

Series e-80SCX Smart Pump

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. Close Coupled, Vertical 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 *** - Alignment of Rotating Equipment
 - Section *** - Cast-in-Place Concrete
 - 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.
- C. Operation and Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts lists.
- D. 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.
- E. Product Data including certified performance curves and rated capacities of selected model, weights (shipping, installed, and operating), furnished specialties, and accessories. Indicate pump’s operating point on curves.
- F. Complete Package information Product Data including:
 - System summary sheet (where applicable)
 - Sequence of Operation
 - 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.

- G. Each pump submittal shall detail the overall efficiency (wire-to-water efficiency) for the customer specified duty point and control head. Each submittal shall detail the pump-motor-drive input power requirements for the duty condition.
- H. Specified Control Head shall be 30% TDH or calculated minimum control head specified within the equipment schedule
- I. Hanging and support requirements should follow the recommendations in the manufacturer's installation instructions.
- J. Submittals that are "rejected" as being "non-compliant" will be re-reviewed once with all time for subsequent reviews back charged to the contractor in accordance with the engineer's current prevailing rate schedule. If a rate schedule for additional services is included, as part of the contract with the owner that rate schedule shall be used in lieu of the "current prevailing" rate schedule.

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 pump operation, at specified system fluid temperatures 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 damaged by the elements should be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.
- B. Store materials in a clean, dry location protected 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. For goods sold to commercial buyers, Seller warrants the goods sold to Buyer hereunder (with the exception of membranes, seals, gaskets, elastomer materials, coatings and other “wear parts” or consumables all of which are not warranted except as otherwise provided in the quotation or sales form) are under warranty for a period of two and a half (2.5) years from the date of installation or three (3) years from the date of shipment (date of shipment shall not be greater than thirty (30) days after receipt of notice that the goods are ready to ship), whichever shall occur first, unless a longer period is specified in the product documentation (the “Warranty”).

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 close-coupled vertical inline pump for chilled water and hot water heating systems as indicated on the drawings. Pumps shall be e80SCX as manufactured by Bell & Gossett 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 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 split-coupled, inline for vertical installation, in cast iron stainless steel fitted construction specifically designed for quiet operation. Suitable for standard operation at up to 225°F and 175 PSIG working pressure with EPR/C/SiC seal option (or optional operations at up to 250°F and 175 PSIG working pressures with EPR/SiC/SiC seal option). Working pressures shall not be de-rated at temperatures up to 225°F. The pump internals shall be capable of being serviced without disturbing piping connections.
- B. The pumps shall have a 416 stainless steel shaft that is guided by a carbon graphite lower throttle bushing.

- C. Pump shall be equipped with a unitized inside mechanical seal assembly with flush line. The seal assembly shall have an EPR or BUNA elastomer bellows and a positive metal-to-metal drive system to reduce torsional stress on the bellows. The bellows will be pressure supported without creases or folds for long life. The mechanical seal shall have a rotating Carbon face against a stationary Silicon Carbide face. As an option the mechanical seal shall have a rotating Silicon Carbide face against a stationary Silicon Carbide face.
- D. Pump shaft shall connect to a stainless steel impeller. Impeller shall be hydraulically and dynamically balanced to Hydraulic Institute Standards ANSI/HI 9.6.4.-2016. The allowable residual imbalance conforms to ANSI grade G6.3, keyed to the shaft and secured by a stainless steel locking capscrew or nut.
- E. The combination motor bracket and volute coverplate shall be a one-piece unit to ensure concentric alignment of the motor to the pump casing. A carbon steel coupler guard conforming to both ANSI B15.1-2000 and OSHA 1910.219 standards shall be mounted on the motor bracket for safety.
- F. Pump volute shall be of a Class 30 cast iron design for heating systems rated for 175 PSIG with integral cast iron flanges drilled for 125# ANSI companion flanges. Volute shall include gauge ports at nozzles, and vent and drain ports. The volute shall be designed with a base ring matching an ANSI 125# flange that can be used for pump support.
- G. hydrovar X motors shall meet scheduled horsepower, speed, voltage, and enclosure design. Motors shall have heavy-duty grease lubricated ball bearings. Motors shall be shall meet NEMA specifications.
- H. Pumps shall conform to ANSI/HI 9.6.3.1 standard for Preferred Operating Region (POR) unless otherwise approved by the engineer.
- I. Pump shall be of a maintainable design and for ease of maintenance should use machine fit parts and not press fit components.
- J. Pump manufacturer shall be ISO-9001 certified.
- K. Each pump shall be factory hydrostatically tested and name-plated before shipment.
- L. Where noted on schedule pumping equipment may require one or all of the following optional tests: Certified Lab tests (unwitnessed), Hydraulic Institute Level B tests, or Witnessed Tests.

2.03 Accessories

- A. Where noted on the schedule, provide one mechanical seal for each model type of primary pump.
- B. Pumps shall be packaged with (2) pressure sensors and associated cabling. Pressure sensors shall be rated for measurements up to 300 PSIG

Part 3 - Motor

3.01 hydrovar X

General performance and design

- A. The unit shall be coupled to a hydrovar X variable-speed, permanent magnet (non-rare earth) assisted reluctance (PMAREL) motor-drive.
- B. The hydrovar X unit shall include provisions to disconnect the drive and motor independently. The motor-drive combination shall perform in accordance with the PDS (power drive system) values indicated on the unit motor nameplate and as outlined by IEC standards for IE5 and IES2 efficiencies.
- C. The motor-drive unit mounting dimensions shall conform to the frame size and type indicated on the unit nameplate.
- D. All hydrovar X units shall be rated for an environmental protection rating of NEMA 4/IP55 and working temperatures of -4 to 122°F (-20 to +50°C).
- E. hydrovar X units shall be compatible with both 3-phase 50 Hz or 60 Hz supply and rated for either 200-240V (+/- 10%) or 380-480V (+/- 10%) ranges. The motor-drive combination will not require shaft grounding rings.

Drive controls and wiring

- A. Units shall be fitted with a full-color HMI (human machine interface) display controlled by rubber button physical input controls.
- B. hydrovar X units shall be compatible with Modbus RTU and BACNet MS/TP communication protocols.
- C. Units shall be equipped with the ability to perform wireless communication via the Xylem X App.
- D. The unit shall support up to (4) analog inputs, (5) digital inputs, (1) analog output, (2) relay outputs (Form C), and (1) 10V output supply. Supported analog input and output ranges are: 0-20 mA, 4-20 mA, 0-10V, and 2-10V.
- E. hydrovar X units shall be equipped with (2) RS485 terminal block connections. The unit shall feature a removable gland plate of which the power supply opening is dimensioned for standard U.S. trade size conduit fittings.
- F. hydrovar X units shall be capable of multi-pump controls up to (8) pumps in parallel and feature a suite of input-driven control programming options including pressure, flow, temperature, and level as well as quadratic and linear proportional pressure control.
- G. hydrovar X units shall support the ability to operate at a user-defined fixed rotational speed (Actuator mode) without external input controls.
- H. hydrovar X powered e-80SC pumps shall come pre-programmed with hydraulic maps for sensorless pressure control, where applicable.

Part 4 - Execution

4.01 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.
- C. Furnish and install triple duty valves on the discharge side of all pumps and furnish and install a line size shut-off valve on the suction side of all pumps. Anywhere that 5 straight pipe diameters of pipe cannot be provided on the inlet side of a pump a suction diffuser shall be used to provide appropriate flow distribution into the eye of the pump's impeller.
- D. Provide temperature and pressure gauges where and as detailed or directed.
- E. On systems where pump seals require flushing water or cooling water for a heat exchanger kit, provide cooling water supply piping and connections as well as the return piping, if required. Piping should be of adequate size to pass required flow rate.
- F. Proper access space around a device should be left for servicing the component. No less than the minimum recommended by the manufacturer.
- G. Provide an adequate number of isolation valves for service and maintenance of the system and its components.
- H. 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. Pump characteristics shall be such that the head of the pump under varying conditions shall not exceed the rated horsepower of the drive motor.
- I. On systems where the final balancing procedure requires the triple duty valve to be throttled more than 25% to attain design flow (on a constant speed pumping system), and no future capacity has been built into the pump, the pump impeller must be trimmed to represent actual system head resistance. The pump provider and engineer of record, based on the balancing contractor's reports, shall determine the final impeller trim diameter.
- J. All piping shall be brought to equipment and pump connections in such a manner so as to prevent the possibility of any loads or stresses being applied to the connections or piping. All piping shall be fitted to the pumps even though piping adjustments may be required after the pipe is installed.
- K. On components that require draining, contractor must provide piping to and discharging into appropriate drains.
- L. Power wiring, as required, shall be the responsibility of the electrical contractor. All wiring shall be performed per manufacturer's instruction and applicable state, federal, and local codes.
- M. 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.



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e-80X/e-80SCX Smart
Pumps**

Xylem Product Cybersecurity:

Xylem values your system security and the availability of your critical services. For more information on Xylem cybersecurity practices or to contact the cybersecurity team please visit xylem.com/security.

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