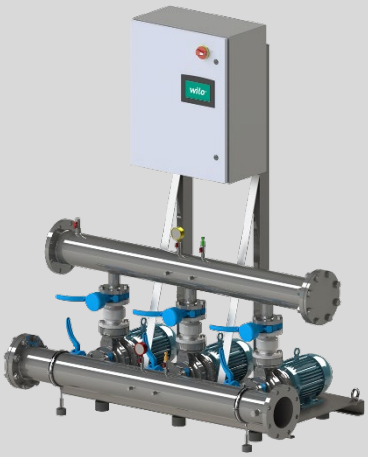

Wilo-WiBooster
Pressure Boosting Systems

Engineering Specification

WILO_SPC_WIBOOSTER_0821

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Horizontal, close-coupled, 304 stainless steel, end suction, centrifugal pump booster package shall be a Wilo-WiBooster as manufactured by Wilo USA.
B. Furnish and install a variable speed, horizontal, close-coupled, end-suction, centrifugal pump booster pumping package with a capacity as indicated in the plans.

1.02 RELATED SECTIONS

A. 23 21 23 – Hydronic Pumps.

1.03 REFERENCES

A. NSF – NSF International.
B. HI – Hydraulic Institute.
C. UL – Underwriters Laboratories.
D. cUL – Canadian Underwriters Laboratories.
E. NEC – National Electrical Code.
F. ANSI – American National Standards Institute.
G. AISI - American Iron and Steel Institute.
H. NEMA – National Electrical Manufacturers Association.
I. VFD – Variable Frequency Drive.
J. ODP – Open Drip Proof.
K. TEFC – Totally Enclosed Fan Cooled.

1.04 SUBMITTALS

A. Submittal data sheet(s).
B. Dimensional print(s).
C. Wiring diagram(s).
D. Installation, operation, and maintenance manual.

1.05 QUALITY ASSURANCE

A. The complete packaged pumping system shall be NSF 61 and NSF 372 listed for drinking water and low lead requirements.
B. The complete packaged pumping system shall be UL QCZJ listed and compliant for “packaged pumping systems”.
C. All wetted surfaces shall be made of corrosion-resistant material.
D. Liquid temperature range for the booster package shall be rated for -4°F to 140°F with a minimum of 32°F for domestic water.
E. Ambient temperature range for the booster package shall be rated for +32°F to 104°F at sea level.
F. Booster pressure rating shall be 150 PSI.
G. Shall be equipped with two to four horizontal, close-coupled, 304 stainless steel, single-stage, centrifugal pumps.

H. The pumping package shall be performance tested prior to shipment.

1.06 WARRANTY

A. Provide manufacturer's standard warranty against defects in materials and workmanship.
   1. Warranty Period: Wilo-WiBooster shall be free of defects in materials and workmanship for a period of two (2) years from date of installation; not to exceed 6 months from date of purchase.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with these specifications, the following manufacturers shall be acceptable:
   1. Wilo -WiBooster series boosters as manufactured by Wilo.
   2. Pre-approved equal.
B. The packaged pumping system shall be a standard product of a single pump manufacturer. The entire pump system including pumps and pump logic controller, shall be designed, built and tested by the same manufacturer.

2.02 COMPONENTS

A. BASE ASSEMBLY
   1. Base material of construction shall be nickel plated steel.
   2. Base assembly fastening bolts and hardware shall be Zinc Plated Steel.
   3. Vibration dampers shall be made of natural, black, rubber with harness approximately 55° +/- 5 shore thread rod, washer, - steel ST37, yellow chromated steel.

B. PUMPS
   1. Shall be of horizontal, close-coupled, 304 stainless steel, single stage, end suction, centrifugal design.
   2. Shall be NSF 61/372 listed for drinking water and low lead requirements.
   3. Pump Housings:
      a. Shall be constructed of AISI 304 stamped stainless steel with Female NPT or 150 class ANSI flanged suction and discharge connections; depending on size.
      b. Shall be equipped with a drain and vent port.
   4. Mechanical Seal:
      a. Face/Primary ring shall be of carbon construction
      b. Seat for the seal shall be constructed of silicon carbide or ceramic depending on pump model and size.
      c. Shaft sleeve, springs and clips shall be constructed 18-8 Stainless Steel.
      d. Elastomer bellows shall be Buna-N constructed of nitrile.
      e. Maximum liquid temperature 140°F.
   5. Impellers shall be constructed of AISI 304 stainless steel as a two-piece, tack-welded, design.
   6. Shaft sleeves shall be equipped with larger pump models equipped with 150 Class flanges and constructed of 304 stainless steel.
   7. Motor adaptor shall be constructed of Cast Iron and covered with a 304 stainless steel, fitted, cover for the wetted surface.

C. MOTORS

1. Shall be fixed speed, NEMA designed and covered at premium efficiency levels NEMA MG1, Table 12-12 or Part 20, Table B (IE3).
2. Shall be a NEMA J or JM framed motor depending on size.
3. Motor shafts shall be constructed of 300 stainless steel for J frame motors or carbon steel for JM frame motors.
4. Motor voltage option are 208/230V, 460V, and 575V. All voltages can be wired for three phase. Motor with 208/230V may be wired for single phase depending on horsepower.
5. Shall be a 2 or 4 pole motor and run up to 60 Hz.
6. All motors shall be equipped with a water slinger; water slingers shall be constructed of Neoprene for J frame motors or 304 stainless steel for JM frame motors.
7. Shall be totally enclosed fan cooled.

D. PUMP MANIFOLD

1. Shall be constructed of AISI 304 Stainless Steel.
2. Manifolds shall have smooth contour transitions to minimize build-up of organisms in the flow path.
3. All pump and system connections shall be 150 Class flanges in accordance with ANSI/ASME B.16.
4. All manifolds shall be electrolytic polished.
5. All manifolds shall be 5S or 10S, or have a thickness of 2mm or 3mm depending on size and pressure rating.
6. Shall be rated for 232 or 363 PSI maximum pressure depending on pump maximum pressure.
7. Suction and discharge manifolds shall each have two ¼" female NPT connections; one for a 316 stainless steel, pressure transducer and the other for a 2.5" 316 stainless steel, glycol-filled, analog pressure gauge.
8. All discharge manifolds shall have a ¾" female NPT connection. Some suction manifolds may also have a ¾" female NPT connection.
9. Discharge manifold shall be equipped with ¾" Male NPT x ¾" Female NPT shut-off valve with ¾" stainless steel plug engaged into the Female NPT portion of the shut-off valve.
10. Suction manifold shall be equipped with a ¾" stainless steel plug engaged into the Female NPT portion of the ¾"connection if present.

E. ISOLATION VALVES

1. 1-1/4" Isolation valves:
    a. Body shall be constructed of ASTM 304 stainless steel.
    b. All threads shall be female, nominal tapered threads in accordance with ANSI B1.20.1.
    c. Packing, thrust washer, seal and gasket shall all be constructed of PTFE.
    d. Seat shall be constructed of PTRE.
    e. Maximum Shut-off pressure is 1,000 PSI
    f. Temperature range of -4°F - +220°F
2. 2" and 2-1/2" Isolation valves:
    a. Body, cap, and lever assembly shall be constructed of A536 65-45-12 ductile Iron, fully lugged, wafer body construction.
    b. Seat shall be constructed of EPDM.
    c. Disc shall be constructed of 316 stainless steel.
    d. Shaft shall be constructed of 420 stainless steel.
    e. Circlip shall be constructed of XC 75/stainless steel.
    f. O'Ring shall be constructed of NBR.
    g. Bushing shall be constructed of Nylon 1010.
    h. SCH Crew, Stop Washer and Nut shall be constructed of Zinc plated carbon steel.
    i. Metal tag shall be constructed of Aluminum.

j. Maximum pressure shall be 250 PSI.
k. Maximum Temperature shall be 220°F.

F. CHECK VALVE
1. 1-1/4" Check valves:
a. Body hall be constructed of ASTM 316 stainless steel.
b. All threads shall be female, nominal tapered threads in accordance with ANSI B1.20.1.
c. Poppet shall all be constructed of 304 stainless steel.
d. Spring shall all be constructed of 302 stainless steel.
e. Guide shall be constructed of 100 Black Delrin Marcus Registrata.
f. O'Ring shall all be constructed of Buna N.
g. Maximum pressure shall be 450 PSI.
h. Maximum temperature shall be 180°F.
2. 2" and 2-1/2" Check valves:
a. Body shall be Epoxy Coated and constructed of A126 CLASS B, Cast Iron, flanged assembly.
b. Bushing, shall be constructed of C95400 Bronze.
c. Spring and Button Socket Screws shall be constructed of 316 stainless steel.
d. Poppet and Seat Ring shall be constructed of C87600 bronze.
e. Maximum pressure shall be 400 PSI for temperatures 0°F-150°F and 370 PSI for temperatures 151°F-200°F.
f. Maximum temperature shall be 200°F.

G. CONTROL PANEL
1. Shall meet the requirements of UL508A: Standard for Industrial Control Equipment.
2. Shall be rated as a NEMA 12 enclosure with a fan, CFM rated for heat sink requirements of VFDs (Variable Frequency Drive).
3. 3~ 208-230/460V and 1~ 208-230V panels shall be equipped and mounted with Danfoss Micro VFDs (1-10 Horse Power) or Danfoss FC-101 drives (10 HP or greater).
4. 3~ 575 voltage panels shall be equipped and mounted with Danfoss FC-101 drives (1-15HP).
5. All voltages of 20-25 HP shall use FC-202 drives.
6. Panels for 208/230V and 575V systems with 20 HP and above motors shall use external VFDs mounted to backplates.
7. Panels for 460V systems with 20 HP and above motors shall use VFDs mounted within the control panel.
8. Shall have labeled wires and terminal block for easy reference to the wiring diagram.
9. Motor protector circuits sized for motor amperage.
10. Through the door disconnect with selector handle and lockout.
11. Shall be equipped with an audible alarm with silencing feature.
12. Shall be equipped with visual alarm on PLC.

H. PROGRAMABLE LOGIC CONTROLLER
1. Shall have a 7" LED color touchscreen.
2. Shall have a display resolution of 800 x 480 pixels.
3. Shall indicate on the display, per the pump icon, whether or not each pump is green=running, amber=running with fault, red=failure, white=off.
4. Shall be factory set for lead/lag or duty/standby operation.
5. Shall provide Hand/Off/Auto function. Hand operation shall be password protected.
6. Shall display pump hours, suction PSI, discharge PSI, pump frequencies, total kWh for system, and current kWh per pump.
7. Shall be able to modify the discharge pressure setting through password protected screen.

8. Shall have a low pressure cut out.
9. Shall have pipe burst protection.
10. Shall be able to be able to flash the PLC program by means of a Micro-SD card via Micro-SD port.
11. Shall have a RJ45 Ethernet port capable of transmitting data 10/100Mbps using a Cat 5 cable.
12. Shall have a 2.0 USB port available for communication.
13. Shall have onboard Modbus Protocol. Two ports available; one for communication to the VFD and one open for the building management system; MS/TP and EtherNet/IP.
14. Shall have the following I/O:
    a. Number of digital inputs: 18.
    b. Number of digital outputs: 17.
    c. Number of analog inputs: 9.
    d. Number of analog outputs: 2.
15. Shall use a coin-type 3v, lithium battery, CR2450.
16. Shall have the ability of the owner/operator to receive a text message for critical alarms.
17. Shall have the ability to access the PLC via downloadable app. Functionality shall be identical to PLC interface.

I. VARIABLE SPEED DRIVES
1. NEMA 1 enclosure.
2. Modbus communications protocol shall report faults and energy usage in kWh back to the programmable logic controller.
3. Optical isolation that requires no external control devices.

J. (External Components) [i]
1. (Hydropneumatic Tank Option; Tanks for system capacity and ASME-rated tanks shall also be available upon request).
2. (ODP motors available in lieu of TEFC upon request (but not recommended)).
3. (NEMA 3R control panel enclosure).
4. (Dome tower light; options for Green (running)/Amber (running with fault)/Red (failure)/White (power present)).
5. (Run/Fault LED lights, per pump, mounted on front of panel).
6. (BMS protocol options):
    a. (BACnet™)
    b. (LonWorks®)

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install equipment in accordance with manufacturer's instructions.
B. Power wiring, as required, shall be the responsibility of the electrical contractor. All wiring shall be performed per manufacturer's instructions and applicable state, federal and local codes.
C. All factory wiring shall be numbered for easy identification and the numbers shall coincide with those shown on the wiring diagram.
D. Unit shall be a Wilo-WiBooster pressure booster system as manufactured by Wilo USA.

END OF SECTION

[1] Components in parenthesis indicate an optional item.

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