Wilo-CO MVI
Pressure Boosting Systems

Engineering Specification

WILO_SPC_CO MVI_0412

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Vertical, multistage, centrifugal pump booster package shall be a Wilo-CO MVI booster as manufactured by Wilo USA.
B. Furnish and install a variable speed, vertical multistage, centrifugal booster pumping package with a capacity as indicated in the plans.

1.02 RELATED SECTIONS

A. 23 21 23 – Hydronic Pumps.
B. 23 22 23.13 – Electric-Driven Steam Condensate Pumps.
C. 23 53 13 – Boiler Feedwater Pumps.

1.03 REFERENCES

A. NSF – NSF International.
B. HI – Hydraulic Institute.
C. UL – Underwriters Laboratories.
D. NEC – National Electrical Code.
E. ANSI – American National Standards Institute.
F. AISI - American Iron and Steel Institute.
G. ISO – International Standards Organization.
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; rated up to 73.4°F (23°C).
B. The complete packaged pumping system shall be UL QCZJ listed and compliant for “packaged pumping systems”, (Pending at the time of this printing).

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 248°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.
F. Booster pressure ratings shall either be 232 PSI, 363 PSI, or 435 PSI maximum working pressure depending on maximum pump working pressure.
G. The pumping package shall be performance tested, at booster duty point, prior to shipment.

1.06 WARRANTY

A. Provide manufacturer's standard warranty against defects in materials and workmanship.
   1. Warranty Period: Wilo-CO MVI boosters 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 -CO MVI series booster 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 black epoxy coated A-500 Steel Tubing and A36 C-Channel/Plates.
   2. Base assembly fasteners shall be Zinc-plated with grade 5 rating tinsel strength.

B. PUMPS
   1. Shall be a non-self-priming, high-efficiency multistage high-pressure centrifugal pump in a vertical design with in-line connections.
   2. Shall be NSF 372/61 Annex G listed for drinking water and low lead requirements and CSA listed.
   3. All pumps shall meet or exceed the DOE requirements for Pump Efficiency Index (PEI).
   4. The pump shall either have a maximum operating pressure rating of 232 PSI, 363 PSI or 435 PSI: depending on size and number of stages.
   5. Pump Housings:
      a. Shall either be constructed of:
         i. AISI 304 stainless steel.
         ii. AISI 316L stainless steel.
      b. Shall be assembled with 150 or 300 Class ANSI rotatable, flanges: depending on size and number of stages.
      c. Shall be equipped with drain and vent ports with ability to accommodate a bypass.
      d. Shall allow for easy access to the coupler, spacer, and seal cartridge assembly. Shall allow for removal/replacement of seal cartridge without removing motor at any horsepower.

C. Seal cartridge assemblies shall have the ability to be disassembled to replace the mechanical seal without having

to replace the entire cartridge assembly.

1. Mechanical Seal:
    a. Metal parts: CrNiMo 316L stainless steel.
    b. Elastomers shall be constructed of EPDM.
    c. Seal face shall be Carbon graphite antimony impregnated Silicon carbide (eSiC-Q7, Q1).
    d. Seal seat shall be Silicon carbide (eSic-Q7, Q1).
2. Impellers:
    a. Shall be constructed of AISI 304L or 316L Stainless Steel depending on pump construction.
    b. Shall be two-piece and tack-welded prior to shipment.

D. 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 have a NEMA C-faced flange for vertical mounting.
3. Shall either be equipped a 208-230v, 460v or 575v motor.
4. Shall be a 2-pole motor and run up to 60 hz.
5. Shall be totally enclosed fan cooled.
6. Shall have a protection class of IP55 with Class F insulation.

E. CONTROL PANEL

1. Shall meet the requirements of UL508A: Standard for Industrial Control Equipment.
2. Shall be equipped with Class J fuses that are fast-acting to prevent equipment damage caused by short-circuit events.
3. Shall be rated as a NEMA 3R enclosure up to 20 HP or greater than 20 HP shall be rated for NEMA 12, with a fan CFM rated for heat sink requirements of VFDs (Variable Frequency Drive).
4. 208-230/460/575V~3 voltage panels shall be equipped and mounted with Danfoss FC-101 drives.
5. Shall have labeled wires and terminal block for easy reference to the wiring diagram.
6. Motor protector circuits sized for motor amperage.
7. Through the door disconnect with selector handle and lockout.
8. Shall be equipped with an audible alarm with silencing feature.
9. Shall be equipped with visual alarm on PLC.

F. 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 either green=running, amber=running with fault, red=failure, white=off.
4. Shall be factory set for either lead/lag or duty/standby operation.
5. Shall provide off/hand/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 the password-protected screen.
8. Shall have a low-pressure cut-out function.
9. Shall have pipe burst protection function.

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 are 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: 4.
    d. Number of analog outputs: 4.
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.

G. 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.

H. PUMP MANIFOLD
1. Shall be constructed of AISI 304, Stainless Steel.
2. Manifolds shall have smooth contour transitions to minimize build-up of organisms.
3. All pump and system connections shall either be 150 or 300 Class ANSI flanges in accordance with ANSI B1.20.
4. All manifolds shall be electrolytic polished.
5. All manifolds shall be size 10S and made from Stainless Steel construction.
6. Suction and discharge manifolds shall each have two ¼" male 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.
7. Discharge manifold blind flange shall be drilled and tapped with a 1" stainless steel Male NPT plug provided.

I. ISOLATION VALVES
1. Body shall be constructed of ductile Iron A536 65-45-12h with a face to face flange for sizes 2"-5" or an ASTM 304 Stainless Steel ball valve for high-pressure applications and equipped with 300 class flanges. All wetted surfaces are stainless steel in construction.

J. CHECK VALVE
1. Every pump, in relation to the pump manifold, shall be equipped with a Wafer-Style, Epoxy Coated Ductile Iron Body ASTM 65-45-12, with 316 Stainless steel internals for 1-1/4" pump branches and above.
2. Check valve shall be a "Piston-style", non-slam, check valve.
3. Elastomer seal for check valve shall be made of EPDM.

K. (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).
    c. (CanBUS)..
7. (Booster packages available at higher pressures upon request)

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-CO MVI booster system as manufactured by Wilo USA.

END OF SECTION

[1] Components in parenthesis indicate an optional item.