A. Detail Drawings

Buoy Assembly ................................................................. A-2
Top Section ................................................................. A-3
Middle Section ............................................................. A-4
Bottom Section ............................................................ A-5
Feed Silo ................................................................. A-6
Helius Turbine .............................................................. A-7
B. Buoy Feed System Operating Procedures

To begin feeding:

1. Be sure ballast discharge valve is closed, it is normally closed. (Turn switch “B” to off).
2. Be sure the feedwater intake valve is open, it is normally open. (Turn switch “C” to off).
3. Open one and only one of the cage selector valves. (Turn switch “F”, “G”, “H”, or “I” to on).
4. Turn on the main pump motor and main pumpside feed line valve. (Turn switch “D” to on).
5. Turn on the screw/auger silo emptier. (Turn switch “N” to on).

To feed a different cage, once feeding has begun:

1. Open the cage selector valve to the cage you want to start feeding. (Turn switch “F”, “G”, “H”, or “I” to on).
2. Close the cage selector valve to the cage you want to stop feeding. (Turn switch “F”, “G”, “H”, or “I” to off).

To stop feeding:

1. Turn off the screw/auger silo emptier. (Turn switch “N” to off).
2. Turn off the main pump motor and main pumpside feed line valve. (Turn switch “D” to off).

To take on ballast:

1. Be sure ballast discharge valve is closed, it is normally closed. (Turn switch “B” to off).
2. Open the ballast intake valve. (Turn switch “A” to on.)
3. Close the ballast intake valve after taking on the appropriate amount of ballast. (Turn switch “A” to on.)

To discharge ballast:

1. Be sure the feedwater intake valve is open, it is normally open. (Turn switch “C” to off).
2. Open one of the cage selector valves. (Turn switch “F”, “G”, “H”, or “I” to on).
3. Turn on the main pump motor and main pumpside feed line valve. (Turn switch “D” to on).
4. Open the ballast discharge valve. (Turn switch “B” to on).
5. Close the feedwater intake valve. (Turn switch “C” to on.)

6. When tank is empty, open feedwater intake valve. (Turn switch “C” to off).

7. Close the ballast discharge valve. (Turn switch “B” to off).

8. Turn off the main pump motor and main pumpside feed line valve. (Turn switch “D” to off).

Close all cage selector valves. (Turn switch “F”, “G”, “H”, and “I” to off).
C. Prefabricated Component Specifications

Main and Backup Pump Motor........................................................................ C-2
Main and Backup Pump.................................................................................... C-4
Solenoid Valves.................................................................................................. C-6
Feed Lines.......................................................................................................... C-9
Velleman Device Controller............................................................................. C-10
RTS AutoPak Wireless Modem.......................................................................... C-11
MOSFET’s.......................................................................................................... C-12
Screw/Auger Feeder.......................................................................................... C-13
Electrical Enclosure.......................................................................................... C-14
Helius Turbine.................................................................................................. C-15
DC Motors & Gearmotors

For information about electric motors, see page 888.

DC Motors

The permanent magnet design means that the motor field is supported by magnets instead of copper windings, giving you a lighter weight motor that's more economical to operate. With linear speed/torque characteristics over the entire speed range, these motors can be used with a control for applications that require adjustable speed and constant torque. For adjustable speed controls, see 7729K on page 771 for 12 and 24 VDC motors; see 7793K on page 771 for 0-180 VDC motors. Great for braking and reversing applications. All motors have permanently lubricated ball bearings. The brush/spring assembly is easy to access for trouble-free maintenance. Housing is steel. End shields are die cast aluminum. Rotation is reversible. Rated for continuous duty. Motors have Class F insulation and a side junction box, except as noted.

NEMA C-Face motors offer direct mounting to equipment with the matching configuration and also include a removable steel bolt-on base for mounting versatility. 12 VDC and 24 VDC motors are great for mobile and generator-powered applications. They have a totally enclosed nonventilated (TENV) enclosure, except as noted. 90 VDC and 180 VDC motors offer a high starting torque for heavy loads. They have a totally enclosed fan-cooled (TEFC) enclosure.

Square-flange motors operate on 12 VDC to 24 VDC and have a totally enclosed nonventilated (TENV) enclosure.

<table>
<thead>
<tr>
<th>Torque, NEMA Full Load Overall</th>
<th>hp</th>
<th>rpm</th>
<th>in.-lbs.</th>
<th>Frame</th>
<th>Amps</th>
<th>Lg.</th>
<th>Each</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C-2
Motor Dimensions

DIMENSIONS
NEMA STEEL FRAME MOTORS

The condensed dimensions shown on these pages are for general reference only and are not for construction. The overall length or "C" dimension for each catalog item is included in this catalog.

Certified drawings of all ratings are available for construction purposes.

NEMA STEEL FRAME DIMENSIONS (inches)

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>O</th>
<th>P</th>
<th>Q</th>
<th>R</th>
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</tr>
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<td>200</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 


- 250-TC and larger have 4 mounting holes as 225-TC, 287-TC and larger have a spacing of 4 holes.

- (A) Note that frames require漫空 dimensional drawings or MUSIC catalog yard.

C-3
Pedestal-Mount Bronze Centrifugal Pumps without Motor

Connect these pumps to your motor, gear reducer, or belt drive to transfer and circulate water. They have a bronze housing and open brass impeller. Shaft is Type 303 stainless steel, 5/8" diameter, and has self-lubricating double ball bearings. Maximum temperature is 210° F. Fluids must be compatible with wetted parts (materials in contact with solution). Wetted parts are bronze, Buna-N, carbon, ceramic, Type 303 stainless steel, and Vellumoid.

Click here (See top of page for details)

<table>
<thead>
<tr>
<th></th>
<th>When Used with 3450 rpm, 60 Hz Motor</th>
<th>When Used with 1725 rpm, 60 Hz Motor</th>
<th>NPT Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Req'd hp 5 ft. 20 ft. 50 ft. Shutoff, ft. Req'd hp 1 ft. 5 ft. 10 ft. Shutoff, ft. Intake Discharge Each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/3</td>
<td>37 27 47 1/4 16 10 3 11 3/4&quot; 1/2&quot; 4284K2 $158.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/4</td>
<td>61 50 19 50 36 28 17 13 1&quot; 3/4&quot; 4284K7 $166.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 1/2</td>
<td>102 86 42 67</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C-4
# Straight Centrifugal Pedestal Pumps

## Pump Dimensional Data

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SUC</th>
<th>DSC</th>
<th>CP</th>
<th>D1</th>
<th>E1</th>
<th>E2</th>
<th>F</th>
<th>H1</th>
<th>H2</th>
<th>L</th>
<th>U</th>
<th>V</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>BHP Required (93450 RPM)</th>
<th>(65) Cast Iron Ship Wt.</th>
<th>(67) Bronze Ship Wt.</th>
<th>(68) S. Steel Ship Wt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3862-bc</td>
<td>3/4&quot;</td>
<td>1 1/2&quot;</td>
<td>1.6</td>
<td>2.2</td>
<td>1.6</td>
<td>1.5</td>
<td>N/A</td>
<td>0.3</td>
<td>0.3</td>
<td>3.0</td>
<td>0.6</td>
<td>1.3</td>
<td>1.9</td>
<td>1.3</td>
<td>1.3</td>
<td>0.58</td>
<td>9 Lbs.</td>
<td>10 Lbs.</td>
<td>9 Lbs.</td>
</tr>
<tr>
<td>3714-bc</td>
<td>1&quot;</td>
<td>3/4&quot;</td>
<td>1.7</td>
<td>2.2</td>
<td>1.6</td>
<td>1.6</td>
<td>N/A</td>
<td>0.3</td>
<td>0.3</td>
<td>3.0</td>
<td>0.3</td>
<td>0.2</td>
<td>1.3</td>
<td>2.4</td>
<td>1.4</td>
<td>2.1</td>
<td>1.13</td>
<td>9 Lbs.</td>
<td>10 Lbs.</td>
</tr>
<tr>
<td>3864-4bc</td>
<td>1-1/4&quot;</td>
<td>1&quot;</td>
<td>1.7</td>
<td>3.2</td>
<td>1.5</td>
<td>1.5</td>
<td>N/A</td>
<td>0.3</td>
<td>0.3</td>
<td>3.0</td>
<td>0.3</td>
<td>0.3</td>
<td>2.5</td>
<td>1.3</td>
<td>2.0</td>
<td>1.90</td>
<td>12 Lbs.</td>
<td>13 Lbs.</td>
<td>12 Lbs.</td>
</tr>
</tbody>
</table>

### GENERAL SERVICE MODELS

### HIGH HEAD MODELS

When Ordering Add the Correct 3x to Model Number Indicating Material Selection:

- XCI (-65) Cast Iron Construction with Stainless Steel Impeller and Buna N Seals, Max. Temperature 200°F
- XSI (-67) Cast Bronze Construction with Viton® Seals, Max. Temperature 200°F
- XSS (-68) Investment Cast Stainless Steel Construction with Viton® Seals, Max. Temperature 200°F

### Standard Features:

- Stainless Steel Fitted Cast Iron, Cast Bronze or Investment Cast Stainless Steel Construction
- Buna N Seals
- Viton® Seals
- 3/4" to 1-1/2" NPT Suction Ports
- 1/2" to 1-1/4" NPT Discharge Ports
- Maximum Flow 110 GPM
- Maximum Head 148 FT
- Maximum Working Pressure: General Service – 75 PSI, High Head – 150 PSI
- Self-Aligning Impellers on General Service Models
- Epoxy Coated Pedestal Drives on High Head Models

---

C-5
# Solenoid Valves Specifications

## Series 31

**2-Way Piloted Diaphragm**

**General Service Solenoid Valves**

**Brass and Polymer Bodies » 3/4" - 3" NPT**

### GENERAL INFORMATION:
The Economy Line of valves offers a reliable low cost, lightweight and compact alternative to the Industrial Line. These valves are well suited for humid environments and can be inexpensively modified to meet specific requirements. (These valves are not intended for use in medical life-support, combustion, aerospace or similar applications)

**Mounting Position:**
Any Position (best if vertical and upright)

**Actuation Response Time:**
1 second - 6 seconds is typical

### ELECTRICAL SPECIFICATIONS:

**Standard Voltages:**
- AC 50/60 Hz: 8, 12, 24, 120, 240
- DC: 6, 12, 24

**DC Latching Valves:**
- 2-Wire (std): 30-50 ms pulse is required for activation; a reversed polarity pulse is required for deactivation. Pules longer than 50 ms may cause the valve to re-actuate

**Nominal Ambient Temperature Ranges:**
- 0°C to 45°C, 32°F to 120°F

**ENCLOSURE OPTIONS:**
- 1/2" FPT Conduit (std): Epoxy potted coil in a glass filled polypropylene housing with integral female conduit connection and 24" leads
- 1/2" MPT Conduit (120, 240 VAC std): Fully molded coil in a Valox housing with integral male conduit connection (Class F Rated)

**Spade Terminals**:
- Two 1/4" spade terminals integrally molded in a Thermoplastic Polyester housing and open frame design

**Din Connection**: Form "B" style connection

**Canister**: Epoxy potted coil in a glass filled nylon canister with two 18" leads wires (custom wire configurations available)

### OPERATING MODES AVAILABLE:

**Normally Closed** - Closed when de-energized, open when energized

**Normally Open** - Open when de-energized, closed when energized

---

### Technical Data, Mounting Holes, Flow Patterns

---

<table>
<thead>
<tr>
<th>Port Size</th>
<th>Orifice Size</th>
<th>Cv Factor</th>
<th>Operating Press</th>
<th>Max. Operating Temp</th>
<th>Coil Wattage</th>
<th>Solenoid Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>AC</td>
<td></td>
<td></td>
<td>Brass 30% GF Nylon</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DC</td>
<td></td>
<td></td>
<td>AC DC</td>
</tr>
</tbody>
</table>

**NORMALLY CLOSED (CLOSED WHEN DE-ENERGIZED)**

<table>
<thead>
<tr>
<th>Port Size</th>
<th>Orifice Size</th>
<th>Cv Factor</th>
<th>AC Air/Gas/Water Max. (MOPD)</th>
<th>DC Air/Gas/Water Max. (MOPD)</th>
<th>Max. Operating Temp</th>
<th>Coil Wattage</th>
<th>Solenoid Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4</td>
<td>1</td>
<td>100</td>
<td>150</td>
<td>125</td>
<td>8.5</td>
<td>180</td>
<td>82.2</td>
</tr>
</tbody>
</table>

**Enclosure/Termination**

AC: A205 - SA - 24-50/60 Spade
Technical Information

Operational Sequence / Flow Patterns:

2-Way Normally Closed

```
[Diagram of 2-Way Normally Closed Flow Pattern]
```

2-Way Normally Open

```
[Diagram of 2-Way Normally Open Flow Pattern]
```

Wattage Rating / Power Consumption:

<table>
<thead>
<tr>
<th>DC</th>
<th>AC</th>
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<tbody>
<tr>
<td></td>
<td>Inrush Current (V ma)</td>
</tr>
<tr>
<td>DC</td>
<td>Voltage (60Hz)</td>
</tr>
<tr>
<td>----</td>
<td>---------------</td>
</tr>
<tr>
<td>24</td>
<td>5</td>
</tr>
<tr>
<td>120</td>
<td>5</td>
</tr>
<tr>
<td>240</td>
<td>5</td>
</tr>
</tbody>
</table>

AC
Inrush Amps = Volt-Amp Inrush / Voltage
Holding Amps = volt-amp Holding / Voltage

Since DC valves have no inrush current, the amp rating can be determined:

Amps = Watts (DC) / Voltage

Valve Dimensions:

**Brass Valves**

**GF Nylon Valves**
<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Weight (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;</td>
<td>n/a</td>
<td>3.8</td>
<td>4.2</td>
<td>1.8</td>
</tr>
<tr>
<td>1&quot;</td>
<td>5.3</td>
<td>4.0</td>
<td>4.4</td>
<td>2.5</td>
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<tr>
<td>1-1/2&quot;</td>
<td>7.3</td>
<td>5.1</td>
<td>6.1</td>
<td>6.8</td>
</tr>
<tr>
<td>2&quot;</td>
<td>7.3</td>
<td>5.6</td>
<td>7.0</td>
<td>8.5</td>
</tr>
<tr>
<td>3&quot;</td>
<td>11.7</td>
<td>10.0</td>
<td>11.7</td>
<td>38.0</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Weight (lbs.)</th>
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<td>5.98</td>
<td>4.1</td>
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<td>.75</td>
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<td>5.98</td>
<td>4.1</td>
<td>4.35</td>
<td>.75</td>
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<td>1-1/2&quot;</td>
<td>7.2</td>
<td>7.2</td>
<td>6.3</td>
<td>2.2</td>
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<td>2&quot;</td>
<td>7.4</td>
<td>7.4</td>
<td>6.8</td>
<td>2.4</td>
</tr>
</tbody>
</table>

**Latch Valve 2-Wire Circuit:**

**Lead Wires:**
Red (+) is for Latching; Black (-) is common

**Current Pulse:**
A 12 VDC 30-50 ms pulse is required to latch actuator in the open or closed position. A pulse longer than 50 ms may cause the armature to re-actuate.

Other configurations and materials are available for special requirements. Please contact the factory or fill out the custom application form with your requirements.
**Pure Gum Rubber Tubing**

- Temperature Range: -70° to +160° F
- Color: Tan
- Durometer, Shore A: 45
- Tensile Strength: 3000 psi
- Elongation: 700%
- Sterilization: Not rated
- Material Meets: FDA (food and beverage), Fed. Spec. ZZ-T-831D
- Fittings: Barbed (see pages 111-118)

Smooth Finish  \[ \square \]  Rough Finish  \[ \square \]

This natural rubber heavy-wall tubing has a rough-textured finish (except where noted). Provides excellent abrasion resistance, yet isn't as resilient, soft, or smooth as latex rubber tubing. Use for abrasive media, air, chemical, food, and beverage transfer lines. Not pressure rated; use for gravity flow applications. Not rated for bend radius. **Vacuum-rated** tubing withstands vacuum up to 29.9" Hg at 70° F.

<table>
<thead>
<tr>
<th>ID</th>
<th>OD</th>
<th>Wall</th>
<th>Available Lengths, ft.</th>
<th>Per Ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot;</td>
<td>1 3/4&quot;</td>
<td>1/4&quot;</td>
<td>Up to 50</td>
<td>5.546K11</td>
</tr>
<tr>
<td>1 1/2&quot;</td>
<td>2 1/2&quot;</td>
<td>1/2&quot;</td>
<td>Up to 20</td>
<td>5.546K12</td>
</tr>
<tr>
<td>2&quot;</td>
<td>2 1/4&quot;</td>
<td>1/8&quot;</td>
<td>Up to 12</td>
<td>5.546K13</td>
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<tr>
<td>2&quot;</td>
<td>2 1/2&quot;</td>
<td>1/4&quot;</td>
<td>Up to 12</td>
<td>5.546K14</td>
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<tr>
<td>2&quot;</td>
<td>3&quot;</td>
<td>1/2&quot;</td>
<td>Up to 12</td>
<td>5.546K15</td>
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<tr>
<td>2 1/4&quot;</td>
<td>2 3/4&quot;</td>
<td>1/4&quot;</td>
<td>Up to 12</td>
<td>5.546K16</td>
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<td>3&quot;</td>
<td>1/4&quot;</td>
<td>Up to 12</td>
<td>5.546K17</td>
</tr>
</tbody>
</table>

趁 Smooth finish.
10-CHANNEL, 2-WIRE REMOTE CONTROL
Order Code: K8023

This kit allows you to control up to 10 devices using only 2 wires at a long distance. Microprocessor controlled. Inputs can be push-buttons, switches or open collector outputs from another device. The receiver section provides 10 open collector outputs that allow you to control relays directly. Terminal block connectors for all input and output connections are included. All outputs are provided with LED indication. Can be used with our kits: K6711, K8000, K8006,... Can be connected to our standard relay card: K6714 or K6714-16.

Specifications

- 10 open collector outputs: 50V / 100mA
- tested to a distance of up to 50m (55 yards) between control- and receiver section
- operating voltage: single 12-15V AC or DC, 300mA
- dimensions:
  - control pcb: 70 x 50 x 16mm (2.7" x 2.0" x 0.6")
  - receiver pcb: 103 x 50 x 24mm (4.0" x 2.0" x 1.0")
- recommended adapter: PS1205

Last Update: 11 Mar 2003
© 2000 Velleman Components N.V.
Also visit the main Velleman Website
Remote Telemetry System AutoPak

Transceiver: Motorola Series IV Cellular Radio - rated at nominal 3 watts maximum power output, TNC antenna connector
Terminal block with dry-contact closure for indicating loss of cellular signal
Motorola messenger receiver; TNC antenna connector.

Power Supply: Keyed connector with cable for 12-VDC input from storage battery
Low voltage and thermal protection of cellular transceiver
Selection of optional batteries and complete solar assemblies for a wide range of applications
Optional AC input supplies for special requirements
Varistor and RFI filtering, transient and overcurrent protection for RJ11 connections
External ground lug.

User Interface: RJ11 Jack for data or voice, RJ45 jack for programming, testing, and antenna setup
AutoSafe automatic transceiver activation
Two wire, loop start
Ring voltage, 25 Hz, 60 Vrms, 150 V p-p
Dial Tone: 350 Hz/440 Hz square wave
Maximum REN=3

RTS-SPM Power Management Module

Environmental: NEMA 3R weatherproof enclosure
Thermal shutoff protection
-40C to 60C (-40F to 140F) operating,
-40C to 80C (-40F to 176F) storage
5% to 95% percent relative humidity, non-condensing

Mechanical: Punch-outs for 1/2-inch conduit to accommodate electrical and telephone wires, securable latch
Size: 11 inches H x 8.5 inches W x 5 inches D
Weight: Approximately 8.5 pounds (including battery)
Optional bracket for mounting cellular antenna
## MOSFET

**Infineon Technologies**

**BIPMOS** Power Transistor

- N channel
- Enhancement mode
- Avalanche rated

---

**BUZ 21**

<table>
<thead>
<tr>
<th>Pin 1</th>
<th>Pin 2</th>
<th>Pin 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>D</td>
<td>S</td>
</tr>
</tbody>
</table>

---

### Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Values</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous drain current, ( T_{J} = 25 , ^\circ C )</td>
<td>( I_D )</td>
<td>21 A</td>
<td></td>
</tr>
<tr>
<td>Pulsed drain current, ( T_{J} = 25 , ^\circ C )</td>
<td>( I_{D\text{pul}} )</td>
<td>84 A</td>
<td></td>
</tr>
<tr>
<td>Avalanche current, limited by ( T_{J\text{max}} )</td>
<td>( I_{A} )</td>
<td>21 A</td>
<td></td>
</tr>
<tr>
<td>Avalanche energy, periodic limited by ( T_{J\text{max}} )</td>
<td>( E_{AR} )</td>
<td>11 mJ</td>
<td></td>
</tr>
<tr>
<td>Avalanche energy, single pulse</td>
<td>( E_{AS} )</td>
<td>100 mJ</td>
<td></td>
</tr>
<tr>
<td>Pulsed drain current, ( I_{D} = 21 , A, V_{DS} = 25 , V, R_{DS} = 25 , \Omega )</td>
<td>( V_{DS} )</td>
<td>± 20 V</td>
<td></td>
</tr>
<tr>
<td>Power dissipation, ( T_{J} = 25 , ^\circ C )</td>
<td>( P_{D\text{max}} )</td>
<td>35 W</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>( T_{J} )</td>
<td>-55 ... +150 , ^\circ C</td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>( T_{J\text{st}} )</td>
<td>-55 ... +150 , ^\circ C</td>
<td></td>
</tr>
<tr>
<td>Thermal resistance, chip case</td>
<td>( R_{thJC} )</td>
<td>≤ 1.87 , KW</td>
<td></td>
</tr>
<tr>
<td>Thermal resistance, chip to ambient</td>
<td>( R_{thJA} )</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>DIN humidity category, DIN 40 040</td>
<td></td>
<td></td>
<td>E</td>
</tr>
<tr>
<td>IEC climatic category, DIN IEC 68-1</td>
<td></td>
<td></td>
<td>55 / 150 / 60</td>
</tr>
</tbody>
</table>

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Data Sheet 1 06.99
Screw/Auger Feeders

These new screw-style feeders are used throughout the world in commercial aquaculture facilities. They are extremely well built, durable and can be used for both indoor and outdoor aquaculture applications. Designed for accurate dispensing of feed, they feature a rheostat adjustable auger that can be set for speed and duration. FS4050 includes a spreader plate with a rheostat adjustment for distance and weighs 8 lbs. FS4059 weighs 5 lbs. Screw feeders are 12V and draw approximately 0.5 amps. They can be used with any of the Lucky Pond hoppers.
Fiberglass Enclosures

For information about NEMA enclosure ratings, see page 718.

**NEMA 6P Fiberglass Enclosures**

All have urethane-gasketed covers with stainless steel hinges and four 0.31" flanged mounting holes. Working depth (area available for component mounting) is approximately 3/4" less than the enclosure depth. UL and C-UL listed.

**Color-Coded Enclosures with Standard Covers— With Screw Seal—** Have two stainless steel captive screws for closing.  **With Padlock Hasp—** Have a stainless steel hasp (3/8" shackle dia.) for padlocking.

Please specify enclosure color: gray, red, white, or yellow.

**Gray Enclosures with Link-Lock Latch—** Have a stainless steel cam-actuated link-lock latch.

**Gray Enclosures with Raised Covers—** Provide additional depth. Offered with a stainless steel hasp (3/8" shackle dia.) for padlocking or with a cam-actuated link-lock latch.

Please specify hasp or link-lock latch.

Removable inner component mounting panels are sold separately below.

<table>
<thead>
<tr>
<th>Overall Size, Ht. x Wd. x Dp.</th>
<th>COLOR-CODED ENCLOSURES</th>
<th>GRAY ENCLOSURES</th>
<th>GRAY ENCLOSURES</th>
<th>GRAY ENCLOSURES</th>
<th>PANELS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>w/Screw Seal</td>
<td>w/Padlock Hasp</td>
<td>w/Link-Lock Latch</td>
<td>with Raised Cover</td>
<td>Each</td>
</tr>
<tr>
<td></td>
<td>Each</td>
<td>Each</td>
<td>Each</td>
<td>Each</td>
<td>Ht. x Wd.</td>
</tr>
<tr>
<td>7.5&quot; x 5.4&quot; x 4.8&quot;</td>
<td>7853K1 $32.50</td>
<td>7740K11 $48.87</td>
<td>6917K31 $48.87</td>
<td>6918K51 $49.37</td>
<td>4.9&quot; x 2.9&quot;</td>
</tr>
<tr>
<td>7.5&quot; x 7.5&quot; x 4.8&quot;</td>
<td>7853K2 37.28</td>
<td>7740K12 50.73</td>
<td>6917K32 50.73</td>
<td>6918K52 51.21</td>
<td>4.9&quot; x 4.9&quot;</td>
</tr>
<tr>
<td>9.6&quot; x 9.4&quot; x 4.8&quot;</td>
<td>7853K3 39.51</td>
<td>7740K13 51.38</td>
<td>6917K33 51.38</td>
<td>6918K53 51.88</td>
<td>6.9&quot; x 4.9&quot;</td>
</tr>
<tr>
<td>11.6&quot; x 9.4&quot; x 4.3&quot;</td>
<td>7853K4 45.15</td>
<td>7740K14 51.98</td>
<td>6917K34 51.98</td>
<td>6918K54 52.50</td>
<td>8.9&quot; x 6.9&quot;</td>
</tr>
<tr>
<td>13.6&quot; x 11.4&quot; x 5.2&quot;</td>
<td>7853K5 52.91</td>
<td>7740K15 59.94</td>
<td>6917K35 59.94</td>
<td>6918K55 60.54</td>
<td>10.9&quot; x 8.9&quot;</td>
</tr>
<tr>
<td>15.5&quot; x 13.5&quot; x 6.3&quot;</td>
<td>7853K6 61.32</td>
<td>7740K16 80.65</td>
<td>6917K36 77.67</td>
<td>6918K56 78.71</td>
<td>12.9&quot; x 10.9&quot;</td>
</tr>
<tr>
<td>17.5&quot; x 15.5&quot; x 6.3&quot;</td>
<td>7853K7 70.46</td>
<td>7740K17 87.71</td>
<td>6917K37 84.46</td>
<td>6918K57 85.58</td>
<td>14.9&quot; x 12.9&quot;</td>
</tr>
<tr>
<td>0.50&quot; x 0.50&quot; x 0.50&quot;</td>
<td>7853K8 103.98</td>
<td>7740K18 113.98</td>
<td>6917K38 103.98</td>
<td>6918K58 111.21</td>
<td>16.9&quot; x 14.9&quot;</td>
</tr>
</tbody>
</table>

C-14
BUOY-MOUNTED HELIUS VERTICAL AXIS WIND TURBINE

For - David V. Parker
Department of Mechanical Engineering
University of New Hampshire

Specifications:

- Rated power: 250 watts (10.4 amperes at 24 volts nominal).
- Rated windspeed: 18 m/sec.
- Power production: 2.9 kWh/day (20 kWh/week) at 6 m/sec average wind speed.
- Power output: 24 volts dc nominal (27.6 v regulated float voltage) for charging 24 volt battery pack.
- Voltage regulation: Electronic voltage regulator included.
- Generator: Direct drive encapsulated three phase brushless permanent magnet alternator.
- Overspeed control: Integral
- Weight: Aluminum construction - 600 kg. Stainless steel construction - 980 kg.
- Dimensions: Height - 4.4 m. Outside diameter (frame) 1.8 m.
- Mounting: On 3 m wide buoy.
- Antenna mounting: On top of turbine.
D. Raw Data Plots of Physical Test Results

Free Release Tests for Heave and Pitch

**Heave Response**

![Heave Response Graph]

**Pitch Response**

![Pitch Response Graph]

D-1
Moored Sea-Keeping Tests

Test 1a: Model Scale T=0.75 sec, H=2 cm

Test 1b: Model Scale, T=0.75 sec, H=2 cm