**1.0 GENERAL**

1.01 Description

The pumping system shall automatically supply water to the commercial irrigation system. The manufacturer shall be solely responsible for providing manufacturing, warranty and service of a prefabricated, skid mounted, fully automatic variable speed pumping system for the irrigation system. The pumping system shall automatically maintain a pre-set discharge pressure at varying flow demands within the flow rating of the station. The pumping system shall conform to all specification documents. The complete pumping station shall be built in accordance with applicable standards for usage and safety. The manufacturer shall provide a complete set of general arrangement drawings, electrical diagrams, and control panel schematics with the operation and service manual.

1.02 Scope

Include all components necessary to construct a complete pumping system capable of delivering water to the irrigation system at the designed pressure and flow rate. The pump station shall be a completely skid mounted horizontal centrifugal pump station built by a single manufacturer. All equipment including, but not limited to pumps, motors, valves, instrumentation and controls shall be mounted on an aluminum base to form a complete operating pumping system. Pumps and motors shall be removable for servicing purposes.

1.03 General Specifications

A. The pumping station shall include the pumps, motors, valves, discharge manifold, control panel, and all accessories.

B. The prefabricated pumping system shall be a factory fabricated and tested system with all components completely piped, wired and assembled on an aluminum skid before shipment.

C. All pumping station components shall be supplied by, and be the responsibility of one pumping system manufacturer.

D. The pumping system shall be completely assembled and tested at the manufacturer’s facility prior to shipping to assure operation and performance. Job site start up shall be limited to minor adjustments for site conditions.

E. The pumping system shall be model Simplicity SIMP23053PHBP as manufactured by Munro.

1.04 Station Capacities

1. The pumping station shall have a total capacity of pumping no less than XX gpm of water at XX psi at the station discharge. Utilizing a minimum dynamic XX psi for maximum coverage.

B. The maximum pump speed shall be 3,600 RPM.

C. Pump motors shall operate at 230/460 volt/60 hertz, 3 phase.

**2.0 MATERIALS**

2.01 Pump

1. Volute:Volute shall be of heavy-duty cast iron ASTM-A48. NPT threaded pipe connections shall be standard. Volute shall be capable of withstanding maximum working pressures of 150 psi. Discharge orientation shall be in the vertical position. 1/4" NPT plugged pipe taps will be available for draining of the volute.
2. Impeller:All impellers shall be of enclosed design and balanced for smooth, vibration free operation. Impellers shall be of bronze, ASTM B124.
3. Mechanical shaft seal:The shaft seal assembly shall be composed of a Carbon rotating face, Ceramic stationary, Nitril elastomer and 300 series stainless steel hardware as standard. Temperature rating shall be 212°F maximum.
4. Shaft sleeve:The shaft sleeve shall be a slip-fit, replaceable o-ring design.

2.02 Electric Motor

A. The pump drive motor shall be of a NEMA standard design, 182JM frame, ODP, footed, close-coupled. Motors shall be of manufacturers standard catalog design. The motor rating shall be: 5 hp, 230/460v, 3ph.

2.03 Pump Station Skid

A. The pump station base shall provide proper structural support for all attached equipment and shall provide sufficient rigidity to withstand the stresses from reasonable transportation to site, off loading, installation, and operation.

B. The main structural members shall be constructed from medium weight channel aluminum.

C. The pump station skid shall incorporate into its structure provisions for off-loading and handling at the site of installation. These lifting points shall be an integral part of the structure.

D. The base shall include a 1/4" aluminum.

2.04 Station Enclosure

1. The pumping system enclosure shall be weather resistant and manufactured entirely of aluminum. The enclosure shall have a lockable, hinged door for easy compartment access. Ventilation louvers are mounted in the enclosure. The vent louvers shall have rodent protective guards. Shall be powder coated Desert Tan.

2.05 Piping, Manifold, Valves

A. All piping shall be ASTM A53 Schedule 40 pipe.

1. Manifold piping shall be 3” carbon steel.
2. Piping shall be assembled by means of mechanical groove fittings.
3. The structural base, piping and supports shall be cleaned and coated with an electrostatic epoxy. The finish coat shall be polyester to a thickness of no less than 3 mills.

2.06 Pump Check Valve

1. The pump station shall have a check valve bolted to the pump discharge, sized so that pressure drop does not exceed 2.0 psi.
2. Check valves shall be of the center guided disc operating type with built in spring.

2.07 Pump Isolation Valves

1. The pump shall be equipped with a groove fitted butterfly isolation valve.
2. Isolation valve shall be sized as shown on the technical data sheets.

2.08Pressure Gauges

A. Pressure and vacuum gauges shall be mounted on the suction and discharge header on top of an isolation ball valve.

B. Gauges shall be silicon filled, accurate within 2% and 2 1/4” in diameter.

C. Range shall be at least 30% higher than the highest pressure attainable from the pumps at shutoff head conditions.

2.09 Pump Station Isolation Valve

1. An isolation valve of the same line size as the discharge spool, shall be installed on the outlet of the pump station to allow for complete isolation of the pumping system from the irrigation system.
2. The valve shall be of the groove style butterfly type with a one-piece body cast from ASTM A536 ductile iron.
3. The valve shall have a lever operator and shall be rated at 175 psi.

**3.0 ELECTRIC EQUIPMENT (CONTROL PANEL)**

3.01 Circuitry

1. The control panel shall include all logic circuitry to provide for the timed sequence, start-up and shutdown of all pumps. A pump start relay shall be provided for an alternate starting option.
2. All relays, terminal strips, and other necessary equipment shall be enclosed in a Type 1, U.L. approved enclosure.
3. The Variable frequency drive shall be mounted separately from the enclosure in order to access all programming parameters.
4. The following features shall be included as standard:
   1. Loss of prime safety
   2. Phase unbalance, phase reversal, loss of phase protection
   3. Low voltage safety protection
5. The control panel shall include all magnetic starters, relays, transformers, pressure sensors and various safety devices for the operation and protection of the pumping station.
6. A custom logic program embedded in the VFD controller shall be provided to perform the sequence of operation. Use of PLCs not acceptable.

3.02 Control Enclosure

1. Control interface equipment shall be housed in a Type 1 enclosure.

3.03 Service Disconnect

1. Provisions shall be to completely isolate all control and motor starting equipment from incoming power by a non-fused disconnect of adequate size.
2. A service disconnect shall be mounted inside the station enclosure.

3.07 Variable Frequency Drive

1. The variable speed drive shall be a digital, pulse width modulation (PWM) variable frequency drive (VFD) with Insulated Gate Bipolar Transistors (IGBTs). The VFD shall have a minimum wire-to-wire efficiency of 98%, and shall be rated up to 230 volt single phase operation in order to eliminate nuisance tripping at marginally high voltage conditions. Any VFD error messages shall be displayed on an eight-language removable digital operator with an illuminated LCD display. The following fault protection circuits shall be included: Overcurrent 120% of rated FLA for 60 seconds for Normal Duty applications; 200% of rated FLA peak, overheat, motor overload, VFD overload, short circuit, overvoltage, undervoltage, input phase loss, output phase loss and output ground fault. The VFD shall be capable of starting into a rotating load and accelerate or decelerate to set point without safety tripping.
2. The following operating information shall be displayed on the VFD display: KWH, elapsed time, output frequency (Hz), motor speed (RPM), motor current (amps), and voltage. VFD shall be as manufactured by LS electric, model H100Plus VFD.

3.08 Pressure Transducer

1. A pressure transducer shall be installed to transmit all pressure signals to the VFD controller.
2. The pressure transducer shall be a solid-state bonded strain gage type with accuracy of plus/minus 0.50%.
3. All wetted parts of the pressure transducer shall be constructed of stainless steel. Plastic is not permitted.
4. The pressure transducer shall be installed downstream of an isolation ball valve for easy service.
5. The pressure transducer shall be rated for the station discharge pressure.

**4.0 WIRING**

1. The main control panel disconnect shall be feed by a 25 AMPS, 208/230/60hz/3∅ service line from the pump house electrical entrance.

**5.0 PAINT AND RUST PROTECTION**

1. All structural steel, piping, and supports shall be abrasive blasted to a near white metal condition, and promptly costed with a polyester powder coat.

**6.0 STATION START-UP AND ADJUSTMENT**

1. Phone-in start up, with support from the manufacturer, is included.
2. On-site start up is available upon request from manufacture.

**7.0 WARRANTY**

A. Scope.

Manufacturer shall maintain a Factory Trained and Managed Service Network to execute all warranty claims. All service entities must maintain as their primary core business the maintenance, service and repair of pump systems and shall be supported by a Factory Direct Service Group to include dedicated factory phone support technicians for 24/7 technical assistance. The manufacturer shall provide technical phone support to the end user during and after the warranty period.

1. The manufacturer warrants that the water pumping system or component will be free of defects in workmanship for two years from date of start up not to exceed 36 months. Provided that all installation and operation responsibilities have been properly performed, manufacturer will provide a replacement part or component during the warranty life. Labor charges (i.e., removal or replacement of parts) are excluded from this warranty. Upon request, manufacturer will provide advice for trouble shooting of a defect during the warranty period. If the packaged pump station is originally specified and sold to be incorporated with a 100% Hunter project, and is identified as such in the Company’s sale documents at the time of sale, and is commissioned as such, the warranty is hereby extended to 63 months from date of sale or 5000 hours of operation (whichever occurs first), from the date of commissioning. The company does not warrant the whole or any part of the Hunter irrigation controller nor any Hunter irrigation components.
2. Manufacturer uses only high quality material. As with any mechanical or electrical device, some preventative maintenance efforts are required to enhance service life. The customer is encouraged to establish a methodical maintenance service program to avoid premature failure. Manufacturer supports a wide network of technical service agents and recommends they be utilized for service. Because of varied conditions beyond the control of the manufacturer, this warranty does not cover damage under the following condition or environment unless otherwise specified in writing.

* Default of any agreement with manufacturer.
* Misuse, abuse, or failure to conduct routine maintenance.
* Handling any liquid other than irrigation water.
* Exposure to electrolysis, erosion, or abrasion.
* Presence of destructive gaseous or chemical solutions.
* Over voltage or unprotected low voltage.
* Unprotected electrical phase loss or phase reversal.

END OF SECTION