



Wilo Stratos Z
Variable Speed, Wet Rotor Inline Pumps

Engineering Specification

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install inline circulating pumps consistent with the hydronic system's performance, requirements and specifications. The circulating pumps shall be suitable for the specified system function and capacity.

1.2 REGULATORY

- A. Circulating pumps shall be rated to a maximum pressure of 145 PSI and temperature of 230°F (110°C) and where applicable, bear the approval symbol of the required regulatory body (NSF/ANSI 61).
- B. Electrical assemblies (circuitry, wiring terminals and internal connections) of the circulating pumps shall be certified and registered to bear the emblem of UL, CSA or ETL as required. Electrical assembly shall meet codes and standards established by national bodies.

1.3 REFERENCES

- A. UL 778 Standard
- B. NSF/ANSI 61, Annex G Standard

1.4 SUBMITTALS

- A. Provide submittals, warranty information and shop drawings in accordance with the General Requirements and as specified herein. Submit detailed product drawings including wiring schematics. Indicate critical dimensions of the circulating pumps.
- B. Submit manufacturer's technical data in the form of published Installation, Operation and Maintenance Manuals to be supplied with the circulating pumps at time of installation.
- C. Circulating pumps shall be tested and verified for performance. Copies of "Submittals" shall be made available to the specifying engineer if requested.
- D. Submit dimensional data on for the pump in order to facilitate or allow the end-user/installer to anticipate the necessary pipe, fittings, fasteners, etc. to complete the system installation.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Inline circulating pumps are shipped in boxes and are to remain in factory shipping condition until immediately prior to installation.
- B. Circulating pumps are to be stored indoors in a conditioned space, protected from exposure to the elements, and from exposure to other potential contaminants.
- C. Factory applied labels are to remain in place and unobscured. These identification tags are to display model numbers, serial numbers, and evidence of certifications/listings.

1.6 WARRANTY

- A. The Manufacturer shall warrant the circulating pumps for a period of 4 years from date of purchase, subject to the Terms and Conditions of said Warranty. A copy of the Manufacturer's Warranty shall be provided as part of the Submittals as outlined in Section 1.4 of this specification.

PART 2 – PRODUCTS

2.1 TERMINAL BOXES

- A. The circulating pumps shall have high quality composite terminal box with NPT electrical connections and a secure, gasketed cover, Class 2 protection level. Included on the face of the terminal box cover is the single "red button" adjustment button, front readable graphical pump display, field adjustable for horizontal or vertical positioning of the terminal box.
- B. The display shall indicate:
- Operation status
 - Control mode
 - Differential pressure or speed/setpoint
 - Fault and warning signals

2.2 ELECTRICAL CONNECTIONS

- A. Inline circulating pump shall have a coded terminal strip indicating common/neutral/ground within the terminal box for field connections for single phase 230 volt, 60 Hz power.

2.3 ELECTRICAL – GENERAL

- A. All low voltage interface (IF) wiring shall be of 18 gauge or larger, UL/CSA approved, 220°F (110°C) maximum / 167°F (75°F) minimum temperature.
- B. All 230 volt main power wiring shall be of 14 gauge or larger, UL/CSA approved, 230 deg F maximum (167 deg F minimum) temperature.
- C. The motor shall be a minimum of class H winding insulation as defined by UL 778.
- D. Voltage variances shall be less than +/- 10% from rated voltage with pump under load conditions. Maximum amperage not to be exceeded is indicated on the pump nameplate. Electrical power to the pump is confirmed when the face of the graphic display is lit.

2.4 CONTROL, OPERATION AND DIAGNOSTICS

- A. Wet rotor, glandless inline circulating pumps shall include electronic variable speed control to operate at constant/variable differential pressure control without external sensors. Automatic night setback control available as standard using "self taught, FUZZI" technology.
- B. Pumps to include integrated synchronous motors using ECM technology with permanent magnetic rotors, special sensorless control electronics and single phase electronic converters.

- C. Pumps to include IR (Infra-red) interface for wireless communication with the optional infra-red monitor.
- D. Integrated overload motor protection shall protect the pump against over/under voltage, over temperature of motor and/or electronics, over current, locked rotor and dry run (no load condition).
- E. Fault contact “FC” terminals shall be included in the terminal box and are to be potentially free, normally closed contacts that open on the event of a failure.
- F. Interface (IF) modules will be included where specified, installed in the terminal box. The modules will allow BMS communication via LONworks, BACnet, MODbus, and 0 – 10 volt DC control of speed or head setpoint, external minimum speed, external off, dual pump communication and pump operation status.

2.5 MATERIALS AND CONSTRUCTION

- A. Circulating pumps shall be constructed with lead free, Stainless Steel, NSF-61 Annex G certified.
- B. Pump flanges shall be:
 - Combination 1.25” – 2 bolt commercial oval type (rotated, 90°) for types 1.25x3-25 and 1.25x3-35
 - Combination 1.5” – 2 bolt commercial oval type (rotated, 90°) for types 1.5x3-25 and 1.25x3-40
 - 2” – 4 bolt “pump flange” for type 2x3-30
 - 3” – 4 bolt, 125# ANSI raised face flange for type 3x3-30
- C. Shafts shall be constructed of high quality stainless steel.
- D. Motor bearings shall be metal-impregnated carbon.
- E. Impellers with three-dimensional curved blades are constructed of Polyphenylene Sulfide (PPS) plastic, 40% glass filled for models 1.25x3-25, 1.25x3-35, 1.5x3-25 and 1.25x3-40 or polyphenylene (PPE) plastic, 30% glass filled for model 3x3-30.

PART 3 EXECUTION

3.1 PREPARATION

- A. Prior to commencing work, the contractor will have read and understood the Installation, Operation and Maintenance Manual (IOM) supplied and enclosed with the attendant circulating pumps. This manual is supplied in English, French and Spanish.
- B. The effectiveness of the system is dependent on the system being designed and installed correctly. Proper consideration of factors such as BTU loads, outdoor design temperature, indoor design temperature, room set-point temperature(s), differential fluid temperatures, head loss, flow rates and transfer capacities of the heat emitters is critical.
- C. Prior to final connection of the circulators as part of the hydronic system, the system piping shall be flushed of all contaminants and foreign objects.

3.2 INSTALLATION

- A. The circulating pumps must be installed by a qualified installer/service technician.
- B. The circulating pumps shall be installed in accordance with the relevant requirements of the local authority having jurisdiction, as required to meet the performance requirements and function specified for the system.
- C. The circulating pumps must be installed and operated strictly in accordance with the terms set out in the Installation, Operation and Maintenance Manual supplied and enclosed with the attendant pumps.

- D. The pump shall be installed with the motor shaft in a horizontal plane with no exceptions. The electrical terminal box shall be installed either horizontally with the IR window to the left of the “Red Button” (wiring connections to the right of the terminal box) or vertically with the IR window above the “Red Button” (wiring connections below the terminal box).
- E. The pump must be installed in a way that it is not stressed by the pipework. A minimum of three pipe diameters is recommended on the inlet of the pump.
- F. Where antifreeze protection is required, the maximum concentration of heating system glycol is 50% by volume. High concentrations of glycol at lower system design temperatures may require increasing the design operating point. Use of leak sealant products or automotive antifreeze is not permitted.
- G. Fluid temperature limitations are 14 to 230°F (-10 to 110°C) for HVAC systems. Maximum ambient temperature surrounding the pump is 104°F (40°C).
- H. Fluid temperature limitations are 32 to 176°F (0 to 80°C) for secondary hot water circulation systems. Maximum ambient temperature surrounding the pump is 104°F (40°C).
- I. Minimum Inlet pressure at pump suction port to avoid cavitation at fluid temperatures:

	Pump 1.25x3-25	Pump 1.25x3-35	Pump 1.5x3-25	Pump 1.5x3-40	Pump 2x3-30	Pump 3x3-30
122 °F (50 °C)	1.3 psi [.3 bar]	1.3 psi [.3 bar]	1.3 psi [.3 bar]	7.1 psi [.5 bar]	7.1 psi [.5 bar]	10.0 psi [0.7 bar]
203 °F (95 °C)	14.2 psi [1.0 bar]	14.2 psi [1.0 bar]	14.2 psi [1.0 bar]	17.1 psi [1.2 bar]	17.1 psi [1.2 bar]	21.3 psi [1.5 bar]
230 °F (110 °C)	22.8 psi [1.6 bar]	22.8 psi [1.6 bar]	22.8 psi [1.6 bar]	25.6 psi [1.8 bar]	25.6 psi [1.8 bar]	32.7 psi [2.3 bar]

3.3 FIELD QUALITY CONTROL

- A. Upon receipt and prior to commissioning the circulating pumps should be inspected for any sign of visible damage.
- B. Prior to commissioning the circulating pumps, the system connections should be complete and leak free. The system should be filled and purged as per instructions in the IOM manuals. The system fluid should be tested and have a pH level of between 6.5 and 9.5 and be suitable for hydronic system use.
- C. Following fill and purge, the system should undergo a pressure test.

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