



**Wilo Stratos
Variable Speed Inline Pumps**

Engineering Specification

PART 1 - GENERAL

1.1 WORKED INCLUDED

- A. Furnish and install 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 minimum 145 PSI and 230 degrees Fahrenheit and where applicable, bear the approval symbol of the required regulatory body.
- 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

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 and 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 "Certification of Performance" shall be made available to the specifying engineer if requested.
- D. Submit catalogue data on all equipment, pipe, fittings, fasteners and associated items supplied by others to complete the installation of the circulating pumps in the system installation.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Circulating pumps 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 un-obscured. These identification tags are to display model numbers, serial numbers, and evidence of certifications/listings.

1.6 WARRANTY

- A. Manufacturer shall warrant the circulating pumps for a period of 2 years from date of manufacture or 1.5 years from the date of installation, 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 1.04 of this specification.

PART 2 - PRODUCTS

2.1 TERMINAL BOXES

- A. The circulating pumps shall have a 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

- 2.3 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.

2.4 ELECTRICAL GENERAL

- A. All low voltage interface (IF) wiring shall be of 18 gauge or larger, UL/CSA approved, 220 deg F maximum (167 deg 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, 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 Cast-Iron bodies with factory applied Cathaphoresic coating.
- B. Shafts shall be constructed of high quality stainless steel. Motor bearings shall be metal impregnated carbon sleeve bearing type. Impellers will be constructed of a high strength, glass filled polypropylene engineered composite.

PART 3 EXECUTION

3.1 PREPARATION

- A. Prior to commencing work the contractor will have read and understood both the Installation, and Operation and Maintenance Manuals (IOM) supplied and enclosed with the attendant circulating pumps. These are to be supplied in English, French and Spanish.
- B. The effectiveness of the system is dependant 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 and Operation and Maintenance Manuals supplied.
- 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 230 deg F (110 deg C) to 14 deg F (-10 deg C) for closed systems. Maximum ambient temperature surrounding the pump shall be between 32 deg F (0 deg C) to 104 deg F (40 deg C).

H. Inlet pressure shall not exceed 145 psi (10 Bar). Minimum inlet pressure shall be enough to avoid boiling bearing lubrication fluid (system water) in the rotor/can assembly

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 8 and 9.5 and be suitable for hydronic system use.
- C. Following fill and purge, the system should undergo a pressure test, followed by a run-through of the sequence of operations listed in the IOM manuals.

Typical Schedule:

Mark	Qty.	Duty	Design Flow Rate	Design Head	Mfg	Model	Electrical	Pump function	Control
P-1, 1A	2	Primary loop pumps	100 USGPM each	30 Feet	WILO	Stratos 1.5 x 3-40	230/1/60	Primary circulation	Δ PC (pressure constant), outdoor reset activated, DP (automatic dual pump operation via IF Module)
P-2	1	Radiant loop manifold supply	40 USGPM	20 Feet	WILO	Stratos 1.25 x 3-35	230/1/60	Zone control to radiant loops	Δ PV (pressure variable), outdoor reset deactivated
P-3, 4,5	3	Radiant panel supply	80 USGPM	25 Feet	WILO	Stratos 2 x 3-35	230/1/60	Zone control to radiant panels	Δ PV (pressure variable), outdoor reset deactivated

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