# SHOP DRAWING REVIEW

| ENGINEER'S REVIEW | | RESPONSE REQUIRED OF CONTRACTOR | |
|---|---|---|---|
| ☒ | No Exception Taken | ☐ | Confirm Markings |
| ☐ | Rejected | ☐ | Resubmittal Required |
| ☐ | Note Markings | ☒ | No Resubmittal Required |
| | | ☐ | Partial Resubmittal Required |

Engineer's review is for general conformance with the design concept and contract documents. Markings and/or comments shall not be construed as relieving the Contractor from compliance with the project plans and specifications, nor departure therefrom. The Contractor remains responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for selecting fabrication processes, for techniques of assembly, and for performing his work in a safe manner. All resubmittals shall have the changed information clearly highlighted by the submitter. Review of resubmittals only applies to the above highlighted information and is not a mechanism for granting approval to items not specifically highlighted.

Name Michael Hoff

**DATE:** March 22, 2023

**TO:** Vasquez Commercial

**SUBJECT:** 232123 – Pumps

**PROJECT:** Department of Corrections
Office of Admin. Division of Facilities Management, Design, And Construction
HVAC & BAS Upgrade
2002 Warren Barrett Dr., Hannibal, MO.

---

**COMMENTS:**
No Exception Taken.

McQUEENY GROUP

MANUFACTURER'S REPRESENTATIVE

# SUBMITTAL INFORMATION FOR:
# State of Missouri Office of Administration
# Supervision Center Building
# Hydronic Pumps and Specialties
# Specification Section: 232123

ARMSTRONG

Submitted to: Vazquez Commercial Contracting

Date Submitted: January 26, 2023

**13605 West 109th Street**
**Lenexa, KS 66215**
**Phone – 913-396-4700 Fax – 913-396-4699**
**Website: www.mcqueenygroup.com**

# SCOPE

**PUMPS & ACCESSORIES**
**Tag: CWP-1, 2**
Quantity of Two (2) Armstrong 4200H Split Coupled End Suction Base Mounted Pumps complete with the following features and accessories:

- 2x1.5x5
- 162 GPM @ 42 TDH
- 5 HP, 208/3/60 Volt, TEFC
- **Integral VFD w/ Disconnect**
- SG-32 Suction Guide
- FTV-3FS Triple Duty Valve
- One (1) Year Parts Only Warranty. 12 months from installation, but not more than 18 months from the date of manufacture.
- **Flex Connectors**
- **Startup**

**Tag: ET-1**
Quantity of One (1) Armstrong A130-L Expansion Tank.

- Bladder Type

**Tag: CPF-1**
Quantity of One (1) Neptune DBF-2HP Chemical Pot Feeder.

- 2 Gallon

**13605 West 109th Street**
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# EQUIPMENT SCHEDULE

**13605 West 109th Street**
**Lenexa, KS 66215**
**Phone – 913-396-4700 Fax – 913-396-4699**
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# PUMP SCHEDULE

CWP

| PLAN MARK | MANUFACTURER | MODEL | TYPE | GPM | HEAD IN FT | MOTOR HP | PUMP RPM | ELECTRICAL VOLT/PH | WEIGHT (lbs) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| CWP-1 | TACO | FI2509D | BASE MOUNTED END SUCTION | 162 | 52 | 5 | 1750 | 208/3 | 343 | ALL |
| CWP-2 | TACO | FI2509D | BASE MOUNTED END SUCTION | 162 | 52 | 5 | 1750 | 208/3 | 343 | ALL |
| | | | | | | | | | | |
| | | | | | | | | | | |

NOTES:

(1) VARIABLE SPEED DRIVE.

(2) SUCTION DIFFUSER.

(3) HEAVY DUTY BASE PLATE.

SEE SPECIFICATIONS FOR APPROVED MANUFACTURERS

PRODUCT LISTED IS BASIS OF DESIGN ONLY

# PUMP DATA

13605 West 109th Street
Lenexa, KS 66215
Phone – 913-396-4700 Fax – 913-396-4699
Website: www.mcqueenygroup.com

# Submittal

Ref. #: SQFOB002145_1

## Design Envelope Split-Coupled Horizontal Base-Mounted End Suction Pump

**Model:** Series Design Envelope Sensorless 4200H 1505-005.0 with Suction Guide and Flo-Trex Valve

**Project name:** State of MO Admin - Hannibal
**Location:**
**Date submitted:** 1/25/2023 4:42 PM
**Engineer:**
**Representative:**
**Phone number:**
**e-mail:**
**Submitted by:** Seals, Tyler

### Application design data

| | | | |
|---|---|---|---|
| Tag number: | CWP-1 & 2 | Configuration: | Single |
| Service: | | Suction pressure: | 0 ft |
| Location: | | Fluid: | Propylene Glycol: 30 |
| Qty: | 2 | Operating temperature: | 60 °F |
| Total system flow: | 162 USgpm | Duty flow per pump: | 162 USgpm |
| System head: | 52 ft | Viscosity: | 31 SSU |
| Environment: | Indoors | Specific gravity: | 1.0033 |
| Total dissolved solids: | 0 ppm | Safety factor % flow: | 0 % |
| Efficiency at Design: | 79.03 % | Safety factor % head: | 0 % |
| NPSHR: | 14.68 ft | Total Absorbed Power: | 2.7 hp |
| Min. maintained system pressure*: | 20.8 ft | Impeller diameter: | 4.97 in |
| PEIvl: | 0.44 | ERvl: | 56 |
| Standby qty: | 0 | Pump/motor run qty: | 1 |
| Outlet velocity: | 25.52 ft/s | | |
| Redundancy %: | N/A | | |

*If minimum maintained system pressure is not known, default is 40% of design head.

### Materials of construction

| | | | |
|---|---|---|---|
| Construction: | Low Pressure Ductile Iron | Impeller: | 316 Stainless Steel |
| Rating: | ANSI-125 | Pump shaft: | 316 Stainless Steel |
| Connections: | Inlet: 2in, Outlet: 1.5in | Flush line: | Braided Stainless Steel |
| Casing (volute): | Ductile Iron, E-coated | Casing o-ring: | EPDM |
| | | Stub Shaft: | N/A |

### Mechanical seal data

| | | | |
|---|---|---|---|
| Seal type: | Outside Balanced | Rotating face: | Resin Bonded Carbon |
| Manufacturer code: | C-SSC AB2 | Stationary seat: | Sintered Silicon Carbide |
| Springs: | Stainless Steel | Secondary seal: | Viton |
| Rotating hardware: | Stainless Steel | Maximum total dissolved solids (TDS)****: | 2000 PPM |

### Electrical data

| | | | |
|---|---|---|---|
| Supplier: | Armstrong | Insulation class: | Class F Insulation |
| Size: | 5 hp | Motor type: | Permanent Magnet |
| Frame size: | IEC112 | Efficiency: | IE5 |
| Enclosure: | TEFC | Power supply: | 208/3/60 |
| Operating speed @ 100% flow: | 2897 rpm | Operating speed @ 50% flow***: | 1992 rpm |

***Based on minimum pressure setting of 40% of design head.

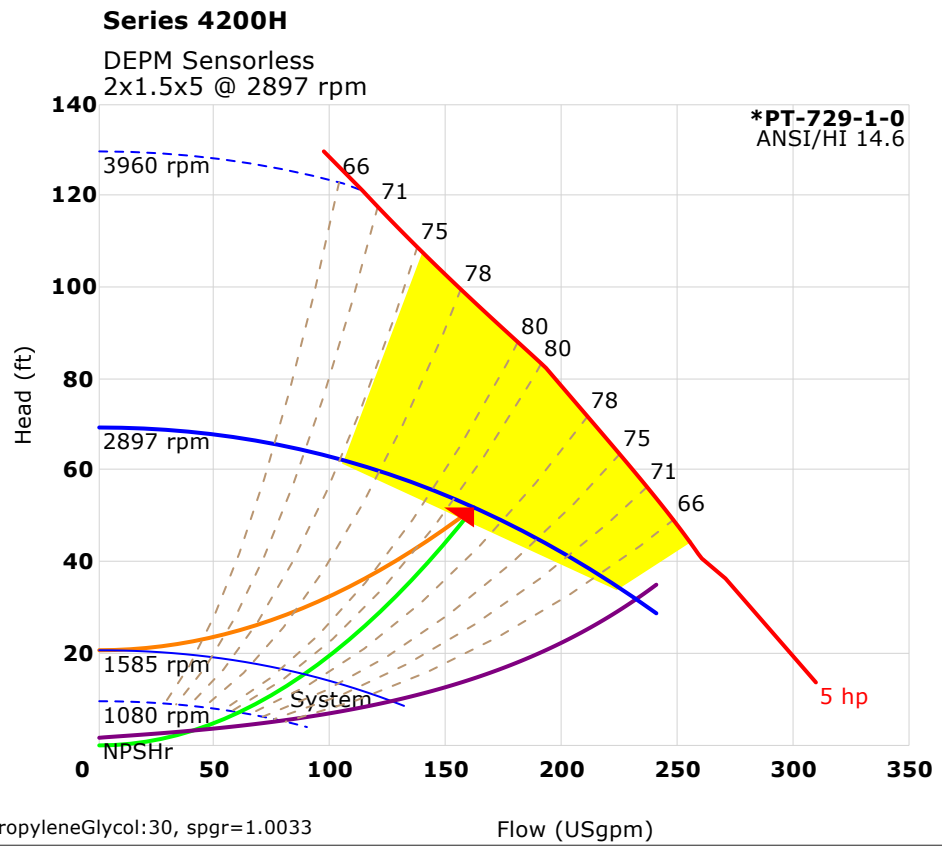
****Note: Please ensure proper seal is selected by inputting Total Dissolved Solids (TDS) in PPM in ADEPT if water quality is poor at site. Also select Flush Line Filter or Cyclone Separator if there are other contaminants in the fluid

## DEPM controller data

| | | | |
|---|---|---|---|
| Sensorless control: | Yes - Quadratic press control | Communication port: | RS 485 |
| Communication protocol (*): | Default Field Reconfigurable | Analog inputs: | 2 (current or voltage) |
| Enclosure: | UL Type 12/IP55 | Analog outputs: | 1 (current or voltage) |
| Fused disconnect switch: | None | Digital inputs: | 2 (programmable) |
| Control orientation: | STD | Digital outputs: | 2 (programmable) |
| Expansion card: | None | Cooling: | Not Applicable |
| Absorbed Power/BHP at 50% load/flow and 55% of design head: | 1.49 hp | Ambient temperature: | 14˚F to 113˚F (up to 3280 ft elevation) |
| Meets ASHRAE 90.1: | Yes | EMI/RFI control: | Integrated filter to meet EN61800-3 |

(*): If Default - Field reconfigurable is selected, Default from factory will be BACnet MS/TP and can be reconfigured in the field.

## Performance curve




PropyleneGlycol:30, spgr=1.0033

**--Control Data—**

**1. Hmax @ 2897 rpm:**
**NPSHR: 14.68 ft**
**Intersection Pt: 162 usgpm @ 52 ft**
**bhp=2.7 hp, eff=79.03 %%,**
**%bepq=107 %%**

**2. Control (QPC) @ 2635 rpm:**
**NPSHR: 11.33 ft**
**Intersection Pt: 141.75 USgpm @ 44.69 ft**
**bhp=2.02 hp, eff=79.39%,**
**%bepq=102.64%**

**3. Control (QPC) @ 2372 rpm:**
**NPSHR: 8.25 ft**
**Intersection Pt: 119.88 USgpm @ 37.89 ft**
**bhp=1.45 hp, eff=79.49%,**
**%bepq=96.02%**

**4. Control (QPC) @ 2110 rpm:**
**NPSHR: 5.47 ft**
**Intersection Pt: 95.58 USgpm @ 31.66 ft**
**bhp=0.97 hp, eff=78.67%,**
**%bepq=85.89%**

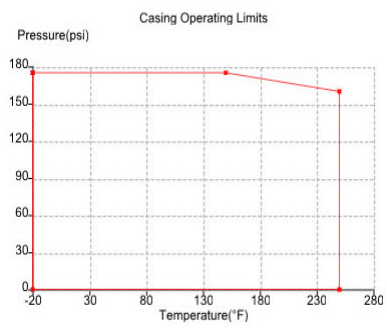
**5. Control (QPC) @ 1848 rpm:**
**NPSHR: 3.05 ft**
**Intersection Pt: 66.42 USgpm @ 26.04 ft**
**bhp=0.59 hp, eff=74.33%,**
**%bepq=68.11%**

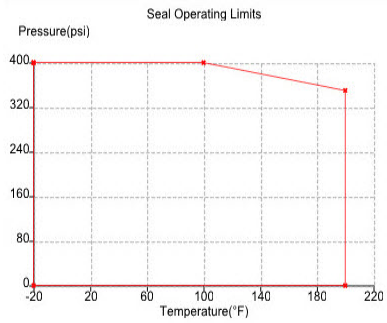
**6. Hmin: 20.8 ft 1585 rpm:**
**NPSHR: 0.5 ft**
**Intersection Pt: 0 USgpm @ 20.8 ft**
**(Head Q Min) Setting= 40% Hmax**

## Design envelope pumping unit capability

| Operating point | Flow | Head | Efficiency |
|---|---|---|---|
| Full capability at 100% design flow | 162 USgpm | 96.96 ft | 78.54% |
| Design point | 162 USgpm | 52 ft | 79.03 % |
| 50% average flow (with default load profile) | 81 USgpm | 28.6 ft | 77.15 % |
| Motor Capability @ Rated Speed | 4.07 hp | | |

## Operating limits (temperature - pressure)




Maximum pressure: 175 psi

Maximum temperature: 200 ˚F

All Pump casings are hydrostatically tested to requirements of ANSI/HI 14.6 standard.

## Options

| | | | |
|---|---|---|---|
| Sensorless Bundle: | Yes | DEPC Parallel Sensorless: | No |
| Energy Performance Bundle: | No | Protection Bundle: | No |
| Dual Season Setup: | No | Zone Optimization Bundle: | No |

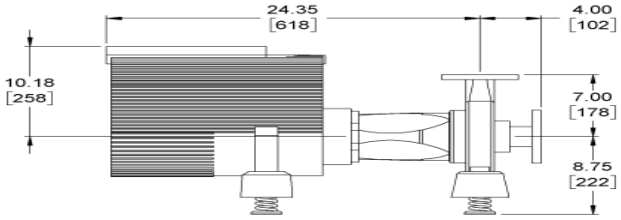
| Cooling | | Heating | |
|---|---|---|---|
| Q1: | N/A | Q2: | N/A |
| H1: | N/A | H2: | N/A |
| H1min: | N/A | H2min: | N/A |
| Maximum Flow: | N/A | Minimum Flow: | N/A |

## Optional Services

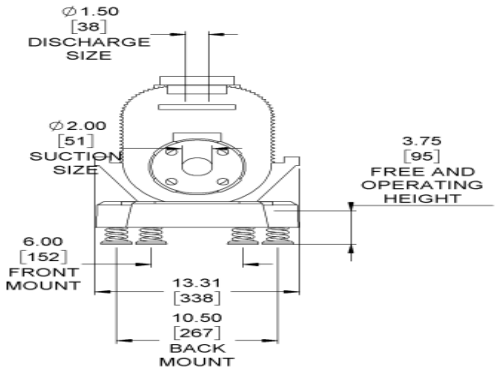
| | | | |
|---|---|---|---|
| On-Site Pump Commissioning: | Cost not Included | Extended Warranty: | No |
| Pump Manager: | Yes | Include Spare Parts Qty: | 0 |

## Dimensional data (not for construction)

Side view




Front view



Weight: 99.2 lb [45 kg], Units of measure: inches [millimeters]
· R = minimum lifting clearance required above motor
· Coupling guard and flush line (not shown) are supplied
· Tolerance of ± 0.125 inch (± 3 mm) should be used
· For certified dimensions, please contact your Armstrong representative
· Pump equipped with casing drain plug and ¼ inch NPT suction and discharge gauge ports
· Rated Capacity per Spring - 113 lb [51.26 kg]
· Rated Deflection - 1 in [25.4 mm]
· Mount Constant - 113 lb/in [2.02 kg/mm]
· Max HorizontalStatic G Rating - N/A

## Connection details

| Connection | Size | Rating | OD | Bolt quantity* | BCD | Bolt size |
|---|---|---|---|---|---|---|
| Inlet | 2 | ANSI-125 | 6.00 | 4 | 4.75 | 0.625 |
| Outlet | 1.5 | ANSI-125 | 5.00 | 4 | 3.88 | 0.5 |

*Equally spaced straddling centreline

## Flow Readout Accuracy

The Design Envelope model selected will provide flow reading on the pump touchscreen & digitally for the BMS. The flow readout will be factory tested to ensure ± 5% accuracy.

## Special instructions

Reference Motor Specification AES 05007.
UL STD 778 & CSA STD C22.2 no.108 certified

## Selected options

Testing: No Test Certification Required
Seal Environment Accessories: None
Pre-Wired Control Bridge: No
Sensorless Bundle: Sensorless control
Constant flow control
Constant pressure control
Flow readout

Design Envelope pumps offer industry-leading efficiency and performance management capabilities for significantly reduced energy consumption. Armstrong has undertaken a multi-year project to transition our pump offering to an integrated design that use Design Envelope Permanent Magnet technology for even greater operating cost savings. In the sizes currently equipped with Design Envelope Permanent Magnet motors, the pumps are also more compact and lighter than our standard Design Envelope pumps.

Please note that depending on the pump sizes, your shipment may include a combination of:

- Design Envelope Permanent Magnet pumps
- Design Envelope Permanent Magnet pumps with IVS controls
- Design Envelope Pumps with Premium efficiency induction motors and IVS controls

# SUCTION GUIDE DATA

13605 West 109th Street
Lenexa, KS 66215
Phone – 913-396-4700 Fax – 913-396-4699
Website: www.mcqueenygroup.com

# Submittal

Ref. #: SQFOB002145_1

## Suction guide

**Model: SG-32**

| | | | |
|---|---|---|---|
| **Project name:** | | **Representative:** | Tyler Seals |
| **Location:** | | **Phone number:** | |
| **Date submitted:** | 1/25/2023 4:42 PM | **e-mail:** | tseals@mcqueenygroup.com |
| **Engineer:** | | **Submitted by:** | Seals, Tyler |

### Application design data

| Tag | Qty | Model | Pipe Conn.size | Pump Conn.size | Design flowrate | Pressure Drop* | Associated pump |
|---|---|---|---|---|---|---|---|
| CWP-1 & 2 | 2 | SG-32 | 3 in | 2 in | 162 USgpm | 3.26 ft | Design Envelope Sensorless 4200H 1505-005.0 |

*at design flow

### Materials of construction

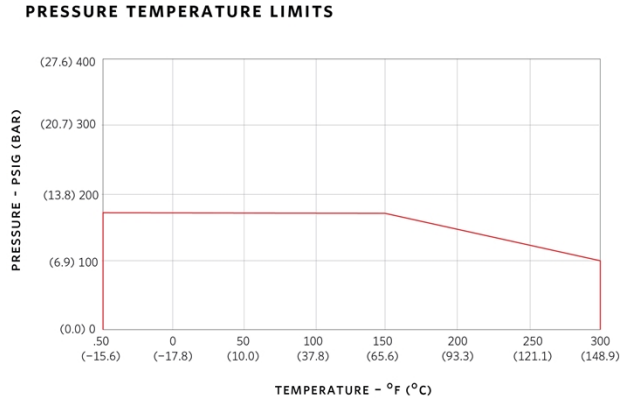
**SG-32**

| | | | |
|---|---|---|---|
| Body: | Cast iron | Cover gasket: | Synthetic fiber |
| Guide vanes: | Cast iron | Strainer: | Stainless Steel,0.125"(3mm)Perf.. |
| Cover plate: | Cast iron | Start-up strainer*: | Fine Mesh Galvanized Steel |

*Remove start up strainer after 24 hours of pump operation

### Operating limits (temperature - pressure)

SG-32-Suction Guide-ANSI-125

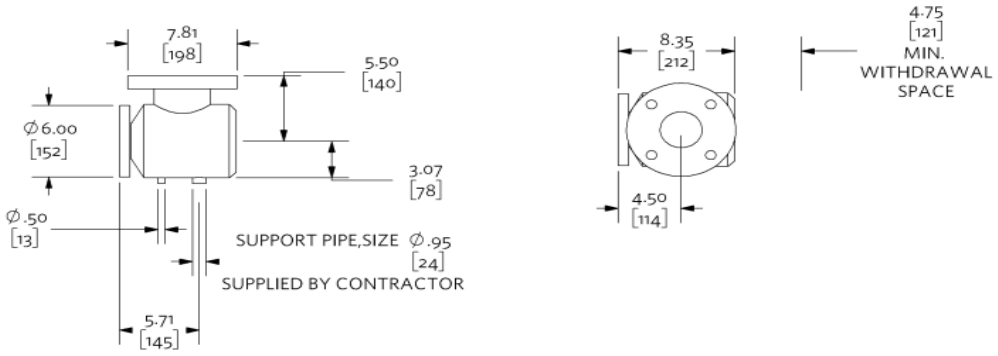



**Maximum pressure:** 175 psi
**Maximum temperature:** 300 F

Units are hydrostatically tested to 150% of maximum working pressure

**Dimensional data (not for construction)**

| SG-32 | Weight: 31 lb [14.06 kg] |
|---|---|
| Side view | Top view |




Not to scale
Units of measure: inches [millimeters]
Tolerance of +/- 0.125 inch (+/- 3 mm) should be used
For certified dimensions, please contact your Armstrong representative

# FLO TREX VALVE

**13605 West 109th Street**
**Lenexa, KS 66215**
**Phone – 913-396-4700 Fax – 913-396-4699**
**Website: www.mcqueenygroup.com**

# Submittal

Ref. #: SQFOB002145_1

## Flo-trex valve

**Model:** FTV-3FS-Flo-Trex Valve-ANSI-125-Straight

| | | | |
|---|---|---|---|
| **Project name:** | | **Representative:** | Tyler Seals |
| **Location:** | | **Phone number:** | |
| **Date submitted:** | 1/25/2023 4:42 PM | **e-mail:** | tseals@mcqueenygroup.com |
| **Engineer:** | | **Submitted by:** | Seals, Tyler |

### Application design data

| Tag | Qty | Model | Size Inlet/Outlet | Config | Pipe Type | Design flowrate | Pressure Drop* | Associated pump |
|---|---|---|---|---|---|---|---|---|
| CWP-1 & 2 | 2 | FTV-3FS | 3 in | Straight | Flanged | 162 USgpm | 4.28 ft | Design Envelope Sensorless 4200H 1505-005.0 |

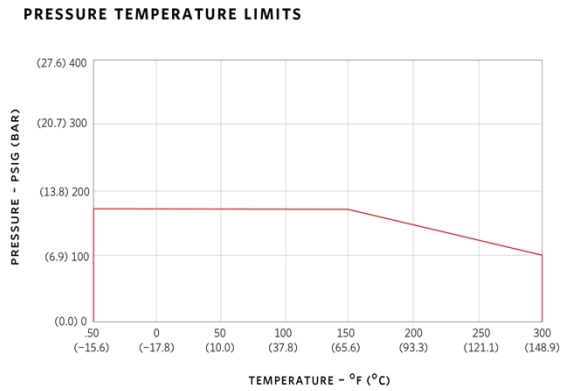
*at design flow

### Materials of construction

| FTV-3FS-Flo-Trex Valve-ANSI-125-Straight | | | |
|---|---|---|---|
| Body: | Cast Iron | Spring: | 302 Stainless Steel |
| Disc: | Brass | O rings: | BUNA N |
| Seat: | EPDM | 2 metering ports: | NPT Brass Body with EPT Check and Gasketed Cap |
| Stem: | 416 Stainless Steel | 2 drain tappings: | 1/4in with Brass Plug |

### Operating limits (temperature - pressure)

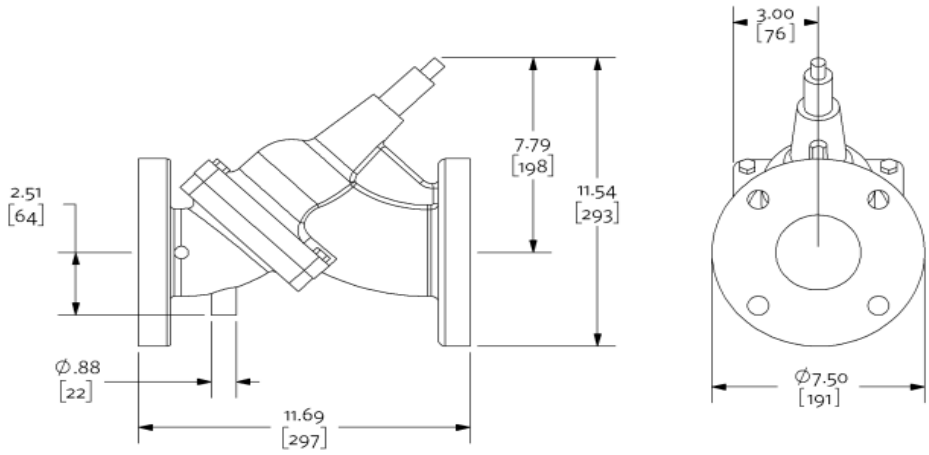
FTV-3FS-Flo-Trex Valve-ANSI-125-Straight




**Maximum pressure:** 175 psi
**Maximum temperature:** 300 F

**Dimensional data (not for construction)**

| Model: FTV-3FS-Flo-Trex Valve-ANSI-125-Straight | Weight: 39 lb [17.69 kg] |
|---|---|
| Side view | Front view |




Not to scale
Units of measure: inches [millimeters]
Tolerance of +/- 0.125 inch (+/- 3 mm) should be used
For certified dimensions, please contact your Armstrong representative

# EXPANSION TANK

13605 West 109th Street
Lenexa, KS 66215
Phone – 913-396-4700 Fax – 913-396-4699
Website: www.mcqueenygroup.com

# Submittal

Ref. #: SQFOB002145_1

**Product:** Expansion
**Model:** 130-L

| | | | |
|---|---|---|---|
| **Project name:** | | **Representative:** | Tyler.Seals |
| **Location:** | | **Phone number:** | |
| **Date submitted:** | 1/25/2023 4:42 PM | **e-mail:** | tseals@mcqueenygroup.com |
| **Engineer:** | | **Submitted by:** | Seals, Tyler |

| System Data | | | |
|---|---|---|---|
| Tag Num: | ET-1 | Service: | |
| Location: | | Qty: | 1 |

**Application: N/A**

Selected by manual selection therefore no system details available

| Expansion Tank | | | |
|---|---|---|---|
| Tank Model: | 130-L | Max. Working Pres.: | 125 psi |
| Standard factory charge is 12 psi (83 kPa) unless otherwise specified. | | · Not for Domestic Potable Water Systems.<br>· Designed and constructed per ASME, Section VIII, Division 1.<br>· California Code Sight-glass available upon request.<br>· Allow a minimum of 18" (457 mm) clearance for system piping. | |
| Shell: | Carbon Steel | Working Temperature: | 240˚F (115˚C) |
| Bladder: | Heavy Duty Butyl | Working Pressure: | 125 psi(862 kPa) |

# L Series - Pre-Charged (ASME) Expansion Tank

**SUBMITTAL**

JOB: _____ REPRESENTATIVE: _____

ORDER NO: _____ DATE: _____

ENGINEER: _____ SUBMITTED BY: _____ DATE: _____

CONTRACTOR: _____ APPROVED BY: _____ DATE: _____

MODEL NO. ORDERED: _____ QTY.: _____

TAG NO.: _____

CHARGE PRESSURE: _____ psi/kPa

***Standard factory charge is 12 psi (83 kPa) unless otherwise specified.***

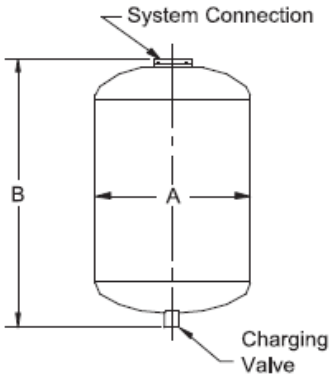
- **Not for Domestic Potable Water Systems.**
- **Designed and constructed per ASME, Section VIII, Division 1.**
- **California Code Sight-glass available upon request.**
- **Allow a minimum of 18" (457 mm) clearance for system**

## MAXIMUM OPERATING CONDITIONS

| | |
|---|---|
| Working Temperature | 240°F (115°C) |
| Working Pressure | 125 psi (862 kPa) |

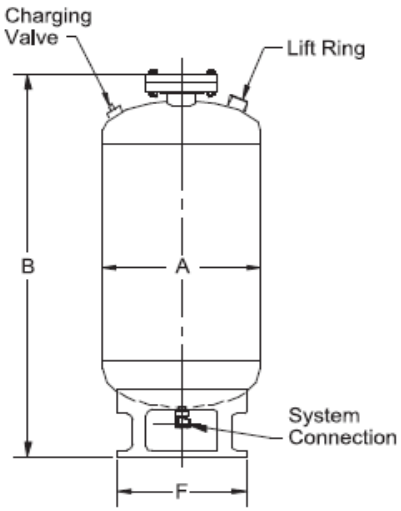
## MATERIALS OF CONSTRUCTION

| | |
|---|---|
| Shell | Carbon Steel |
| Bladder | Heavy Duty Butyl |




**35-L & 50-L**

| Model | Tank Volume | Maximum Acceptance Volume | A | | B | System Connection NPT | Shipping Weight | |
|---|---|---|---|---|---|---|---|---|
| | gal. (L) | gal. (L) | in. | (mm) | in. (mm) | in. (mm) | lbs. | (kg) |
| **35-L** | 10 (38) | 10 (38) | 12 (305) | | 25 (635) | 0.75 (19) | 40 | (18) |
| **50-L** | 13 (49) | 13 (49) | 14 (356) | | 25 (635) | 0.75 (19) | 50 | (23) |
| **85-L** | 23 (87) | 23 (87) | 16 (406) | | 37 (940) | 1.00 (19) | 90 | (41) |
| **130-L** | 35 (132) | 35 (132) | 20 (508) | | 37 (940) | 1.00 (19) | 125 | (57) |




**85-L & 130-L**

## TYPICAL SPECIFICATION

Furnish and install, as shown on the plans, Armstrong Model _____-L ASME pre-charged Bladder Expansion Tank, stamped 125 psi (862 kPa) working pressure. Each tank will be supplied with a heavy duty butyl replaceable bladder. Tank shall be supplied with a ring base, lifting rings, and NPT system connection. An air charging valve connection (standard tire valve) shall be provided to facilitate adjusting pre-charge pressure to meet actual system conditions.


S. A. Armstrong Limited
23 Bertrand Avenue
Toronto, Ontario
Canada, M1L 2P3
T: (416) 755-2291
F (Main): (416) 759-9101

Armstrong Pumps Inc.
93 East Avenue
North Tonawanda, New York
U.S.A. 14120-6594
T: (716) 693-8813
F: (716) 693-8970

Armstrong Holden Brooke Pullen
Wenlock Way
Manchester
United Kingdom, M12 5JL
T: +44 (0) 161 223 2223
F: +44 (0) 161 220 9660

# PUMP FLEX CONNECTORS

VIBRO-ACOUSTICS by Swegon

MEMBER VISCMA

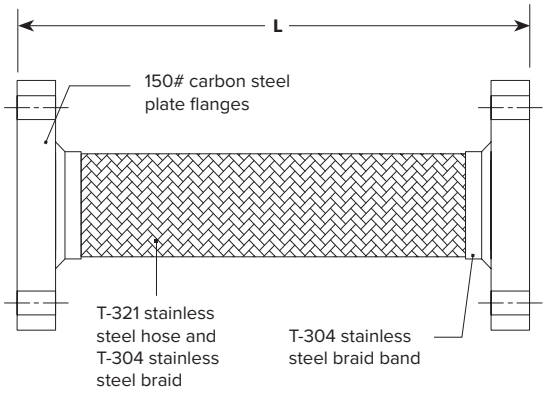
**tel:** 416-291-7371 1-800-565-8401
**fax:** 416-291-8049 1-888-811-2264
**web:** www.vibro-acoustics.com
**eml:** info@vibro-acoustics.com

# FCSS Stainless Steel Flexible Connectors (pg. 1 of 2)

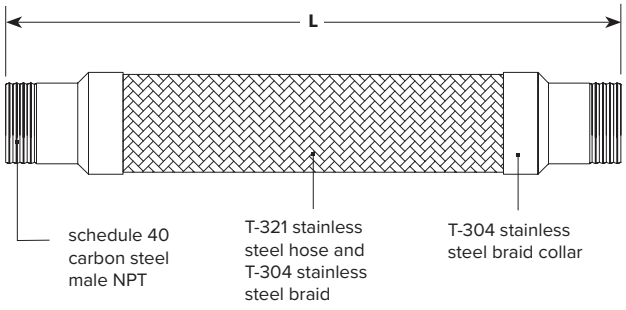
**FCSS**
FL, SM

File No.: FCSS-002 Date: 8 Feb 2022
Supersedes: FCSS-001 Date: 30 Oct 2014

## FCSS FL




## FCSS SM




**PERFORMANCE AND DIMENSIONS**

| Model | Nominal Size | | "L" Overall Length | | Lateral Offset | | Working Pressure @ 70°F |
|---|---|---|---|---|---|---|---|
| | in | mm | in | mm | in | mm | psi |
| FCSS-1.50-FL | 1 ½ | 40 | 9 | 229 | 1/16 | 1.6 | 535 |
| FCSS-2-FL | 2 | 50 | 9 | 229 | 1/16 | 1.6 | 535 |
| FCSS-2.50-FL | 2 ½ | 65 | 9 | 229 | 1/16 | 1.6 | 400 |
| FCSS-3-FL | 3 | 80 | 9 | 229 | 1/16 | 1.6 | 288 |
| FCSS-4-FL | 4 | 100 | 9 | 229 | 1/16 | 1.6 | 250 |
| FCSS-5-FL | 5 | 125 | 11 | 279 | 1/16 | 1.6 | 200 |
| FCSS-6-FL | 6 | 150 | 11 | 279 | 1/16 | 1.6 | 175 |
| FCSS-8-FL | 8 | 200 | 12 | 305 | 1/16 | 1.6 | 212 |
| FCSS-10-FL | 10 | 250 | 13 | 330 | 1/16 | 1.6 | 175 |
| FCSS-12-FL | 12 | 300 | 14 | 356 | 1/16 | 1.6 | 160 |
| FCSS-14-FL | 14 | 350 | 14 | 356 | 1/16 | 1.6 | 110 |
| FCSS-16-FL | 16 | 400 | 14 | 356 | 1/16 | 1.6 | 110 |
| FCSS-0.25-SM | 1/4 | 8 | 6 | 152 | 1/16 | 1.6 | 2240 |
| FCSS-0.38-SM | 3/8 | 10 | 10 | 254 | 1/16 | 1.6 | 1100 |
| FCSS-0.50-SM | ½ | 15 | 6 ½ | 165 | 1/16 | 1.6 | 796 |
| FCSS-0.75-SM | ¾ | 20 | 7 | 178 | 1/16 | 1.6 | 597 |
| FCSS-1-SM | 1 | 25 | 8 | 203 | 1/16 | 1.6 | 455 |
| FCSS-1.25-SM | 1 ¼ | 32 | 8 ¼ | 210 | 1/16 | 1.6 | 441 |
| FCSS-1.50-SM | 1 ½ | 40 | 9 | 229 | 1/16 | 1.6 | 370 |
| FCSS-2-SM | 2 | 50 | 10 ½ | 267 | 1/16 | 1.6 | 370 |
| FCSS-2.50-SM | 2 ½ | 65 | 12 | 305 | 1/16 | 1.6 | 400 |
| FCSS-3-SM | 3 | 80 | 12 | 305 | 1/16 | 1.6 | 288 |
| FCSS-4-SM | 4 | 100 | 14 | 356 | 1/16 | 1.6 | 250 |
| FCSS-5-SM | 5 | 125 | 16 | 406 | 1/16 | 1.6 | 200 |
| FCSS-6-SM | 6 | 150 | 16 | 406 | 1/16 | 1.6 | 175 |

**TEMPERATURE DERATING FACTORS**

| Temperature °F | Multiplier | | | | |
|---|---|---|---|---|---|
| | FL | SM | SW | GR | GRFL |
| 150 | - | - | 0.92 | - | - |
| 200 | 0.94 | 0.94 | 0.89 | 0.94 | 0.94 |
| 250 | 0.92 | 0.92 | 0.86 | 0.92 | 0.92 |
| 300 | 0.88 | 0.88 | 0.83 | 0.88 | 0.88 |
| 350 | 0.86 | 0.86 | 0.81 | 0.86 | 0.86 |
| 400 | 0.83 | 0.83 | 0.78 | 0.83 | 0.83 |
| 500 | 0.78 | 0.78 | 0.75 | 0.78 | 0.78 |
| 600 | 0.74 | 0.74 | - | 0.74 | 0.74 |
| 700 | 0.70 | 0.70 | - | 0.70 | 0.70 |

**NOTES**

- Standard End Fittings:
  FL: Carbon Steel Plate Flanges 150# Drill
  SM: Sch. 40 Carbon Steel Male NPT Ends
- 3/4" offset available as standard upon request. Dimensions may vary.
- Contact Vibro-Acoustics for other size, and custom style requirements
- See "Temperature Derating Factors Chart" for pressure derating multipliers by temperature. Apply multiplier to the working pressure to calculate the operating pressure at the corresponding temperature. i.e. working pressure for FCSS-1-SM at 200°F is 0.94 × 455 psi = 428 psi
- Flexible connectors with higher pressure ratings can be custom built with additional braid layers.

| | | | | |
|---|---|---|---|---|
| **Project:** | **Model:** | | **QTY of sets required:** | |
| **Customer:** | **Dwn:** | **Check:** | **Rev:** | **Date:** |
| **Consultant:** | **Tag:** | | **Unit:** | |
| **V-A Project No:** | **Comments:** | | | |
| **V-A Project Manager:** | | | | |

VIBRO-ACOUSTICS by Swegon

MEMBER VISCMA

**tel:** 416-291-7371 1-800-565-8401
**fax:** 416-291-8049 1-888-811-2264
**web:** www.vibro-acoustics.com
**eml:** info@vibro-acoustics.com

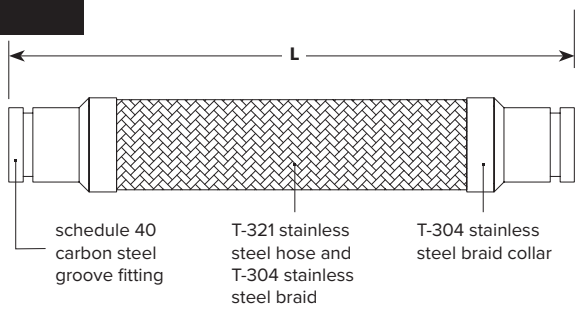
# FCSS Stainless Steel Flexible Connectors (pg. 2 of 2)

**FCSS**
SW, GR, GRFL

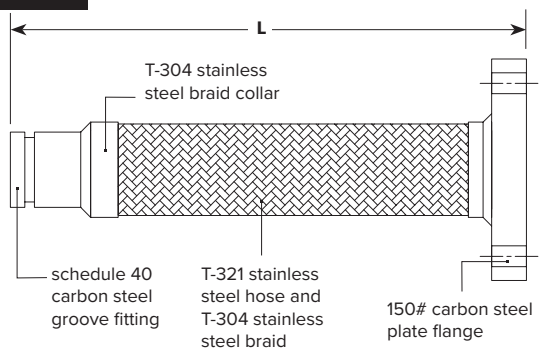
File No.: FCSS-002 Date: 8 Feb 2022
Supersedes: FCSS-001 Date: 30 Oct 2014

## OPTIONS IF PREFERRED

**FCSS**
**GR**




**FCSS**
**GRFL**




**PERFORMANCE AND DIMENSIONS**

| Model | Nominal Size | | "L" Overall Length | | Lateral Offset | | Working Pressure @ 70°F |
|---|---|---|---|---|---|---|---|
| | in | mm | in | mm | in | mm | psi |
| FCSS-2-GR | 2 | 50 | 12 | 305 | 3/8 | 9.5 | 370 |
| FCSS-2.50-GR | 2 1/2 | 65 | 14 | 356 | 3/8 | 9.5 | 400 |
| FCSS-3-GR | 3 | 80 | 14 | 356 | 3/8 | 9.5 | 288 |
| FCSS-4-GR | 4 | 100 | 16 | 406 | 1/2 | 12.7 | 250 |
| FCSS-5-GR | 5 | 125 | 17 | 432 | 1/2 | 12.7 | 200 |
| FCSS-6-GR | 6 | 150 | 18 | 452 | 1/2 | 12.7 | 175 |
| FCSS-8-GR | 8 | 200 | 20 | 508 | 1/2 | 12.7 | 212 |
| FCSS-10-GR | 10 | 250 | 24 | 610 | 3/4 | 19.1 | 175 |
| FCSS-12-GR | 12 | 300 | 25 | 635 | 3/4 | 19.1 | 160 |
| FCSS-2-GRFL | 2 | 50 | 12 | 305 | 3/8 | 9.5 | 450 |
| FCSS-2.50-GRFL | 2 1/2 | 65 | 14 | 356 | 3/8 | 9.5 | 390 |
| FCSS-3-GRFL | 3 | 80 | 14 | 356 | 3/8 | 9.5 | 250 |
| FCSS-4-GRFL | 4 | 100 | 16 | 406 | 1/2 | 12.7 | 210 |
| FCSS-5-GRFL | 5 | 125 | 17 | 432 | 1/2 | 12.7 | 210 |
| FCSS-6-GRFL | 6 | 150 | 18 | 452 | 1/2 | 12.7 | 165 |
| FCSS-8-GRFL | 8 | 200 | 20 | 508 | 1/2 | 12.7 | 220 |
| FCSS-10-GRFL | 10 | 250 | 24 | 610 | 3/4 | 19.1 | 165 |
| FCSS-12-GRFL | 12 | 300 | 25 | 635 | 3/4 | 19.1 | 155 |

**TEMPERATURE DERATING FACTORS**

| Temperature °F | Multiplier | | | | |
|---|---|---|---|---|---|
| | FL | SM | SW | GR | GRFL |
| 150 | - | - | 0.92 | - | - |
| 200 | 0.94 | 0.94 | 0.89 | 0.94 | 0.94 |
| 250 | 0.92 | 0.92 | 0.86 | 0.92 | 0.92 |
| 300 | 0.88 | 0.88 | 0.83 | 0.88 | 0.88 |
| 350 | 0.86 | 0.86 | 0.81 | 0.86 | 0.86 |
| 400 | 0.83 | 0.83 | 0.78 | 0.83 | 0.83 |
| 500 | 0.78 | 0.78 | 0.75 | 0.78 | 0.78 |
| 600 | 0.74 | 0.74 | - | 0.74 | 0.74 |
| 700 | 0.70 | 0.70 | - | 0.70 | 0.70 |

**NOTES**

- Standard End Fittings:
  GR: Sch. 40 Carbon Steel Groove Fittings
  GRFL: One end 'GR', other end 'FL'
- 3/4" offset available as standard upon request. Dimensions may vary.
- Contact Vibro-Acoustics for other size, and custom style requirements
- See "Temperature Derating Factors Chart" for pressure derating multipliers by temperature. Apply multiplier to the working pressure to calculate the operating pressure at the corresponding temperature. i.e. working pressure for FCSS-1-SM at 200°F is 0.94 × 455 psi = 428 psi
- Flexible connectors with higher pressure ratings can be custom built with additional braid layers.

| | | | | |
|---|---|---|---|---|
| **Project:** | **Model:** | | **QTY of sets required:** | |
| **Customer:** | **Dwn:** | **Check:** | **Rev:** | **Date:** |
| **Consultant:** | **Tag:** | | **Unit:** | |
| **V-A Project No:** | **Comments:** | | | |
| **V-A Project Manager:** | | | | |

# CHEMICAL POT FEEDER

VERTICAL STYLE - DISH BOTTOM IN

VERTICAL STYLE - DISH BOTTOM OUT

# By-Pass Feeders

Neptune By-Pass Feeders are a convenient method of introducing treatment chemicals into closed circulating water systems.

Neptune By-Pass Feeders are ideal for treating hot and chilled water circulating loops used in heating and air conditioning systems, process heating and cooling, or large engine water jackets.

Neptune offers two styles of By-Pass Feeders: A vertical style with dish bottom in and a vertical style with dish bottom out.

Filters are available for system cleanup and monitoring.

***A high-pressure cap rated to 300 psi (20.7 bar) is now standard.***

FILTER FEEDER

Convenient features include Full Bottom Drain and Anchor Bolt Holes

# Filter Feeders

The Neptune Filter Feeders combine chemical addition and high-capacity filtering in one piece of equipment. They are a convenient way to introduce solid or liquid chemicals into hot or cold water closed circulating systems.

- Eliminate need for separate By-Pass Feeder and filter
- Filtration can be achieved at the same time as chemical addition
- Extended neck with top inlet allows simple installation of filter bag and basket
- Filter bags are available in 50, 20, 5 and 1 micron ratings (order separately)
- Filter bags are quickly and easily replaced

OLD STYLE CAPS

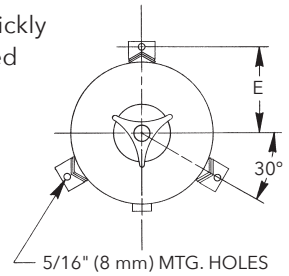
Three-lug, 1/3-turn design rated to 200 psi (13.8 bar).

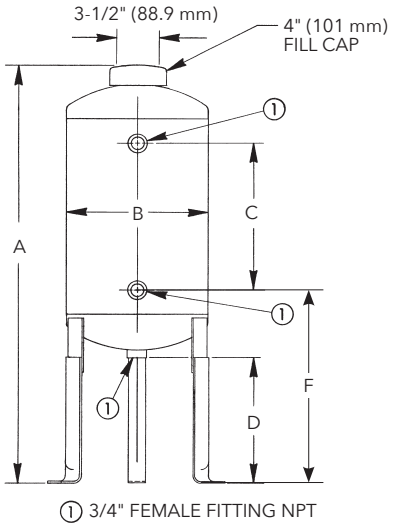
NEPTUNE HIGH PRESSURE CAP

Coarse-thread, 2-1/2-turn design rated to 300 psi (20.7 bar).

# Caps

All Neptune By-Pass Feeders offer a convenient, quick-opening, high-pressure closure. These closures offer better sealing with less force and eliminate the need for tools. Design binds cap tightly when under pressure making it necessary to bleed pressure from tank before removing cap. Underside of cap that contacts liquid is epoxy-coated.




# Vertical Style – Dish Bottom Out

The DBF series features wide-mouth caps manufactured by Neptune. These caps utilize a square-section O-ring seal and will close easily by hand. Advantages of this series are demountable leg extensions and a full bottom drain. Optional Filter Bag Kit may be added.

DBFC models include a built-in support and mounting for a cartridge filter (order cartridge separately).

***See page 3 for filter specifications.***

| MODEL | FILTER | APPROX. CAPACITY GAL. (L) | MAX. PRESSURE PSI (BAR)* | DIMENSIONS INCHES (MM) | | | | | | SHIP WEIGHT LB. (KG) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | E | F | |
| DBF-2HP | Optional† | 2 (7.6) | 300 (20.7) | 31-1/4 (793.8) | 6 (152.4) | 12-3/4 (323.9) | 8-5/8 (219.1) | 4-1/8 (104.8) | 13-1/4 (336.6) | 23 (10) |
| DBFC-2 | Cartridge | 2 (7.6) | 300 (20.7) | 31-1/4 (793.8) | 6 (152.4) | 12-3/4 (323.9) | 8-5/8 (219.1) | 4-1/8 (104.8) | 13-1/4 (336.6) | 23 (10) |
| DBF-5HP | Optional† | 5 (18.9) | 300 (20.7) | 29-3/4 (1,009.7) | 10 (254.0) | 10-1/2 (266.7) | 8 (203.2) | 6-1/8 (155.6) | 13 (330.2) | 38 (17) |
| DBFC-5 | Cartridge | 5 (18.9) | 300 (20.7) | 29-3/4 (1,009.7) | 10 (254.0) | 10-1/2 (266.7) | 8 (203.2) | 6-1/8 (155.6) | 13 (330.2) | 38 (17) |
| DBF-10HP | Optional† | 10 (37.9) | 300 (20.7) | 45-3/4 (1,162.1) | 10 (254.0) | 26-1/2 (673.1) | 8 (203.2) | 6-1/8 (155.6) | 13 (330.2) | 61 (28) |

*At 200°F (93°C) max. †Filter support not included with base unit. Purchase optional filter bag kit.

# Filter Bag Kits

Available for all VTF and DBF models up to 10 gallons (39.7 L). Kit includes bag, bag frame, tubing and connectors. The addition of a filter bag allows the By-Pass Feeder to function simultaneously as a side stream filter. (A clean bag is rated at approximately 30 microns.) Cannot be used with DBFC models.

| MODEL | FOR USE ON |
|---|---|
| FBK-2 | VTF-2HP, DBF-2HP |
| FBK-5 | VTF-5HP, DBF-5HP |
| FBK-10 | VTF-10HP, DBF-10HP |

VTF-2HP WITH FILTER BAG KIT INSTALLED

(Bag frame displayed in front of bag for clarity only.)