



# ecocirc<sup>®</sup> XL

## High Efficiency Large Wet Rotor Pump For Heating, Cooling And Potable Water Systems

DIVISION 23 - Heating, Ventilating, and Air-Conditioning (HVAC)

23 21 00 - Hydronic Piping and Pumps

23 21 23 - Hydronic Pumps

### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF WORK

A. Provide pumps and required system trim for heating, chilled water, and dual temperature water systems including all related appurtenances for a complete and operating systems.

#### 1.02 SECTION INCLUDES

A. Wet Rotor, Inline Pump

#### 1.03 RELATED SECTIONS

A. Drawings and general provisions of the contract, including general and supplementary Conditions and Division 1 Specification Sections, apply to these Sections.

- Section \*\*\* - Mechanical General Requirements
- Section \*\*\* - Supports, Anchors, and Sleeves
- Section \*\*\* - Motors and Starters
- Section \*\*\* - Drives
- Section \*\*\* - Mechanical Identification
- Section \*\*\* - Vibration Isolation
- Section \*\*\* - Piping Insulation
- Section \*\*\* - Equipment Installation
- Section \*\*\* - Hydronic Piping and Specialties
- Section \*\*\* - Testing, Adjusting, and Balancing
- Section \*\*\* - Meters and Gauges
- Section \*\*\* - Electrical

#### 1.04 REFERENCES

- A. HI - Hydraulic Institute.
- B. ANSI - American National Standards Institute.
- C. OSHA - Occupational Safety & Health Administration.
- D. ASHRAE - American Society of Heating, Refrigeration and Air-Conditioning Engineers.
- E. NEMA - National Electrical Manufacturers Association.
- F. UL - Underwriters Laboratories.
- G. ETL - Electrical Testing Laboratories.
- H. CSA - Canadian Standards Association.
- I. NEC - National Electric Codes.
- J. ISO - International Standards Organization.
- K. IEC - International Electrotechnical Commission.
- L. ASME - American Society of Mechanical Engineers.

#### 1.05 SUBMITTAL

- A. Submit each item in this article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Submit manufacturer's installation instructions under provisions of General Conditions and Division 1.
  - Operation and Maintenance Data: Include installation instructions, assembly views, and replacement parts lists.
  - Under provisions of commissioning documentation, testing of pumps, as well as training of owner's operation and maintenance personnel may be required in cooperation with the commissioning consultant.
- C. Product Data including published performance curves and rated capacities of selected model, shipping weights, furnished specialties, and accessories. Indicate pump's operating point on curves.
- D. Complete Package information::
  - System summary sheet (where applicable)
  - Shop drawing indicating dimensions, required clearances and location and size of each field connection
  - Power and control wiring diagram
  - System profile analysis including pump curves, system curve, and variable speed pump curves (where applicable)
  - Pump data sheets - Rated capacities of selected models and indication of pump's operating point on curves.
  - Submittals on furnished specialties and accessories
  - Submittals must be specific to this project. Generic submittals will not be accepted
- E. Hanging and support requirements should follow the recommendations in the manufacturer's installation instructions.

#### 1.06 QUALITY ASSURANCE

- A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the drawings.

- B. Ensure that pump operates at specified design conditions without vapor binding and cavitation, is non-overloading in parallel or individual operation, and operates to ANSI/HI 9.6.3.1 standard for Preferred Operating Region (POR) unless otherwise approved by the engineer.
- C. Ensure pump pressure ratings are at least equal to system's maximum operating pressure at point where installed but not less than specified.
- D. Equipment manufacturer shall be a company specializing in manufacture, assembly, and field performance of provided equipment with a minimum of 20 years experience.
- E. Equipment provider shall be responsible for providing certified equipment start-up and, when noted, an in the field certified training session. New pump start-up shall be for the purpose of determining pump alignment, lubrication, voltage, and amperage readings. All proper electrical connections, pump's balance, discharge and suction gauge readings, and adjustment of head, if required. A copy of the start-up report shall be made and sent to both the contractor and to the engineer.

### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs if required for handling. Materials which could be damaged by the elements should be packaged in such a manner that they could withstand short-term exposure during transportation.
- B. Store materials in clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.
- C. Use all means necessary to protect equipment before, during, and after installation.
- D. All scratched, dented, and otherwise damaged units shall be repaired or replaced as directed by the Architect Engineer.

### 1.08 WARRANTY:

- A. Provide a minimum 18 month warranty on materials and installation under provision of Section 01 78 36

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. The specifying engineer reserves the right to specify a primary supplier / lead spec manufacturer on all supplied schedule and specification documents. These primary suppliers have led their respective industry in research and development and their products have had proven track records in the field. These primary suppliers, in the opinion of this engineering firm, produce a superior product to the alternately listed manufacturers. The contractor may choose to supply equivalent equipment as manufactured by the alternately specified manufacturer. This alternately

specified equipment shall be supplied on a deduct alternate basis and based on the approval of the supplied alternate manufacturer's submittals. The use of a primary supplier and deduct alternates protects the specifying engineer's design concept, but allows for a check-and-balance system to protect the post-commissioning owner.

- B. Contractor shall furnish and install new wet rotor inline pump for hydronic radiant and geothermal heating and cooling systems as indicated on the drawings. Pumps shall be ecocirc XL as manufactured by **Bell & Gossett, a Xylem Company**, under base bid. Equivalent units as manufactured by other manufacturers may be submitted as deduct alternates. Pumps shall meet types, sizes, capacities, and characteristics as scheduled on the Equipment Schedule and drawings. Pump substitutions shall be provided with connection sizes equal to those scheduled. Pump connections shall not be downsized. Pump substitutions shall not be provided at efficiencies less than those scheduled.

### 2.02 COMPONENTS

- A. The pumps shall be a wet rotor inline pump, in cast iron or stainless steel construction specifically designed for quiet operation. Suitable standard operations at 230° F and 175 PSIG working pressure. The pump internals shall be capable of being serviced without disturbing piping connections.
- B. The pump internals shall be capable of being serviced without disturbing piping connections.
- C. Pump shall be equipped with a water-tight seal to prevent leakage.
- D. Pump volute shall be of a cast iron design for heating systems or stainless steel for domestic water systems. The connection style on the cast iron and stainless steel pumps shall be flanged.
- E. Flange to Flange dimension shall be standard Bell & Gossett booster sizes such as 6-3/8", 8-1/2", 11-1/2", and 12". Flange dimensions shall be HVAC industry standard 2 or 4 bolts sizes.
- F. Motor shall be a synchronous, permanent-magnet (PM) motor and tested with the pump as one unit. Conventional induction motors will not be acceptable.
- G. Each motor shall have an Integrated Variable Frequency Drive tested as one unit by the manufacturer.
- H. Integrated motor protection shall be verified by UL to protect the pump against over/under voltage, over temperature of motor and/or electronics, over current, locked rotor and dry run (no load condition).
- I. Pump shall have MODBUS or BACnet connections built into the VFD as standard options.
- J. Analog inputs, such as 0-10V and 4-20mA, are standard inputs built into the VFD.
- K. Pumps shall be UL 778 listed and bear the UL Listed Mark for USA and Canada with on-board thermal overload protection.

- L. Pumps shall be UL 778 listed and bear the UL Listing Mark for USA and Canada with on-board thermal overload protection.
- M. Each pump shall be factory performance tested before shipment.
- N. Optional Wireless Module can be added to create a short range wireless field for remote connection to the pump. An internet browser can be used to program the advanced settings.
- O. Signal relay (three phase pumps only) - Two normally open relay contacts are available at terminals 22, 23 and 24, 25. If an error causes the pump to stop operating, the fault relay contact closes and terminals 24-25 are closed. The pump status relay is terminals 22-23 and indicate stop/run status.
- P. Signal relay (single phase pumps only) - A dry contact relay is provided at terminals 4 and 5. If there is a fault, the relay contact closes to display a red status light and the error code on the user interface display. The relay contact closure can also be used to energize a remote fault display.

### 2.03 OPERATING MODES

- A. Proportional Pressure - The differential pressure will continuously increase or decrease along a linear curve based on the flow demand.
- B. Constant Pressure - The pump maintains a constant differential pressure set by the user at any flow demand until the maximum speed is reached.
- C. Constant Speed - The pump maintains a constant speed at any flow rate
- D. Night Set Back - The pump will recognize a 10°C water temperature reduction and will switch to nighttime operation.
- E. T-Constant - This control will use a PI algorithm to vary the speed of the pump in order to maintain a constant temperature of the fluid media.
- F. Delta-T Constant - This control mode will use a PI algorithm to vary the speed of the pump in order to maintain a constant differential temperature between the built-in temperature sensor and external temperature sensor.
- G. Delta-P-T - This control mode is paired with proportional or constant pressure mode. The nominal differential pressure setpoint will vary according to the fluid temperature.
- H. Delta-P-Delta-T - This control mode is paired with proportional or constant pressure mode. The nominal differential pressure setpoint will vary according to the differential temperature between the built-in temperature sensor and external temperature sensor.

### 2.04 TWO PUMP CONTROL

- A. Backup - This mode will start the second pump in case of failure to the master pump.

- B. Alternate Operation - This mode will run one pump at a time. The working time is switched every 24 hrs. The second pump is started immediately in case of failure of the lead pump.
- C. Parallel Operation - In this mode, both pumps run simultaneously at the same set point. The master pump determines the behavior of the full system and is able to optimize the performance. To guarantee the required performance with the minimum power consumption the master pump starts or stops the second pump depending on the head and the flow required.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install equipment in accordance with manufacturer's instructions.
- B. Reduction from line size to pump connection size shall be made with eccentric reducers attached to the pump with tops flat to allow continuity of flow and to avoid air pockets.
- C. Furnish and install a line size shut-off valve on the suction and discharge sides of the pumps.
- D. Provide temperature and pressure gauges where and as detailed or directed.
- E. Provide an adequate number of isolation valves for service and maintenance of the system and its components.
- F. Circulating pump shall have sufficient capacity to circulate the scheduled GPM against the scheduled external head (feet) with the horsepower and speed as scheduled and/or as denoted on the drawings. Motors shall be of electrical characteristics as scheduled, denoted and/or as indicated on the electrical plans and specifications.
- G. All piping shall be brought to equipment and pump connections in such a manner so as to prevent the possibility of any load or stress being applied to the connections or piping.
- H. Power wiring, as required, shall be the responsibility of the electrical contractor. All wiring shall be performed per manufacturer's instruction and per applicable state, federal, and local codes.
- I. Control wiring for remote mounted switches and sensor / transmitters shall be the responsibility of the control's contractor. All wiring shall be performed per manufacturer's instructions and applicable state, federal, and local codes.
- J. Power and control wiring shall run in separate channel.
- K. Pumps are supplied with an integrated VFD and should not be used with any external VFDs.
- L. Pumps shall NOT be run dry to check rotation.

END OF SECTION

## NOTES



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