

**WaterMax**  
**WATERPAK TURF SERIES**  
VARIABLE FREQUENCY DRIVE PUMP STATION  
GENERAL SPECIFICATION

**Project Name:** ?  
**Project Location:** ?  
**Pumping System Model #:** WPV-2-230-1-30-70  
**Total Design Criteria:** Quantity of Pumps: 1  
**Station Design Capacity:** 30 GPM @ 70 PSI Discharge

**08/22/06**  
SCOPE OF WORK

It is the intention of this specification to describe a self-enclosed automatic pump station for a turf irrigation system. This is to be accomplished by using a completely prefabricated pump station conforming to the following specifications. The water supply can be from a surface reservoir **suction lift** only. The water supply type must be identified and call out the pump's lift in feet of elevation from water surface to the eye of the pump impeller.

The pumping station shall be model number WaterPak WPV-2 as manufactured by WATERTRONICS, INC. 525 Industrial Drive, P.O. Box 530, Hartland, Wisconsin 53029-0530, [www.watertronics.com](http://www.watertronics.com).

**SECTION 1: GENERAL**

1.1 The pump station performance at mounting base limits shall be up to 30 GPM @ 70 PSI. The pump shall operate at no more than 3600 RPM. The power supply to the station shall be **230/1/60**.

1.2 Operational sequence: The pump shall activate automatically upon detecting a drop in pressure in the irrigation main line. Operation shall be maintained at an adjustable minimum demand. The pump shall be automatically retired when the demand falls below the minimum adjustable set point for an adjustable time delay.

1.3 Construction: Construction shall be of modular form utilizing a steel base structurally adequate to support pumps, piping, and electrical equipment as a single integral assembly. All nuts, bolts washers, and fasteners shall be stainless steel, zinc or cadmium plated for corrosion resistance.

**SECTION 2: PUMP AND MOTOR**

**2.0 PUMP**

Pump shall be electric motor driven, horizontal centrifugal with mechanical shaft seal, volute case and impeller. The shaft seal shall be a self-adjusting mechanical type to prevent leakage and eliminate the need for drain piping. The volute case shall be precision machined from stainless steel and engineered to modern hydraulic standards. A heavy cast iron bracket shall maintain alignment between the motor and volute case. The impeller shall be an balanced to provide smooth operation. The impeller shall be keyed to the shaft and locked with a special cap screw and washer. The motor shaft is to be manufactured from Noryl and of reduced length to increase shaft rigidity, extend bearing life, and reduce the overall length of the pump and motor assembly. The pump motor and impeller shall be removable from the back of volute case for service without disturbing the plumbing.

## 2.1 MOTOR

The pump motor shall be a squirrel cage induction horizontal solid shaft type. The pump impeller shall be direct mounted and keyed to the motor shaft with a stainless steel protective sleeve. The temperature rise of the motor shall be to NEMA Standard for class B or Class F insulation. Radial and thrust bearings of ample capacity to accommodate the hydraulic thrust of the pump shall be incorporated into the motor. The motor shall be of proper size to drive the pump at any point on its operation curve without exceeding the motor service factor. .

## **SECTION 3: PIPING MANIFOLD, VALVES, GAUGES AND OTHER MECHANICAL EQUIPMENT**

### 3.1 FABRICATED PIPING

All fabricated piping shall conform to ASTM specifications A53 for Grade B welded or seamless schedule 40 pipe. All welded fittings shall be seamless, ASTM Specification A234, with pressure rating not less than 150 PSI.

### 3.2 FOOT VALVE

Suction lift models will be supplied with a pressure rated 2" foot valve, in place of a check valve, for the end of the suction pipe to maintain pump prime.

### 3.3 DRAIN VALVES

Drains are to be provided from any possible low point in the system.

### 3.4 ISOLATION VALVES

Isolation valves shall be gate type 150 PSI WOG working pressure.

### 3.5 PRESSURE GAUGES

A pressure gauge shall be located downstream of the pump for easy reading of the inlet and discharge pressure. Pressure gauges shall be 304 stainless steel case and bezel construction. Gauges shall be 2-1/2" diameter. Pressure sensing connection shall be 1/4" NPT lower gauge connection.

## **SECTION 4: ELECTRICAL CONTROLS**

### 4.1 GENERAL

The complete control panel assembly shall be built in accordance with the provisions of the National Electrical Code.

### 4.2 VARIABLE FREQUENCY DRIVE (VFD)

The variable frequency drive shall be IGBT based with selectable carrier frequency up to 15 KHZ. The VFD shall include terminals for incoming power, motor output power and control terminals.

The VFD shall generate a sine-coded, variable voltage/frequency, three-phase output for optimum speed control. The VFD shall incorporate power loss ride-through. VFD protective features shall include current limit, short circuit protection, electronic motor overload protection and ground fault protection. The VFD shall have push button programming display for easy access to operation parameters.

#### 4.3 MAIN STATION DISCONNECT AND FUSING

A fusible main station disconnect shall be mounted in a separate NEMA 3R enclosure outside the pump station enclosure to completely isolate the pump station electrical system from incoming power. The service disconnect shall not be located inside the pump enclosure. Each leg of the incoming power shall be fused with a time delay fuse of the appropriate amperage.

#### 4.5 NATIONAL ELECTRICAL CODE STANDARDS

Electrical controls shall conform to National Electrical Code Standards.

##### CONTROL ALARMS:

#### 4.6 LOW SYSTEM PRESSURE SAFETY SHUTDOWN

When the station discharge pressure remains below an adjustable set point and time delay, the pumps will be de-energized and remain so until the alarm is manually reset. The Low Pressure alarm will be indicated on the processor display.

#### 4.7 HIGH SYSTEM PRESSURE SAFETY SHUTDOWN

When the station discharge pressure remains above an adjustable set point and time delay, the pumps will be de-energized and remain so until the alarm is manually reset. The High Pressure alarm will be indicated on the processor display.

#### 4.8 MOTOR OVERLOAD SHUTDOWN

If the over current condition lasts longer than the pre-programmed limit the motor will be de-energized and remain so until the alarm is manually reset. The overload alarm will be indicated on the processor display.

#### 4.10 VFD FAULT SHUTDOWN

The VFD shall sense additional internal faults that will cause the VFD to shutdown for system protection. These faults will be indicated on the processor display.

### **SECTION 5: MOUNTING BASE & ENCLOSURE**

#### 5.1 MOUNTING BASE

Construction shall include a fabricated steel base assembly to support all components during shipping and to serve as the installed mounting base. Pump station base shall be formed from a single sheet plate resulting in a seamless, one-piece base with rounded edges and corners. The base shall be strategically reinforced beneath as required to provide additional support and strength. The base shall be drilled and tapped allowing the pump to be secured to the base. The base shall be shot blasted to bare metal prior to painting process.

#### 5.2 ENCLOSURE

Construction shall include a weather resistant, 14 gauge, all metal enclosure. The front side of the enclosure shall have oversized cooling vents. All components are to be accessible from the top and front with the lid completely open. Enclosure is to be suitable for mounting to the pump station base and shall include openings for suction and discharge piping.

**SECTION 6: PAINTING**

Painting of the entire pump station shall consist of a multi-step coating system which includes metal preparation, rust inhibitive baked epoxy prime coat, and a two part ultraviolet light insensitive baked polyurethane finish having total dry film thickness of not less than 5 mils. Prime coat and finish coat shall be baked at 165 degrees for not less that 30 minutes to achieve a high gloss, corrosion resistant finish. Exterior pump station components shall be painted medium green.

**SECTION 7: TESTING**

The pump station and all its component parts shall undergo a complete hydraulic and electrical test prior to shipment from the factory. Testing shall be dynamic and include operation over the entire flow range of the pump station under specified suction and net discharge pressure conditions. A plot containing actual flow, pressure, KW consumption and motor RPM shall be furnished upon request.

**SECTION 8: OWNERS MANUAL**

Complete start up instructions shall be provided by the manufacturer in the form of an owners manual.

**SECTION 9: WARRANTY**

The manufacturer shall warrant the pump station to be free of defects for one year from date of start up or fifteen months after shipment, whichever occurs first. Failures caused by lightning strikes, power surges, vandalism, operator abuse, or acts of God are excluded from warranty coverage.

**END OF SPECIFICATION: WaterPak Written Spec-08-22-06**