difficult-to-access locations shall be the sole responsibility of the customer, regardless of the reason requiring removal, repair or replacement of the equipment.

The terms and conditions of this Customer Satisfaction Policy do not cover damage, loss or injury caused by or resulting from the following:

- 1) Misapplication, abuse, or failure to conduct routine maintenance (to include winterization / winter lay-up procedures).
- 2) Pumping of liquids other than fresh water as defined by the U.S. Environmental Protection Agency, unless the pump station quoted by Rain Bird specifically lists these other liquids and their concentrations.
- 3) Use of pesticides (to include insecticides, fungicides and herbicides), free chlorine or other strong biocides.
- 4) Exposure to electrolysis, erosion or abrasion.
- 5) Use or presence of destructive gases or chemicals unless these materials and their concentrations are specified in the Rain Bird quotation.
- 6) Electrical supply voltages above or below those specified for correct pump station operation.
- 7) Electrical phase loss or reversal.
- 8) Use of a power source other than that specified in the original quotation.
- 9) Non-WYE configured power supplies such as open delta, phase converters or other forms of unbalanced three phase power supplies
- 10) Improper electrical grounding or exposure to incoming power lacking circuit breaker or fused protection.
- 11) Using the control panel as a service disconnect.
- 12) Lightning, earthquake, flood, windstorm or other Acts of Nature.
- 13) Failure of pump packing seal (unless the failure occurs on initial start-up).
- 14) Any damage or loss to plants, equipment or groundwater or injury to people caused by the failure of or improper use of an injection system or improper



concentration of chemicals or plant nutrients introduced into the pump station by an injection system.

- 15) Any failure of nutrient or chemical storage or spill containment equipment or facilities associated with the pump station location.

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Pump Station Professional Customer Satisfaction Policy January 26, 2016