Horizontal base mounted end suction pump

**Model:** Series 4030-4x3x10-15 hp Pump (Motor supplier: Armstrong choice)

**Representative:** Walmar Limited Nepean, Ontario

**Phone number:** renebueneman@walmar.net

**Submitted by:** Rene Bueneman

**Pipe orientation:** Single

**Suction pressure:** 0 ft

**Fluid:** Propylene Glycol:50

**Operating temperature:** 60 F

**Viscosity:** 49.45 SSU

**Specific gravity:** 1.0416

**Duty flow per pump:** 377 USgpm

**Duty head:** 75 ft

**Total dissolved solids:** 0 ppm

**Impeller:** Bronze (B584-844)

**Pump shaft:** Carbon Steel

**Shaft sleeve:** 304 SS

**Flexible coupling:** Rotex

**Casing gasket:** Confined Non-Asbestos Fiber

**Seal type:** Inside Single Spring

**Rotating face:** Sintered Silicon Carbide

**Manufacturer code:** SSCsc L EPSS 2A

**Stationary seat:** Sintered Silicon Carbide

**Springs:** Stainless Steel

**Secondary seal:** EPDM

**Rotating hardware:** Stainless Steel

**Supplier:** Factory Choice

**Insulation class:** Class F Insulation

**Inverter motor type:** Inverter Duty

**Frame number:** 254TC

**Efficiency:** NEMA Prem (12.12)

**Enclosure:** ODP

**Speed:** 1770 rpm

**Size:** 15 hp

**Motor Electricals:** 575/3/60

**Maximum pressure:** 175 psi

**Maximum temperature:** 240 F

Pump casings are hydrostatically tested to 150% of maximum pump working pressure.

JRP Endorsement

M. Karakolis

**DATE:** May 10th, 2017
The review by JRP Engineering is for the sole purpose of ascertaining conformance with the general design concept. This review shall not relieve the detail design inherent in the shop drawings nor approved, responsibility of which shall remain with the Contractor submitting same and review shall not relieve the Contractor of this responsibility for errors or omissions in the shop drawings or his responsibility for meeting all requirements of the Contract Documents. The Contractor is responsible for dimensions and conformance not correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of the work of all sub-trades.

M. Karakolis
DATE: May 10th, 2017
Dimensional data (not for construction)

Weight: 446 lb
• 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
• Pump equipped with casing drain plug and ¼ inch NPT suction and discharge gauge ports

Connection details

<table>
<thead>
<tr>
<th>Connection</th>
<th>Size</th>
<th>Rating</th>
<th>OD</th>
<th>Bolt quantity*</th>
<th>BCD</th>
<th>Bolt size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet</td>
<td>4</td>
<td>ANSI-125</td>
<td>9</td>
<td>8</td>
<td>7.5</td>
<td>0.625</td>
</tr>
<tr>
<td>Outlet</td>
<td>3</td>
<td></td>
<td>7.5</td>
<td>0.625</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Equally spaced straddling centreline

Special instructions

The program has defaulted to a NEMA Premium Efficiency motor supplied with NEMA MG-1 Part 31.4.4.2 insulation standards for inverter-fed polyphase motors.

Selected options

Couplings: Rotex

Additional equipment

Flotrex: F TV-4FS (570200-378)
Suction Guide: SG-44 (516860-021)

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M. Karakolis

DATE: May 10th, 2017
Design envelope horizontal base mounted end suction pump

Model: Series Design Envelope Sensorless 4200H 2506-015.0

Project name: Tomlinson Pumps

Location: Walmar Limited Nepean, Ontario

Date submitted: 3/31/2017

Engineer: renebueneman@walmar.net

Contractor: Rene Bueneman

Application design data

- **Tag number:** P2a/b
- **Service:** single
- **Duty flow per pump:** 450 USgpm
- **Duty head:** 88 ft
- **Operating temperature:** 60°F
- **Specific gravity:** 1.0248
- **Duty head:** 88 ft
- **Safety factor % head:** 0%
- **Environment:** indoors
- **Total dissolved solids:** 0 ppm

Materials of construction

- **Construction:** BF
- **Impeller:** Bronze (B584-844)
- **Rating:** ANSI-125
- **Pump shaft:** SS ASTM A276 Type 416
- **Connections:** inlet: 3 in, outlet: 2.5 in
- **Flush line:** braided stainless steel
- **Casing (volute):** Cast Iron (A48-30)
- **Casing gasket:** confined non-asbestos fiber

Mechanical seal data

- **Seal type:** outside balanced
- **Manufacturer code:** C-SSC AB2
- **Rotating face:** resin bonded carbon
- **Springs:** stainless steel
- **Secondary seal:** Viton
- **Rotating hardware:** stainless steel

Motor electrical data

- **Supplier:** Factory Choice
- **Size:** 15 hp
- **Frame number:** 254TC
- **Enclosure:** TEFC
- **Motor Electrics:** 575/3/60
- **Efficiency:** NEMA Prem (12.12)
- **Operating speed @ 100% flow:** 3318 rpm
- **Operating speed @ 50% flow:** 2194 rpm

IVS 102 controller data

- **Sensorless control:** Yes-Quadratic press control
- **BMS protocol:** BACnet Native
- **Enclosure:** U.L Type 12
- **Fused disconnect switch:** no
- **Control orientation:** std
- **Expansion card:** None
- **BHP at 50% load/flow and 55% of design head:** 3.3 hp
- **Min. maintained sys. pressure:** 35.2 ft
- **Ambient temperature:** 14°F to 113°F (up to 3280ft elevation)
- **EMI/RFI control:** Integrated filter to meet E61800-3

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

**The IVS 102 control is a low harmonic control with a built-in DC link reactor equivalent in performance to a 5% AC line reactor. This does not guarantee performance to any system wide harmonic specification or the costs to meet a system wide specification. If supplied with the system electrical details, Armstrong will run a computer simulation of the system wide harmonics. If system harmonic levels are exceeded, Armstrong can also recommend additional harmonic mitigation and the cost for such mitigation.

M. Karakolis

DATE: May 10th, 2017

4/11/2017, Ref. # RBW604497.1 rev1
The review by JRP Engineering is for the sole purpose of ascertaining correctness with the general design concept. This review shall not mean the design design inherent in the shop drawings are approved, responsibility of which shall remain with the Contractor submitting same and review shall not relieve the Contractor of this responsibility for errors or omissions in the shop drawings or his responsibility for locating all requirements of the Contract Documents. The Contractor is responsible for all options to be entered and coordinated at the velocity of information that remains solely to fabrication. Sensorless control to techniques of construction and installation and for coordination of the work of all sub-trades.

M. Karakolis

DATE: May 10th, 2017

1. Hmax @ 56.2 Hz:
   - 450 @ 88, 13.2 hp
2. Control (QPC) @ 51.2 Hz:
   - 395.9 @ 76.1, 9.88 hp
3. Control (QPC) @ 46.3 Hz:
   - 340.8 @ 65.5, 7.2 hp
4. Control (QPC) @ 41.2 Hz:
   - 279.4 @ 55.6, 4.96 hp
5. Control (QPC) @ 36.1 Hz:
   - 209.2 @ 46.6, 3.17 hp
6. Index @ 31.1 Hz:
   - 112.5 @ 38.5, 1.69 hp
7. Hmin: 35.2 ft 29.0 Hz:
   - Setting= 40.00% Hmax

PropyleneGlycol:30, spgr= 1.0248

--- Admin Data ---
Tag Num: P2a/b
--- Motor Data ---
Motor Size: 15 hp
--- Design Duty Point ---
Flow: 450 usgpm
Head: 88 ft
Impeller: 6.19 in
--- Performance Data ---
• NPSHR: 17.2 ft
• Eff. @ Design: 77.63 %
• BHP @ Design: 13.20 hp
• Mtr Capability @ Rated Spd: 13.82 hp
• %Mtr Safety: 4.69%
• BEP @ Design Imp.: 80.98 % @ 377.3 usgpm
--- Control Data ---
1. Hmax @ 56.2 Hz:
   - 450 @ 88, 13.2 hp
2. Control (QPC) @ 51.2 Hz:
   - 395.9 @ 76.1, 9.88 hp
3. Control (QPC) @ 46.3 Hz:
   - 340.8 @ 65.5, 7.2 hp
4. Control (QPC) @ 41.2 Hz:
   - 279.4 @ 55.6, 4.96 hp
5. Control (QPC) @ 36.1 Hz:
   - 209.2 @ 46.6, 3.17 hp
6. Index @ 31.1 Hz:
   - 112.5 @ 38.5, 1.69 hp
7. Hmin: 35.2 ft 29.0 Hz:
   - Setting= 40.00% Hmax

Maximum pressure: 175 psi
Maximum temperature: 200 F

Pump casings are hydrostatically tested to 150% of maximum pump working pressure rating.
Design envelope pumping unit capability

<table>
<thead>
<tr>
<th>Operating point</th>
<th>Flow</th>
<th>Head</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full capability at 100% design flow</td>
<td>450 USgpm</td>
<td>94.7 ft</td>
<td>78.53 %</td>
</tr>
<tr>
<td>Design point</td>
<td>450 USgpm</td>
<td>88 ft</td>
<td>77.63 %</td>
</tr>
<tr>
<td>50% average flow (with default load profile)</td>
<td>225 USgpm</td>
<td>48.5 ft</td>
<td>80.25 %</td>
</tr>
</tbody>
</table>

Dimensional data (not for construction)

- 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
- Pump equipped with casing drain plug and ¼ inch NPT suction and discharge gauge ports

Connection details

<table>
<thead>
<tr>
<th>Connection</th>
<th>Size</th>
<th>Rating</th>
<th>OD</th>
<th>Bolt quantity</th>
<th>Bolt size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet</td>
<td>3</td>
<td>ANSI-125</td>
<td>7.5</td>
<td>4</td>
<td>0.625</td>
</tr>
<tr>
<td>Outlet</td>
<td>2.5</td>
<td>ANSI-125</td>
<td>7</td>
<td>4</td>
<td>0.625</td>
</tr>
</tbody>
</table>

*Equally spaced straddling centreline

Additional information:

- The review by JRP Engineering is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean the detail design inherent in the shop drawings are approved, responsibility of which shall remain with the Contractor submitting same and review shall not relieve the Contractor of this responsibility for errors or omissions in the shop drawings, or his responsibility for meeting all requirements of the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of the work of all sub-trades.

M. Karakolis

DATE: May 10th, 2017

UL STD 778 & CSA STD C22.2 no.108 certified

Selected options

- Environmental Application: Indoors

Additional equipment

- Florex: FTV-4FA (570200-478)
- Suction Guide: SG-33 (516860-019)
Submittal

Design envelope horizontal base mounted end suction pump

Model: Series Design Envelope Sensorless 4200H 1506-007.5

Project name: Tomlinson Pumps

Location: Representative: Walmar Limited Nepean, Ontario

Date submitted: 3/31/2017

Contact: e-mail: renebueneman@walmar.net

Submitted by: Rene Bueneman

Application design data

Tag number: P3a/b
Pipe orientation: Single

Location: Fluid: Non-Potable Fluid - Water

Quantity: 2

Duty flow per pump: 129 USgpm

Duty head: 122 ft

Environment: Safety factor % head: 0%

Total dissolved solids: 0 ppm

Materials of construction

Construction: BF
Impeller: Bronze (B584-844)

Rating: ANSI-125
Pump shaft: SS ASTM A276 Type 416

Connections: Inlet: 3 in, Outlet: 1.5 in
Flush line: Braided Stainless Steel

Casing (volute): Cast Iron (A48-30)
Casing gasket: Confined Non-Asbestos Fiber

Mechanical seal data

Seal type: Outside Balanced
Rotating face: Resin Bonded Carbon

Manufacturer code: C-SS'CABZ
Stationary seat: Sintered Silicon Carbide

Springs: Stainless Steel
Secondary seal: Viton

Rotating hardware: Stainless Steel

Motor electrical data

Supplier: Factory Choice

Motor: Inverter motor type: Inverter Duty

Inverter choice: Class F Insulation

Size: 7.5 hp

Frame number: 213TC

Enclosure: Operating speed @ 100% flow: 3444 rpm

Motor Electrics: Operating speed @ 50% flow: 2476 rpm

575/3/60

IVS 102 controller data

Sensorless control: Yes-Quadratic press control

Communication port: RS 485

BMS protocol: BACnet Native

Enclosure: UL Type 12

Fused disconnect switch: No

Control orientation: STD

Expansion card: None

BHP at 50% load/flow and 55% of design head: 1.41 hp

Ambient temperature: 14F to 113F (up to 3280ft elevation)

Meets ASHRAE 90.1: No

EMI/RFI control: Integrated filter to meet EN61800-3

Min. maintained sys. pressure: 44.8 ft

Harmonic suppression: Integrated DC link reactor**

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

** The IVS 102 control is a low harmonic control with a built-in DC link reactor equivalent in performance to a 5% AC line reactor. This does not guarantee performance to any system wide harmonic specification or the costs to meet a system wide specification. If supplied with the system electrical details, Armstrong will run a computer simulation of the system wide harmonics. If system harmonic levels are exceeded, Armstrong can also recommend additional harmonic mitigation and the cost for such mitigation.

www.armstrongfluidtechnology.com

DATE: May 10th, 2017
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M. Karakolis
DATE: May 10th, 2017

**Operating limits (temperature - pressure)**

- **Maximum pressure:** 175 psi
- **Maximum temperature:** 200 F

Pump casings are hydrostatically tested to 150% of maximum pump working pressure rating.
Design envelope pumping unit capability

<table>
<thead>
<tr>
<th>Operating point</th>
<th>Flow</th>
<th>Head</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full capability at 100% design flow</td>
<td>129 USgpm</td>
<td>122.7 ft</td>
<td>63.97 %</td>
</tr>
<tr>
<td>Design point</td>
<td>129 USgpm</td>
<td>112 ft</td>
<td>64.54 %</td>
</tr>
<tr>
<td>50% average flow (with default load profile)</td>
<td>64.5 USgpm</td>
<td>61.7 ft</td>
<td>57.69 %</td>
</tr>
</tbody>
</table>

Dimensional data (not for construction)

- Top view
- Side view

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M. Karakolis

DATE: May 10th, 2017

Connection details

<table>
<thead>
<tr>
<th>Connection</th>
<th>Size</th>
<th>Rating</th>
<th>OD</th>
<th>Bolt quantity*</th>
<th>BCD</th>
<th>Bolt size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet</td>
<td>3</td>
<td>ANSI-125</td>
<td>7.5</td>
<td>4</td>
<td>6</td>
<td>0.625</td>
</tr>
<tr>
<td>Outlet</td>
<td>1.5</td>
<td>ANSI-125</td>
<td>5</td>
<td>4</td>
<td>3.88</td>
<td>0.5</td>
</tr>
</tbody>
</table>

*Equally spaced straddling centreline

Special instructions

The program has defaulted to a NEMA Premium Efficiency motor supplied with NEMA MG-1 Part 31.4.4.2 insulation standards for inverter-fed polyphase motors.

UL STD 778 & CSA STD C22.2 no.108 certified

Selected options

Environmental Application: Indoors

Additional equipment

- Flotrex: FTV-3FA (S70200-477)
- Suction Guide: SG-33 (S16860-019)
Wet rotor circulator

**Model:** Series ASTRO 225BS 1/2" SWT

**Part number:** 110223-303

**Project name:** Tomlinson Pumps

**Location:** Walmar Limited Nepean, Ontario

**Date submitted:** 3/31/2017

**Engineer:**

**Contractor:** Rene Bueneman

<table>
<thead>
<tr>
<th>Application design data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tag number: P-6&amp;7</td>
</tr>
<tr>
<td>Service: Single</td>
</tr>
<tr>
<td>Location: Water</td>
</tr>
<tr>
<td>Quantity: 2</td>
</tr>
<tr>
<td>Duty flow per pump: 1.5 US gpm</td>
</tr>
<tr>
<td>Duty head: 11 ft</td>
</tr>
<tr>
<td>Total dissolved solids: 0 ppm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Materials of construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction: AB</td>
</tr>
<tr>
<td>Impeller: Polyether Imide (PEI)</td>
</tr>
<tr>
<td>Connections: Inlet: 0.6 in, Outlet: 0.6 in</td>
</tr>
<tr>
<td>Bearings: Ceramic</td>
</tr>
<tr>
<td>Connection type: NPSM union</td>
</tr>
<tr>
<td>Companion flange: Not required</td>
</tr>
<tr>
<td>Certified standard: UL 778 &amp; CSA C22.2 No. 108-01</td>
</tr>
<tr>
<td>Listing: ETL listed for US and Canada</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motor electrical data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier: Factory Choice</td>
</tr>
<tr>
<td>Size: 0.1 hp</td>
</tr>
<tr>
<td>Frame number: Not applicable</td>
</tr>
<tr>
<td>Enclosure: ODP</td>
</tr>
<tr>
<td>Motor Electrics: 115/1/60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating limits (temperature - pressure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum pressure: 150 psi</td>
</tr>
<tr>
<td>Maximum temperature: 230 F</td>
</tr>
</tbody>
</table>

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M. Karakolis

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JRP Engineering

M. Karakolis

DATE: May 10th, 2017

Weight: 7 lb
• 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
☑ REVIEWED
☐ REVIEWED AND MODIFIED
☐ REVISE AND RESUBMIT
☐ NOT REVIEWED

The review by JRP Engineering is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean the detail design inherent in the shop drawings are approved, responsibility of which shall remain with the Contractor submitting same and review shall not relieve the Contractor of this responsibility for errors or omissions in the shop drawings or his responsibility for meeting all requirements of the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of the work of all sub-trades.

JRP Engineering

M. Karakolis

DATE: May 10th, 2017
Design envelope  close coupled vertical in-line pump  
Model:  Series Design Envelope Sensorless 4380 0310-005.0  

Project name:  Tomlinson Pumps  
Location:  Representative:  Walmar Limited Nepean, Ontario  
Date submitted:  3/31/2017  
Engineer:  Contractor:  Rene Bueneman  

Application design data  
Tag number:  P-12  
Pipe orientation:  Single  
Suction pressure:  0 ft  
Service:  PropyleneGlycol:50  
Location:  Fluid:  
Quantity:  1  
Duty flow per pump:  194 USgpm  
Viscosity:  50.45 SSU  
Operating temperature:  60 F  
Specific gravity:  1.0416  
Duty head:  52 ft  
Safety factor % head:  0 %  
Environment:  Indoors  
Total dissolved solids:  0 ppm  

Materials of construction  
Construction:  BF  
Impeller:  Bronze (BS1400 Grade LG1)  
Rating:  ANSI-125  
Shaft sleeve:  316 SS  
Connections:  Inlet: 3 in, Outlet: 3 in  
Casing gasket:  Confined Non-Asbestos Fiber  
Casing (volute):  Cast Iron (BS1452 GR220)  
Flush line:  Braided Stainless Steel  

Mechanical seal data  
Seal type:  Inside Single Spring  
Rotating face:  Sintered Silicon Carbide  
Manufacturer code:  SSCssc L EPSS 2A  
Springs:  Stainless Steel  
Stationary seat:  Sintered Silicon Carbide  
Rotation hardware:  Stainless Steel  

Motor electrical data  
Supplier:  Factory Choice  
Insulation class:  Class F Insulation  
Size:  5 hp  
Inverter motor type:  Inverter Duty  
Frame number:  184JM  
Efficiency:  NEMA Prem (12.12)  
Enclosure:  TEFC  
Operating speed @ 100% flow:  1618 rpm  
Motor Electrics:  575/3/60  
Operating speed @ 50% flow:  1130 rpm  

IVS 102 controller data  
Sensorless control:  Yes-Quadratic press control  
Communication port:  RS 485  
BMS protocol:  BACnet Native  
Analog inputs:  2 (current or voltage)  
Enclosure:  UL Type 12  
Analog outputs:  1 (current)  
Fused disconnect switch:  No  
Digital inputs:  4 (programmable)  
Control orientation:  L1  
Digital outputs:  2 (programmable)  
Expansion card:  None  
Cooling:  Fan cooled through back channel  
BHP at 50% load/flow and 55% of design head:  1.06 hp  
Ambient temperature:  14F to 113F (up to 3280ft elevation)  
Meets ASHRAE 90.1:  Yes  
EMI/RfI control:  Integrated filter to meet EN61800-3  
Min. maintained sys. pressure:  20.8 ft  
Harmonic suppression:  Integrated DC link reactor**  

*If minimum maintained system pressure is not known, default is 40% of design head.  
** The IVS 102 control is a low harmonic control with a built-in DC link reactor equivalent in performance to a 5% AC line reactor. This does not guarantee performance to any system wide harmonic specification or the costs to meet a system wide specification. If supplied with the system electrical details, Armstrong will run a computer simulation of the system wide harmonics. If system harmonic levels are exceeded, Armstrong can also recommend additional harmonic mitigation and the cost for such mitigation.
Operating limits (temperature - pressure)

Maximum pressure: 175 psi
Maximum temperature: 250 F

Pump casings are hydrostatically tested to 150% of maximum pump working pressure rating.
Design envelope pumping unit capability

<table>
<thead>
<tr>
<th></th>
<th>Flow</th>
<th>Head</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full capability at 100% design flow</td>
<td>194 USgpm</td>
<td>58.4 ft</td>
<td>63.09 %</td>
</tr>
<tr>
<td>Design point</td>
<td>194 USgpm</td>
<td>52 ft</td>
<td>62.33 %</td>
</tr>
<tr>
<td>50% average flow (with default load profile)</td>
<td>97 usgpm</td>
<td>28.6 ft</td>
<td>60.55 %</td>
</tr>
</tbody>
</table>

Dimensional data (not for construction)

- **Side view**
- **Top view**

- **Weight**: 379 lb
- **Not to scale**
- **R = minimum lifting clearance required above motor**
- **Units of measure : inches [millimeters]**
- **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**

Connection details

<table>
<thead>
<tr>
<th>Connection</th>
<th>Size</th>
<th>Rating</th>
<th>OD</th>
<th>Bolt quantity</th>
<th>DCC</th>
<th>Bolt size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet</td>
<td>3</td>
<td>ANSI-125</td>
<td>7.5</td>
<td>4</td>
<td>6</td>
<td>0.625</td>
</tr>
<tr>
<td>Outlet</td>
<td>3</td>
<td>ANSI-125</td>
<td>7.5</td>
<td>4</td>
<td>6</td>
<td>0.625</td>
</tr>
</tbody>
</table>

*Equally spaced straddling centreline |

Special instructions

The program has defaulted to a NEMA Premium Efficiency motor supplied with NEMA MG-1 Part 31.4.4.2 insulation standards for inverter-fed polyphase motors.

OSHPD Seismic Certification OSP-0422-10
UL STD 778 & CSA STD C22.2 no.108 certified

Selected options

- Environmental Application: Indoors

Additional equipment

- Flotrex: FTV-3FA (570200-477)
- Suction Guide: SG-33 (516860-019)
**Model:** Series Design Envelope Sensorless 4380 0310-005.0

**Project name:** Tomlinson Pumps

**Location:** Representative: Walmar Limited Nepean, Ontario

**Date submitted:** 3/31/2017

**Engineer:** renebueneman@walmar.net

**Contractor:** Rene Bueneman

## Application design data

<table>
<thead>
<tr>
<th>Tag number</th>
<th>Alt. P-9</th>
<th>Duty flow per pump</th>
<th>Duty head</th>
<th>Environment</th>
<th>Total dissolved solids</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>167 USgpm</td>
<td>47 ft</td>
<td>Indoors</td>
<td>0 ppm</td>
</tr>
</tbody>
</table>

## Materials of construction

<table>
<thead>
<tr>
<th>Construction</th>
<th>Inlet: 3 in</th>
<th>Outlet: 3 in</th>
<th>Impeller</th>
<th>Bronze (BS1400 Grade LG1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating</td>
<td>184JM</td>
<td>Inverter motor type:</td>
<td>Inverter duty</td>
<td></td>
</tr>
</tbody>
</table>

## Mechanical seal data

<table>
<thead>
<tr>
<th>Seal type</th>
<th>Stainless Steel</th>
<th>Secondary seal: EPDM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer code</td>
<td>SSScsc L BS1452</td>
<td>Sintered Silicon Carbide</td>
</tr>
</tbody>
</table>

## Motor electrical data

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Insulation class: Class F Insulation</th>
<th>Inverter duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>5 hp</td>
<td></td>
</tr>
<tr>
<td>Frame number</td>
<td>184JM</td>
<td></td>
</tr>
<tr>
<td>Enclosure</td>
<td>TEFC</td>
<td></td>
</tr>
<tr>
<td>Motor Electrics</td>
<td>575/3/60</td>
<td></td>
</tr>
</tbody>
</table>

## IVS 102 controller data

<table>
<thead>
<tr>
<th>Sensorless control: Yes-Quadratic press control</th>
<th>Communication port: RS 485</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMS protocol: BACnet Native</td>
<td>Analog inputs: 2 (current or voltage)</td>
</tr>
<tr>
<td>Enclosure: UL Type 12</td>
<td>Analog outputs: 1 (current)</td>
</tr>
<tr>
<td>Fused disconnect switch: No</td>
<td>Digital inputs: 4 (programmable)</td>
</tr>
<tr>
<td>Control orientation: L1</td>
<td>Digital outputs: 2 (programmable)</td>
</tr>
<tr>
<td>Expansion card: None</td>
<td>Cooling: Fan cooled through back channel</td>
</tr>
<tr>
<td>BHP at 50% load/flow and 55% of design head: 0.82 hp</td>
<td>Ambient temperature: 14F to 113F (up to 3280ft elevation)</td>
</tr>
<tr>
<td>Meets ASHRAE 90.1: Yes</td>
<td>EMI/RFI control: Integrated filter to meet EN61800-3</td>
</tr>
</tbody>
</table>

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

**The IVS 102 control is a low harmonic control with a built-in DC link reactor equivalent in performance to a 5% AC line reactor. This does not guarantee performance to any system wide harmonic specification or the costs to meet a system wide specification. If supplied with the system electrical details, Armstrong will run a computer simulation of the system wide harmonics. If system harmonic levels are exceeded, Armstrong can also recommend additional harmonic mitigation and the cost for such mitigation.

M. Karakolis

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**DATE:** May 10th, 2017

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Operating limits (temperature - pressure)

- Maximum pressure: 175 psi
- Maximum temperature: 250 F

Pump casings are hydrostatically tested to 150% of maximum pump working pressure rating.
Design envelope pumping unit capability

<table>
<thead>
<tr>
<th>Operating point</th>
<th>Flow</th>
<th>Head</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full capability at 100% design flow</td>
<td>167 USgpm</td>
<td>69.7 ft</td>
<td>63.27%</td>
</tr>
<tr>
<td>Design point</td>
<td>167 USgpm</td>
<td>47 ft</td>
<td>62.79%</td>
</tr>
<tr>
<td>50% average flow (with default load profile)</td>
<td>83.5 USgpm</td>
<td>25.9 ft</td>
<td>59.27%</td>
</tr>
</tbody>
</table>

Dimensional data (not for construction)

- Top view
- Side view
- Weight: 379 lb
- Not to scale
- R = minimum lifting clearance
- Units of measure: inches [millimeters]
- 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

Connection details

<table>
<thead>
<tr>
<th>Connection</th>
<th>Size</th>
<th>Rating</th>
<th>OD</th>
<th>Bolt quantity*</th>
<th>BCD</th>
<th>Bolt size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet</td>
<td>3</td>
<td>ANSI-125</td>
<td>7.5</td>
<td>4</td>
<td>6</td>
<td>0.625</td>
</tr>
<tr>
<td>Outlet</td>
<td>3</td>
<td>ANSI-125</td>
<td>7.5</td>
<td>4</td>
<td>6</td>
<td>0.625</td>
</tr>
</tbody>
</table>

*Equally spaced straddling centreline

Special instructions

The program has defaulted to a NEMA Premium Efficiency motor supplied with NEMA MG-1 Part 31.4.4.2 insulation standards for inverter-fed polyphase motors.

OSHPD Seismic Certification OSP-0422-10
UL STD 778 & CSA STD C22.2 no.108 certified

Selected options

- Environmental Application: Indoors

Additional equipment

- Flotrex: FTV-3FA (570200-477)
- Suction Guide: SG-33 (516860-019)

www.armstrongfluidtechnology.com

DATE: May 10th, 2017

M. Karakolis

JRP Engineering
### Design envelope  close coupled vertical in-line pump

**Model:** Series Design Envelope Sensorless 4380 0208-003.0

**Project name:** Tomlinson Pumps

**Location:** Representative: Walmar Limited Nepean, Ontario

**Date submitted:** 3/31/2017

**Phone number:**

**Engineer:** e-mail: renebueneman@walmar.net

**Contractor:** Submitted by: Rene Bueneman

#### Application design data

<table>
<thead>
<tr>
<th>Tag number:</th>
<th>Alt. P-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe orientation:</td>
<td>Single</td>
</tr>
<tr>
<td>Suction pressure:</td>
<td>0 ft</td>
</tr>
<tr>
<td>Service:</td>
<td>Location:</td>
</tr>
<tr>
<td>Fluid: Propylene Glycol:50</td>
<td></td>
</tr>
<tr>
<td>Quantity:</td>
<td>1</td>
</tr>
<tr>
<td>Duty flow per pump:</td>
<td>140 USgpm</td>
</tr>
<tr>
<td>Duty head:</td>
<td>34 ft</td>
</tr>
<tr>
<td>Environment:</td>
<td>Indoors</td>
</tr>
<tr>
<td>Total dissolved solids:</td>
<td>0 ppm</td>
</tr>
</tbody>
</table>

#### Materials of construction

| Construction: | BF |
| Impeller: | Bronze (BS1400 Grade LG1) |
| Rating: | ANSI-125 |
| Shaft sleeve: | 316 SS |
| Connections: | Inlet: 2 in, Outlet: 2 in |
| Casing (volute): | Cast Iron (BS1452 GR220) |
| Flush line: | Braided Stainless Steel |

#### Mechanical seal data

| Seal type: | Inside Single Spring |
| Rotating face: | Sintered Silicon Carbide |
| Manufacturer code: | SS |
| Springs: | SS |
| Rotating hardware: | Stainless Steel |

#### Motor electrical data

| Supplier: | Factory Choice |
| Size: | 3 hp |
| Frame number: | 182JM |
| Enclosure: | TEFC |
| Motor Electrics: | 575/3/60 |

#### IVS102 controller data

| Sensorless control: | Yes-Quadratic press control |
| BMS protocol: | BACnet Native |
| Enclosure: | UL Type 12 |
| Fused disconnect switch: | No |
| Control orientation: | L1 |
| Expansion card: | None |
| BHP at 50% load/flow and 55% of design head: | 0.55 hp |
| Ambient temperature: | 14F to 113F (up to 3280ft elevation) |
| Meets ASHRAE 90.1: | Yes |
| Min. maintained sys. pressure: | 13.6 ft |

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

** The IVS 102 control is a low harmonic control with a built-in DC link reactor equivalent in performance to a 5% AC line reactor. This does not guarantee performance to any system wide harmonic specification or the costs to meet a system wide specification. If supplied with the system electrical details, Armstrong will run a computer simulation of the system wide harmonics. If system harmonic levels are exceeded, Armstrong can also recommend additional harmonic mitigation and the cost for such mitigation.

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M. Karakolis

DATE: May 10th, 2017

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M. Karakolis

DATE: May 10th, 2017

1. Hmax @ 48.0 Hz:
   • 140 @ 34.2, 2.22 hp
2. Control (QPC) @ 43.9 Hz:
   • 123 @ 29.3, 1.67 hp
3. Control (QPC) @ 39.8 Hz:
   • 105.3 @ 25.1, 1.22 hp
4. Control (QPC) @ 35.7 Hz:
   • 86.2 @ 21.3, 0.85 hp
5. Control (QPC) @ 31.6 Hz:
   • 64.5 @ 17.9, 0.55 hp
6. Index @ 27.6 Hz:
   • 35 @ 14.9, 0.29 hp
7. Hmin: 13.6 ft 25.7 Hz:
   • Setting=40.00% Hmax

PropyleneGlycol:50, spgr=1.0416, 50.45 ssu, 60 F

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Design envelope pumping unit capability

<table>
<thead>
<tr>
<th>Operating point</th>
<th>Flow</th>
<th>Head</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full capability at 100% design flow</td>
<td>140 USgpm</td>
<td>40.9 ft</td>
<td>57.94 %</td>
</tr>
<tr>
<td>Design point</td>
<td>140 USgpm</td>
<td>34 ft</td>
<td>56.48 %</td>
</tr>
<tr>
<td>50% average flow (with default load profile)</td>
<td>70 USgpm</td>
<td>18.7 ft</td>
<td>56.15 %</td>
</tr>
</tbody>
</table>

Dimensional data (not for construction)

<table>
<thead>
<tr>
<th>Side view</th>
<th>Top view</th>
</tr>
</thead>
<tbody>
<tr>
<td>R: 4.00</td>
<td>18.00</td>
</tr>
<tr>
<td>[102]</td>
<td>[457]</td>
</tr>
<tr>
<td>20.01</td>
<td>5.80</td>
</tr>
<tr>
<td>[508]</td>
<td>[147]</td>
</tr>
<tr>
<td>21.87</td>
<td>8.60</td>
</tr>
<tr>
<td>[555]</td>
<td>[216]</td>
</tr>
<tr>
<td>9.50</td>
<td>5.80</td>
</tr>
<tr>
<td>[241]</td>
<td>[129]</td>
</tr>
<tr>
<td>8.50</td>
<td>9.50</td>
</tr>
<tr>
<td>[216]</td>
<td>[129]</td>
</tr>
<tr>
<td>Weight: 292 lb</td>
<td></td>
</tr>
<tr>
<td>Not to scale</td>
<td></td>
</tr>
<tr>
<td>R = minimum lifting clearance required above motor</td>
<td></td>
</tr>
<tr>
<td>Units of measure: inches [millimeters]</td>
<td></td>
</tr>
<tr>
<td>Coupling guard and flush line (not shown) are supplied</td>
<td></td>
</tr>
<tr>
<td>Tolerance of ±0.125 inch (±3 mm) should be used</td>
<td></td>
</tr>
<tr>
<td>For certified dimensions, please contact your Armstrong representative</td>
<td></td>
</tr>
<tr>
<td>Pump equipped with casing drain plug and ¼ inch NPT suction and discharge gauge ports</td>
<td></td>
</tr>
</tbody>
</table>

Connection details

<table>
<thead>
<tr>
<th>Connection</th>
<th>Size</th>
<th>Rating</th>
<th>OD</th>
<th>Bolt quantity*</th>
<th>BCD</th>
<th>Bolt size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet</td>
<td>2</td>
<td>ANSI-125</td>
<td>6</td>
<td>4</td>
<td>0.625</td>
<td></td>
</tr>
<tr>
<td>Outlet</td>
<td>2</td>
<td>ANSI-125</td>
<td>6</td>
<td>4</td>
<td>0.625</td>
<td></td>
</tr>
</tbody>
</table>

*Equally spaced straddling centreline

Special instructions

The program has defaulted to a NEMA Premium Efficiency motor supplied with NEMA MG-1 Part 31.4.4.2 insulation standards for inverter-fed polyphase motors.

OSHPD Seismic Certification OSP-0422-10
UL STD 778 & CSA STD C22.2 no.108 certified

Selected options

Environmental Application: Indoors

Additional equipment

Flotrex: FTV-3FA (570200-477)
Suction Guide: SG-32 (516860-016)
Submittal

Flo-trex valve

Model: FTV-F

Project name: Tomlinson Pumps

Location: Nepean, Ontario

Date submitted: 3/31/2017

Engineer: Rene Bueneman

Contractor: Walmar Limited

Application design data

<table>
<thead>
<tr>
<th>Tag</th>
<th>Qty</th>
<th>Model</th>
<th>Size</th>
<th>Config</th>
<th>Flange rating</th>
<th>Design flowrate</th>
<th>Pressure Drop*</th>
<th>Associated pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alt. P-9</td>
<td>1</td>
<td>FTV-3FA</td>
<td>3 in</td>
<td>Angle Flanged</td>
<td>ANSI-125</td>
<td>167.0 USgpm</td>
<td>1.9 psi</td>
<td>P-9 Design Envelope Sensorless 4380 0310-005.0</td>
</tr>
<tr>
<td>Alt. P-10</td>
<td>1</td>
<td>FTV-3FA</td>
<td>3 in</td>
<td>Angle Flanged</td>
<td>ANSI-125</td>
<td>140.0 USgpm</td>
<td>1.5 psi</td>
<td>P-10 Design Envelope Sensorless 4380 0208-003.0</td>
</tr>
<tr>
<td>P-1a/b</td>
<td>2</td>
<td>FTV-4FS</td>
<td>4 in</td>
<td>Straight Flanged</td>
<td>ANSI-125</td>
<td>377.0 USgpm</td>
<td>2.2 psi</td>
<td>P-1a/b Design Envelope Sensorless 4380 0208-003.0</td>
</tr>
<tr>
<td>P2a/b</td>
<td>2</td>
<td>FTV-4FA</td>
<td>3 in</td>
<td>Angle Flanged</td>
<td>ANSI-125</td>
<td>450.0 USgpm</td>
<td>2.8 psi</td>
<td>P2a/b Design Envelope Sensorless 4200H 2506-015.0</td>
</tr>
<tr>
<td>P3a/b</td>
<td>2</td>
<td>FTV-3FA</td>
<td>3 in</td>
<td>Angle Flanged</td>
<td>ANSI-125</td>
<td>129.0 USgpm</td>
<td>1.3 psi</td>
<td>P3a/b Design Envelope Sensorless 4200H 1506-007.5</td>
</tr>
<tr>
<td>P-9</td>
<td>1</td>
<td>FTV-3FA</td>
<td>3 in</td>
<td>Angle Flanged</td>
<td>ANSI-125</td>
<td>167.0 USgpm</td>
<td>1.9 psi</td>
<td>P-9 Design Envelope Sensorless 4380 0308-005.0</td>
</tr>
<tr>
<td>P-10</td>
<td>1</td>
<td>FTV-3F</td>
<td>3 in</td>
<td>Angle Flanged</td>
<td>ANSI-125</td>
<td>129.0 USgpm</td>
<td>1.3 psi</td>
<td>P-10 Design Envelope Sensorless 4380 0308-003.0</td>
</tr>
<tr>
<td>P-11</td>
<td>1</td>
<td>FTV-2TS</td>
<td>2 in</td>
<td>Straight Threaded</td>
<td>None</td>
<td>10.0 USgpm</td>
<td>1.5 psi</td>
<td>P-11 Design Envelope Sensorless 4380 1508-001.0</td>
</tr>
<tr>
<td>P-12</td>
<td>1</td>
<td>FTV-3FA</td>
<td>3 in</td>
<td>Angle Flanged</td>
<td>ANSI-125</td>
<td>194.0 USgpm</td>
<td>2.5 psi</td>
<td>P-12 Design Envelope Sensorless 4380 0310-005.0</td>
</tr>
</tbody>
</table>

*at design flow

Materials of construction

FTV-4FS-Flo-Trex Valve-ANSI-125-Straight Flanged

Body: Cast Iron ASTM A48 Class 30
Disc: Bronze ASTM B584-C84400
Seat: EPDM
Stem: Stainless Steel ASTM A582 Type 416
Spring: Stainless Steel ASTM A313 Type 302
O-rings: BUNA (STEM) Elastomers & EPDM
2 metering ports: Brass Body with EPDM Check and Gasketed Cap
2 drain tappings: ¼" NPT with Brass Plug

FTV-4FA-Flo-Trex Valve-ANSI-125-Angle Flanged

Body: Cast Iron ASTM A48 Class 30
Disc: Bronze ASTM B584-C84400
Seat: EPDM
Stem: Stainless Steel ASTM A582 Type 416
Spring: Stainless Steel ASTM A313 Type 302
O-rings: BUNA (STEM) Elastomers & EPDM
2 metering ports: Brass Body with EPDM Check and Gasketed Cap
2 drain tappings: ¼" NPT with Brass Plug

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JRP Engineering

DATE: May 10th, 2017

M. Karakolis

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<table>
<thead>
<tr>
<th>Product</th>
<th>Body Material</th>
<th>Spring Material</th>
<th>Disc Material</th>
<th>O-Ring Material</th>
<th>Seat Material</th>
<th>Drain Tapping Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTV-3FA-Flo-Trex Valve-ANSI-125-Angle Flanged</td>
<td>Cast Iron ASTM A48 Class 30</td>
<td>Stainless Steel ASTM A313 Type 302</td>
<td>Bronze ASTM B584-C84400</td>
<td>BUNA (STEM) Elastomers &amp; EPDM</td>
<td>EPDM</td>
<td>¼” NPT with Brass Plug</td>
</tr>
</tbody>
</table>

Operating limits (temperature - pressure)

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M. Karakolis

DATE: May 10th, 2017
FTV-4FS-Flo-Trex Valve-ANSI-125-Straight Flanged

Maximum pressure: 175 psi
Maximum temperature: 230 F

FTV-2TS-Flo-Trex Valve-Straight Threaded

Maximum pressure: 175 psi
Maximum temperature: 230 F

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JRP Engineering

M. Karakolis

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M. Karakolis

DATE: May 10th, 2017
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JRP Engineering

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DATE: May 10th, 2017
Suction guide

Model: SG (2 to 12 inches), SG-TF

<table>
<thead>
<tr>
<th>Tag</th>
<th>Qty</th>
<th>Model</th>
<th>System</th>
<th>Design flowrate</th>
<th>Pressure Drop</th>
<th>Associated pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2a/b</td>
<td>2</td>
<td>SG-33</td>
<td>3 in</td>
<td>450.0 USgpm</td>
<td>3.8 psi</td>
<td>Design Envelope Sensorless 4200H 2506-015.0</td>
</tr>
<tr>
<td>P3a/b</td>
<td>2</td>
<td>SG-33</td>
<td>3 in</td>
<td>147.0 USgpm</td>
<td>0.5 psi</td>
<td>Design Envelope Sensorless 4200H 1506-007.5</td>
</tr>
<tr>
<td>P-9</td>
<td>1</td>
<td>SG-33</td>
<td>3 in</td>
<td>180.0 USgpm</td>
<td>0.0 psi</td>
<td>Design Envelope Sensorless 4380 0308-005.0</td>
</tr>
<tr>
<td>P-10</td>
<td>1</td>
<td>SG-33</td>
<td>3 in</td>
<td>140.0 USgpm</td>
<td>0.4 psi</td>
<td>Design Envelope Sensorless 4380 0308-003.0</td>
</tr>
<tr>
<td>P-11</td>
<td>1</td>
<td>SG-215TF</td>
<td>2 in</td>
<td>169.0 USgpm</td>
<td>0.7 psi</td>
<td>Design Envelope Sensorless 4380 1508-010.0</td>
</tr>
<tr>
<td>Alt. P-9</td>
<td>1</td>
<td>SG-33</td>
<td>3 in</td>
<td>167.0 USgpm</td>
<td>0.5 psi</td>
<td>Design Envelope Sensorless 4380 0310-005.0</td>
</tr>
<tr>
<td>Alt. P-10</td>
<td>1</td>
<td>SG-32</td>
<td>3 in</td>
<td>140.0 USgpm</td>
<td>0.4 psi</td>
<td>Design Envelope Sensorless 4380 0208-003.0</td>
</tr>
<tr>
<td>P-1a/b</td>
<td>2</td>
<td>SG-44</td>
<td>4 in</td>
<td>377.0 USgpm</td>
<td>0.8 psi</td>
<td>Pump (Factory Choice Motor)</td>
</tr>
</tbody>
</table>

*at design flow

Materials of construction

**SG-33**

- Body: Cast Iron
- Guide vanes: Cast Iron
- Cover plate: Cast Iron
- Cover gasket: Synthetic fiber
- Strainer: Stainless Steel, 0.125" (3mm) Perf. Galvanized Steel

**SG-215TF**

- Body: Ductile Iron
- Guide vanes: Ductile Iron
- Cover plate: Ductile Iron
- Cover gasket: Synthetic fiber
- Start-up strainer*: Fine Mesh Galvanized Steel

**SG-33**

- Body: Cast Iron
- Guide vanes: Cast Iron
- Cover plate: Cast Iron
- Cover gasket: Synthetic fiber
- Strainer: Stainless Steel, 0.125" (3mm) Perf.

**SG-33**

- Body: Cast Iron
- Guide vanes: Cast Iron
- Cover plate: Cast Iron
- Cover gasket: Synthetic fiber
- Strainer: Stainless Steel, 0.125" (3mm) Perf.

**SG-32**

- Body: Cast Iron
- Guide vanes: Cast Iron
- Cover plate: Cast Iron
- Cover gasket: Synthetic fiber
- Strainer: Stainless Steel, 0.125" (3mm) Perf.
<table>
<thead>
<tr>
<th>Model</th>
<th>Body</th>
<th>Cover gasket</th>
<th>Strainer</th>
<th>Start-up strainer*</th>
</tr>
</thead>
<tbody>
<tr>
<td>SG-44</td>
<td>Cast Iron</td>
<td>Synthetic fiber</td>
<td>Stainless Steel, 0.125&quot; (3mm) Perf.</td>
<td>Fine Mesh Galvanized Steel</td>
</tr>
<tr>
<td>SG-33</td>
<td>Cast Iron</td>
<td>Synthetic fiber</td>
<td>Stainless Steel, 0.125&quot; (3mm) Perf.</td>
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<td>Cast Iron</td>
<td>Synthetic fiber</td>
<td>Stainless Steel, 0.125&quot; (3mm) Perf.</td>
<td>Fine Mesh Galvanized Steel</td>
</tr>
</tbody>
</table>

*Remove start up strainer after 24 hours

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**Operating limits (temperature - pressure)**

<table>
<thead>
<tr>
<th>SG-33 Suction Guide ANSI-125</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum pressure: 175 psi</td>
</tr>
<tr>
<td>Maximum temperature: 230 F</td>
</tr>
</tbody>
</table>

Units are hydrostatically tested to 150% of maximum working pressure.

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