

Customer Note:

Section 2.12 Technical data requires input information. Place part number in location of “**SCSUL08-X-X-X-X-X-X-X-X-X-X**” and following sections marked with “**XXX**” or “**X**” should be updated to match pump station performance criteria gathered from the part number configurator sheet.

SAMPLE

PREFABRICATED BOOSTER PUMPING

PART 1: GENERAL

1.1 SCOPE

To provide a single source responsibility for the manufacture, warranty, and operation of a prefabricated, skid mounted, fully automatic pumping system for turf irrigation.

The pumping system shall conform to the following specifications in all respects. This specification covers the minimum requirements; however, it should not be construed as all inclusive. It is the successful vendor's responsibility to include all necessary appurtenances to provide for a complete, automatic, smooth operating, and reliable pumping system. ~~The manufacturer shall supply a complete set of general arrangement drawings, electrical power schematics, and control schematics in the operations and service manual.~~

Installing Contractor shall be responsible installing the pump station, concrete base, pump enclosure, all appurtenant fittings and items of a minor nature required for a fully functioning booster pumping station.

1.2 MANUFACTURER

The pumping station shall be manufactured by Munro, Grand Junction Colorado, 81501, U.S.A., Phone 800-942-4270 or equal, approved by the purchaser prior to bid opening. The station shall be of the model number and capacities as shown in the attached technical data sheet. For consideration of a proposed equal system, the contractor shall furnish the following data to the architect/engineer at least 10 days prior to the date of the bid opening:

- A. A complete specification for the pumping system proposed as an equal.
- B. A statement of full conformance to the following specifications signed by an officer of the manufacturer.
- C. A general arrangement drawing showing overall dimensions and all piping layouts.
- D. A complete Submittal, with Data Sheets, for all major equipment, pumps, motors,

and motor starters.

- E. An Electrical Schematic showing power wiring, and control wiring.
- F. List of 2 factory trained service technicians within a 100 mile radius of project site.
- G. A list, with references for 5 projects that are similar in scope within a 50 mile radius of project site.
- H. Manufacturer's electrical control panel UL 508A file number.
- I. Manufacturer's packaged pumping systems UL QCZJ file number.
- J. A copy of manufacturer's certificate of insurance showing as a minimum, a general liability coverage of \$1,000,000 and an excess liability coverage of \$5,000,000.

PART 2 - - MATERIALS

2.1 PUMP ASSEMBLY:

- A. Performance requirements: The pump and drive motor shall be capable of operating satisfactorily under the full range of conditions from shut-off through run-out.
- B. The centrifugal pump shall be manufactured according to the standards of the Hydraulic Institute and to ANSI specification number, B58.1. The pump casing shall be ASTM A-48, class 30 cast iron capable of hydrostatic test @ 150% of maximum discharge. All mating shall have a register fit to ensure alignment.
- C. The impeller shall be cast iron ASTM A-48, class 30. Completely machined on all outside surfaces and statically balanced at the time of pump assembly. The impeller shall be keyed to the shaft and securely fastened with a vibration resistant lock screw and washer.
- D. The mechanical seal shall be a Type 1 design with carbon vs. ceramic faces and buna elastomers. Mechanical seal shall be installed on a stainless shaft sleeve.
- E. The pump and motor shall be connected by an ASTM 48, Class 30, cast iron bracket incorporating a full isolating shield with slinger rings to prevent moisture from entering the front motor bearing.

2.2 MOTORS:

- A. All motors shall be built in accordance in the latest NEMA, IEEE, ANSI and AFBMA standards where applicable. The motor shall have Class F insulation with a temperature rise as specified by NEMA standards and shall be furnished with a 1.15 service factor.
- B. Leads shall be terminated in a connection box and shall be clearly identified.
- C. The motors shall be equipped with adequate bearings that are locally available and have minimum B-10 at the design condition of 40,000 hours.
- D. The motor shall be designed for Variable Frequency Start. Motors shall be TEFC, 3 phase, 60 cycle, and 208-230/480 volt.

2.3 STATION BASE:

- A. The pump station base shall be designed and fabricated to provide proper structural support for all attached equipment. The base shall supply sufficient rigidity to withstand the stresses of reasonable and competent transportations to site, off loading, installation, and operation. Main structural members shall be constructed from heavy weight aluminum channel. Provisions shall be made in the station base for off-loading with a forklift. The base shall create a flooring substructure when installation is per factory recommendations and will aide in installation of pump station as per recommended Hydraulic Institute standards. All bolts for the package assembly shall be zinc coated to retard corrosion.

2.4 PIPING:

- A. Piping shall be ASTM A53 schedule 40 steel pipes or heavier as required to maintain a 3 to 1 pressure safety factor (including 1/16" corrosion allowance). All piping shall be hydrostatically tested to 150% of maximum shutoff pressure. Piping between pumping system suction and discharge connection shall be groove fitted for maximum flexibility, minimize vibration and the stress of transportation and operation.
- B. Discharge Z-pipe same as above see plans for length. (If Used)
- C. Pipe groove fittings shall be ductile iron, non-lead orange rust inhibiting painted conforming to ASTM A536, Grade 65-45-12. Coupling gaskets shall be Nitrile, orange color coded and a temperature rating of -20°F to 180°F. Coupling bolts shall be carbon steel heat treated zinc plated with a tensile strength rating to 110,000 PSI: ASTM A 183 grade 2.

2.5 STATION ENCLOSURE:

- A. Enclosure shall be marine grade aluminum 5052 with locking doors on both sides, SS hardware and shall be powder coated desert tan.

2.6 VALVES:

- A. Pump and station isolation valves shall be grooved fitted. Body shall be constructed of ductile iron and the body epoxy coated. Disc shall be ductile iron epoxy coated and stainless steel shaft. Sizes 3"-4" shall be lever operated with 10 point locking plate.
- B. The discharge check valve design shall incorporate a center guided, spring loaded disc and having a short linear stroke that generates a flow area equal to the nominal valve size. Valve bodies shall be constructed of ASTM A536 ductile iron. Disc shall be carbon steel with a EPDM coating. Wafer compression spring shall be 304 stainless steel. Valve shall be manufactured by Munro.

2.7 POWDER COATING:

- A. Structural aluminum and supports shall be prepared to accept electrostatically heat applied powder coating of 3 mils. Finish must not have blooming, blushing, picture framing, outgassing, fish eyes, craters, poor color, opacity, sags, drips, runs, poor flow, orange peel, pin holing, and popping. Finish must withstand 500 UV hour exposure - loss of gloss exceed 10% of original gloss. Film coating adhesion shall meet ASTM standard ASTM D3359-09, class 4B and a hardness class H.
- B. Color shall be BG-16 (beige).

2.8 GAUGES:

- A. Pressure gauges shall be supplied for suction and discharge system pressures. For suction lift pump stations, the suction pressure gauge shall be vacuum type. All gauges shall be glycerin filled stainless steel bottom mounted. Accuracy shall be within 1.5%. Gauges shall be 2-1/2" minimum with pressure ranges at least 30% higher than highest-pressure attainable from pumps at shutoff head conditions.

2.9 ELECTRICAL:

- A. Provide complete instrumentation and controls to start and stop the pumps automatically. Full alarms and safety features needed to protect the equipment and piping systems shall be included.
- B. Controls shall be housed in a TYPE 1 enclosure with integral latches. The control enclosure shall be constructed of 12-gauge steel and the back-plate assembly shall

be constructed of 12-gauge steel. All internal components shall be mounted upon and secured to the removable back plate assembly.

- C. Power for the controls shall be provided by a control power transformer, which shall provide 120 Volt, single-phase power for the pumping system control operation. The control power transformer shall be protected on the primary side by current limiting fuses of adequate size and voltage rating. All control components shall be protected by miniature circuit breakers of adequate size.
- D. Variable frequency drive will be provided for starting, stopping, motor protection and process control. The VFD shall be rated type 1 and include a type 1 conduit connection kit. Each VFD must be rated for the proper voltage and HP. VFD's must include the following features and provide process functionality without the need for external process equipment such as PLC's, PID controller's or external pilot devices.

Input Connection

Input Voltage (U1) 200-240 VAC 3-phase +10%/-15%
200-240 VAC 1-phase +10%/-15%
380-480 VAC 3-phase +10%/-15%
Frequency: 48 - 63 Hz

Line Limitations: Max +/-3% of nominal phase to phase input voltage

Fundamental Power Factor (cos Ø): 0.98 at nominal load

Connection: R(L1), S(L2), T(L3) *Output (Motor) Connection*

Output Voltage: 0 to U1, 3-phase symmetrical, U2 at the field weakening point

Output Frequency: 400 to 400 Hz

Frequency Resolution: 0.01 Hz

Continuous Output Current: Variable Torque: $1.0 * I_{2N}$ (Nominal rated output current, Variable Torque)

Short Term Overload Capacity: Variable Torque: $1.1 * I_{2N}$, (1 min/10 min)

Peak Overload Capacity: Variable Torque: $1.35 * I_{2N}$, (2 sec/1 min)

Base Motor Frequency Range: 10 to 500 Hz

Switching Frequency: 1, 4, 8 or 12 kHz

Acceleration Time: 0.1 to 1800 s

Deceleration Time: 0.1 to 1800 s

Efficiency: 0.98 at nominal power level

Short Circuit Withstand Rating: 100,000 AIC (UL) w/o fuses

Connection: U, V, W

Enclosure Style: UL (NEMA) Type 1

Agency Approval Listing and Compliance: UL, cUL, CE

Ambient Conditions, Operation

Air Temperature: -150 to 400C (50 to 1040F), above 400C the maximum output current is de-rated 1% for every additional 10C (up to 500C (1220F) maximum limit.
Relative Humidity: 5 to 95%, no condensation allowed, maximum relative humidity is 60% in the presence of corrosive gasses.
Contamination Levels: IEC: 60721-3-1, 60721-3-2 and 60721-3-3
Chemical Gasses: 3C1 and 3C2
Solid Particles: 3S2
Installation Site Altitude: 0 to 1000 m (3300 ft) above sea level. At sites over 1000 m (3300 ft) above sea level, the maximum power is de-rated 1% for every additional 100 m (330 ft). If the installation site is higher than 2000 m (6600 ft) above sea level.
Vibration: Max 3.0 mm (0.12 in) 2 to 9 Hz, Max 10 m/s² (33 ft/s²) 9 to 200 Hz sinusoidal
Ambient Conditions, Storage (in Protective Shipping Package)
Air Temperature: -400 to 700C (-400 to 1580F)
Relative Humidity: Less than 95%, no condensation allowed
Vibration: In accordance with ISTA 1A and 1B specifications
Shock (IEC 60086-2-29): Max 100 m/s² (330 ft/s²) 11 ms.
Analog Inputs: Quantity Two (2) programmable
Voltage Reference: 0 (2) to 10 V, 250kOhm, single ended
Current Reference: 0 (4) to 20 mA, 100Ohm, single ended
Potentiometer: 10 VDC, 12 mA (1K to 10KOhms)
Input Updating Time: 8 ms
Terminal Block Size: 2.3mm² / 14AWG
Reference Power Supply: Reference Voltage : +10 VDC, 1% at 250C (770F)
Maximum Load: 12 mA
Applicable Potentiometer : 1 kOhm to 10 kOhm
Terminal Block Size : 2.3mm² / 14AWG
Analog Outputs: Quantity two (2) programmable current outputs
Signal Level : 0 (4) to 20 mA
Accuracy: +/- 1% full scale range at 250C (770F)
Maximum Load Impedance : 500 Ohms
Output Updating Time : 2 ms
Terminal Block Size : 2.3mm² / 14AWG
Digital Inputs Quantity seven (7) programmable digital inputs
Isolation: Isolated as one group
Signal Level : 24 VDC
Input Current : 15 mA at 24 VDC
Input Updating Time: 4 ms
Terminal Block Size : 2.3mm² / 14AWG
Internal Power Supply
Primary Use Internal supply for digital inputs

Voltage: +24 VDC, max 100 mA
Maximum Current: 100 mA
Protection: Short circuit protected
Relay Outputs: Quantity three (3) programmable relay (Form C) outputs.
Switching Capacity: 8 A at 24 VDC or 250 VAC, 0.4 A at 120 VDC
Max Continuous Current: 2A RMS
Contact Material: Silver Cadmium Oxide (AgCdO)
Isolation Test Voltage :4 kAIC, 1 minute
Output Updating Time:12 ms
Terminal Block Size :2.3mm2 / 14AWG
Protections:
Single Phase: Protected (input & output)
Overcurrent Trip Limit: 3.5 x I2N instantaneous
Adjustable Current Regulation Limit: 1.1 x I2N (RMS) max.
Overvoltage Trip Limit: 1.30 x UN
Undervoltage Trip Limit: 0.65 x UN
Overtemperature (Heatsink): +115°C (+239°F)
Auxiliary Voltage: Short Circuit Protected
Ground Fault: Protected
Short Circuit: Protected
Microprocessor fault: Protected
Motor Stall Protection: Protected
Motor Overtemperature Protection (I2t): Protected
Input Power Loss of Phase: Protected
Loss of Reference: Protected
Short Circuit Current Rating: 100,000 RMS symmetrical Amperes

E. Controls and enclosure:

The pump station manufacturer shall build the complete control panel in accordance with the NEC and be so authorized under UL508A. The VFD shall be mounted separately from the control enclosure. All other electrical equipment and wiring shall be mounted within the enclosure and each device shall be labeled for proper identification. All programming adjustments shall be performed from the front of the VFD keypad. A complete wiring circuit diagram and legend with terminal components and wiring completely identified shall be provided. The electrical safety disconnect shall be mounted outside of station enclosure.

F. Touch Screen Option: (If used)

7" Touch function screen
Individual pump status indication
Hand/Off/Automatic positioning indicator
Alarm status and history screen
Communication ports(10/100Mbit/ USB Host, USB Device,
RS485/RS422 25 –pin D-sub and Ethernet

Real Time Clock

G. Surge Arrestor:

Shall be installed in the control panel enclosure. UL 1449, SPD Type 1 (US), Type 4-1 (Canada) Peak Surge Current: 200kA/Phase, Short Circuit Current Rating: 200,000A.

2.10 START-UP SERVICE:

1. When discharge piping, electrical connections, and electrical inspection have been completed, the pump station manufacturer shall be contacted for start-up. A two-week notice shall be given to the manufacturer prior to scheduled start-up date. During start-up, the complete pumping system shall be given a running test of normal start and stop, and fully loaded operating conditions. During this test of the pump shall demonstrate its general ability to operate without undue vibration or overheating, and shall demonstrate its general fitness of service. All defects shall be corrected and adjustments shall be made for proper operating system. After station start-up has been completed and accepted, a training session shall be given to the owner or owner's representative familiarizing that person with pumping system operations, maintenance and adjustments. Minimum start-up assistance, exclusive of travel time, shall be one 4-hour day. Provide for minimum of an 4-hour training session, exclusive of travel time, in addition to the start-up assistance. Start-up and training assistance shall be by the manufacturer's technical service agent.

2.11 TECHNICAL DATA:

Munro Stand Alone Pump Station

SCSUL08-X-X-X-X-X-X-X-X-X-X

Rated at XXX GPM. Minimum suction pressure for maximum coverage is XXX psig, Discharge pressure to be XXX psig. Motor is X HP, 3600 RPM Full voltage, Centrifugal. Pumps shall have Cast iron casing, Cast Iron enclosed impeller and mechanical seal. Electrical power shall be XXX volts, X phases, 60 Hertz. Pump shall be a Barnes Model XXX or approved equal.

- Electrical non fusible disconnect
- X in. flanged suction and discharge connections with powder coated piping.
- 2 5/8 in. silicone filled pressure gauges with isolation valve.
- Factory run testing using actual suction pressure, discharge pressure and flow conditions.
- U.L. listed Type 1 control panel.
- 1-11volt Pressure transducer 0-200 psig.
- Suction pressure gauge.
- Low/ High discharge pressure shutdown and alarms.
- Type 1 Variable Frequency Drive with Munro Smart Software without using a PLC.
- VFD Fault Shutdown.

- **X** in. station discharge isolation valve with individual pump suction & discharge isolation valves. Powder Coated
- 1 Operation & maintenance manual.

PART 3: EXECUTION

3.1 TESTING:

Run Testing. The pumping system shall be completely run tested after installation to verify the performance. A complete report of this test shall be included with the pumping system and shall include actual flow of test, pressure at discharge, voltage, and amperage.

3.2 STARTUP:

Startup shall be performed by the Manufacturer's Authorized Technician and shall be performed with the Owner's Representative present.

3.3 TRAINING:

A minimum 4 hour training session shall be provided to the Owner at no additional cost.

3.4 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.

B. Warranty.

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.

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