**AG2000**

**IRRIGATION MAGMETER INSTRUCTIONS**

**FEATURES**

- Rate and total indicator
- Powder-coated diecast-aluminum electronics housing
- Cross-drilled screws (2) for tamper-evidence
- Tamper-evident security seal
- Internal data logger (Optional)
- Power/Output cable port access, Tamper-sealed
- Equalization lug
- Welded steel epoxy-coated flow tube
- 316SS electrodes
- Santoprene/polypropylene liner
- Flanges, ANSI 150 lb. drilling

**ISO 9001:2008 CERTIFIED COMPANY**
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**Tamper-Evident Seal.** The battery-powered AG2000 has a seal wire to protect against unauthorized access. The seal can be broken to change units of measure, replace the battery pack, or to field-install a power/output cable (see page 6). **CAUTION:** If water usage regulation is in effect, only a person authorized by your regulatory agency should break the seal wire, and replace it when finished.

**Positioning the Meter.** These meters can be installed horizontally, vertically, and in any radial position. If sludge accumulation is possible, vertical or horizontal placement with the register at a 45˚ angle is recommended. **Using a check valve on the upstream side of the meter, and/or an air vent (vacuum relief valve) in the same, unobstructed run of pipe as the meter, is required in any installation where the meter may be exposed to suction when the system is not in normal operation. Suction can cause damage to the liner. Liner damage caused by suction, without the use of a check valve and/or air vent, may void the warranty.**

**Full Pipe Recommendations.** All magmeters require a method for determining that the pipe is empty, to prevent false reading. This meter is designed to go to zero reading if one or more electrodes is exposed. For highest accuracy, install the meter so that the pipe will be full when there is flow. If air bubbles may be present in the pipe, rotate the meter by one flange hole to position the control housing at a 45˚ angle. See mounting diagrams below.

**Straight Pipe Recommendations.** See the diagrams below for manufacturers' recommendations. **Local regulations may vary, confirm before installing to assure compliance.**

**Fittings and Flanges.** The AG2000 flanges have standard ANSI 150 lb. drilling, and should match up with any other ANSI 150 lb. flange. **IMPORTANT:** Piping protruding beyond welded-on flange faces may damage meter sealing surfaces.

**Temperature.** These flow sensors are recommended for operating temperatures of 10˚ to 130˚ F (-12˚ to 54˚ C) and non-operating temperatures of -40˚ to 158˚ F (-40˚ to 70˚ C).

**Chemigation Applications.** Magmeters in chemigation applications must be placed either upstream of the chemical injection line, or far enough downstream for complete mixing to occur before the solution reaches the meter. Proper placement prevents spikes and drops in readings that result when fluids of different conductivity pass through the meter. (For more information, refer to the technical bulletin on the Seametrics website Downloads page.)

**Conductivity.** The AG2000 requires media with >20 microSiemens/cm of conductivity.

**Possible Problem:** Air pockets, accuracy loss, empty pipe reading

**Better Installation:** Keeps pipe full at sensor for accuracy

**Possible Problem:** Air can be trapped, loss of accuracy

**Better Installation:** Allows air to bleed off, higher accuracy

**Possible Problem:** Electromagnet moved from top by rotating meter

**Better Installation:** Electromagnet free from sediment build-up

**Electrode moved from top by rotating meter**

**Electrode free from sediment build-up**

**Fitting and Flanges.** The AG2000 flanges have standard ANSI 150 lb. drilling, and should match up with any other ANSI 150 lb. flange. **IMPORTANT:** Piping protruding beyond welded-on flange faces may damage meter sealing surfaces.

**Possible Problem:** Air bubbles and sediment on the electrodes can affect accuracy.

**Better Installation:** Improved accuracy results from unimpeded electrodes.

**Possible Problem:** Air can be trapped, loss of accuracy

**Possible Problem:** Intermitent air bubbles pass over electrode

**Better Installation:** Intermitent air bubbles miss electrode

**Possible Problem:** Intermitent air bubbles pass over electrode

**Possible Problem:** Air pockets, accuracy loss, empty pipe reading

**Better Installation:** Vertical upflow with full pipe

**Possible Problem:** Vertical downflow, open discharge

**Better Installation:** Vertical upflow with full pipe

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot;</td>
<td>7.5 gal/min</td>
<td>700 gal/min</td>
</tr>
<tr>
<td></td>
<td>(0.47 liter/sec)</td>
<td>(44 liter/sec)</td>
</tr>
<tr>
<td>4&quot;</td>
<td>12 gal/min</td>
<td>1000 gal/min</td>
</tr>
<tr>
<td></td>
<td>(0.75 liter/sec)</td>
<td>(63 liter/sec)</td>
</tr>
<tr>
<td>6&quot;</td>
<td>32 gal/min</td>
<td>2400 gal/min</td>
</tr>
<tr>
<td></td>
<td>(2 liter/sec)</td>
<td>(151 liter/sec)</td>
</tr>
<tr>
<td>8&quot;</td>
<td>60 gal/min</td>
<td>4400 gal/min</td>
</tr>
<tr>
<td></td>
<td>(4 liter/sec)</td>
<td>(278 liter/sec)</td>
</tr>
<tr>
<td>10&quot;</td>
<td>95 gal/min</td>
<td>7000 gal/min</td>
</tr>
<tr>
<td></td>
<td>(6 liter/sec)</td>
<td>(442 liter/sec)</td>
</tr>
<tr>
<td>12&quot;</td>
<td>130 gal/min</td>
<td>10,000 gal/min</td>
</tr>
<tr>
<td></td>
<td>(8 liter/sec)</td>
<td>(631 liter/sec)</td>
</tr>
</tbody>
</table>
Installing the Gaskets.

1. Select a suitable full-face gasket.
   • Only use flat compressible gaskets (either pliable or hard fiber will work).
   • Use a material compatible with the fluid you will be using.
   • Thickness should be 1/8" - 1/4" (3 - 6 mm), depending on the flatness of the pipe flange surface.
   • Inner diameter must be larger than opening in flow meter.

2. Be sure all mating surfaces are smooth and free of debris.

3. Install gaskets on each end of meter as shown in diagrams at right.

Tightening Flange Bolts.

NOTE: Mating pipe flanges must be ANSI 150# full face (FF) and/or raised face (RF).

1. Tighten flange bolts in an alternating pattern.
   a. Tighten left flange bolt-1 to 20% recommended torque.
   b. Tighten right flange bolt-1 to 20% of recommended torque.
   c. Repeat steps a and b for each bolt in an alternating order, such as shown at right, tightening to 40%, then 60%, then 80%, and then 100%.

2. Test for leaks.

3. If needed, tighten further in 10% increments until leaking stops. **DO NOT OVER-TIGHTEN. OVER-TIGHTENING CAN CAUSE SERIOUS DAMAGE TO THE FLOW METER.**

4. Recheck after 24 hours, adjusting if needed.

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Santoprene Liner</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ft-lb</td>
</tr>
<tr>
<td>3&quot;</td>
<td>25</td>
</tr>
<tr>
<td>4&quot;</td>
<td>20</td>
</tr>
<tr>
<td>6&quot;</td>
<td>42</td>
</tr>
<tr>
<td>8&quot;</td>
<td>65</td>
</tr>
<tr>
<td>10&quot;</td>
<td>73</td>
</tr>
<tr>
<td>12&quot;</td>
<td>97</td>
</tr>
</tbody>
</table>

**CAUTION!** Improper tightening sequence can cause serious damage to the flow meter.

- Do not tighten one side at a time.
- Do not tighten each bolt completely at one time.
POWER SUPPLY

Battery Power (standard). The AG2000 is powered by a non-rechargeable battery pack with standard battery life of 2.5 years; 5 years with extended battery life (EBL) option. Actual lifespan will vary from application to application, depending on the duty cycle (the High Frequency option, if selected, will shorten battery life).

“Low Batt” will display when it is time to replace the battery (see illustration at right). Replacement instructions come with the custom battery pack available from your dealer or Seametrics.

NOTE: Memory will not be lost during a battery change.

External Power (optional). When external power is used, the batteries serve as backup in case of power failure, keeping the meter reading out during an outage. The display reads “P” to indicate that external power is in use (see illustration on next page).

When the display is reading numbers/letters but neither the “Low Batt” or “P” symbol is displayed, the meter is functioning normally under battery power (see illustration at right). When the display is completely blank, the meter is not powered.

Solar Power (optional). In most areas of the US, a 12-volt, 5 watt solar power unit (panel, charge controller and battery) should suffice to operate the meter. In this case, the internal batteries will serve as backup and battery life will be conserved.
**Display Reading.** There are two lines to the display, the bottom line for flow rate and the top line for accumulated total. Measurement units are pre-ordered and factory-set and can be changed in the field only by an authorized individual.

<table>
<thead>
<tr>
<th>Total</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Batt</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td></td>
<td>Rate</td>
</tr>
</tbody>
</table>

- **Low Battery Indicator**
- **No Power**

<table>
<thead>
<tr>
<th>Total</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>00000.0.0.0</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td></td>
<td>Rate</td>
</tr>
</tbody>
</table>

- **External Power Indicator**
- **Empty Pipe**

- **Battery Power**
- **Meter Installed Backwards**

**Optional Input and Outputs.** An optional cable, factory-installed or field-installed by an authorized individual, provides power input, pulse output* for remote reading (4-20 mA conversion, telemetry and data logging functions). See diagram below. Detailed wiring diagrams provided with cable.

*See High Frequency Output Technical Bulletin for available pulse rates.

For data logger setup and operation, refer to FlowInspector Manual

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**WARNING:** Using an unregulated power supply >18 Vdc may damage the meter due to AC line input voltage fluctuation.

**IMPORTANT:** Ensure that plastic cable gland is sealed with tape or sealant and that cap is tight.

**Orange and Blue:** Serial Output (Technician Use Only)

**Green (+) and White (–):** Pulse Output, 30 Vdc max, 10 mA max

**Red (+) and Black (–):** External Power, 8-32 Vdc at 30 mA max (See WARNING)

**Drain:** Connect to earth ground

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**Optional Input/Output Cable - Factory or Field Installed**

![Diagram of AG2000 Cable](https://via.placeholder.com/150)

**Seametrics FLOW**

**Shielded Direct Burial Cable 22 AWG Stranded**

**Drain Wire**

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**Seametrics**

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## TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Problem</th>
<th>Probable Cause</th>
<th>Try...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blank display</td>
<td>Dead battery</td>
<td>Replace battery pack</td>
</tr>
<tr>
<td>Flow rate steadily reads zero when there is flow</td>
<td>Flow is below cutoff (very low)</td>
<td>Reading will resume when flow increases</td>
</tr>
<tr>
<td></td>
<td>There is air in the meter</td>
<td>Reposition meter for full pipe</td>
</tr>
<tr>
<td>Display reads [-]</td>
<td>Meter is installed backward</td>
<td>Note flow direction arrow, reverse meter</td>
</tr>
<tr>
<td>Flow rate intermittently drops when there is flow</td>
<td>There is air in the meter</td>
<td>Reposition meter for full pipe or rotate to avoid bubbles</td>
</tr>
<tr>
<td>Jumpy reading</td>
<td>Improperly equalized</td>
<td>Check for proper equalization</td>
</tr>
<tr>
<td></td>
<td>Pulsing flow</td>
<td>Use external power source (allows more flow averaging)</td>
</tr>
<tr>
<td></td>
<td>Rapidly changing conductivity (chemigation applications)</td>
<td>Install chemigation line downstream of meter (or enough upstream for thorough mixing of fluids before meter)</td>
</tr>
</tbody>
</table>