**Differential Temperature Control**

**Fast, easy installation - reduces labor**

**Diagnostic LEDs give instant system operation feedback**

**Lightning and static electricity protected**

**Proven reliability with outstanding warranty coverage**

**Sensors can be located up to 1000 feet away**

**Precision electronic accuracy within ±1°F**

**Specifications**

- **Input power**
  - 120 VAC or 240 VAC

- **Output**
  - SPDT powered contacts
  - 1HP@115VAC, 2HP@240VAC
  - rating @ 240VAC:
    - 20A on NO contacts
    - 10A on NC contacts

- **Differential**
  - 8/4 to 24/4°F

- **High Limit**
  - 110°F to 230°F

- **Environment**
  - 15°F to 130°F
  - 0 to 95% rH

- **Accuracy:**
  - +/- 1°F

- **Dimensions**
  - 5.875" x 4.875" x 2.375"

- **Temperature Sensors**
  - Thermistor 10k @ 25°C/77°F
  - not included

**Description**

The Goldline GL-30 differential temperature controls is designed to provide maximum operating efficiency and flexibility to effectively manage today's innovative solar energy systems. It is a continuation of the advanced electronic technology which produced the popular C-30 and CM-30 controllers - standards of the solar industry since 1975, with hundreds of thousands of units installed worldwide. With an adjustable high limit of 50°F-104°F, the GL-30 is capable of handling most differential temperature control functions for operation of domestic water heating and sophisticated space heating and cooling. The GL-30 is designed to control recirculation, drain-back and closed loop systems.
LED Indicators
Three highly visible LEDs show: 1) power to control, 2) power out from control, 3) power out from control due to a recirculation mode to protect the system from freeze damage.

GL-30 Output
The GL-30 output is rated at 20 Amps and is designed to directly operate a pump or fan for heat collection when the controller is sensing an appropriate temperature differential.

Differential
The GL-30 has an adjustable differential with a range of 8° to 24°F. Solar systems with long pipe runs normally require a higher turn-on differential temperature, and open loop systems with short pipe runs usually require a lower turn-on differential temperature for optimum performance. The GL-30 offers versatility to tailor controls to numerous specific systems designs.

Storage High Limit
The GL-30 allows you to set a high limit storage temperature from 110° to 230°F.

Recirculation Freeze Protection
Recirculation freeze protection, when enabled, turns the GL-30 output on to circulate warmer storage water through the collectors when near freezing temperatures are reached at the collector sensor.

System Test Switch
The system test switch manually switches the GL-30 to ON, AUTO, or OFF for complete control over the system at all times.

3 Year Warranty
Goldline Controls warrants its Goldline Solar products to be free from defects in material or workmanship, under normal use and service for 3 years from date of manufacture, providing it is installed according to the installation instructions and specifications. The datecode stamped on the outside of the product and also coded on the printed circuit board will be the sole determination of manufacturing date.

Accessories

Goldline Sensors
Goldline provides a wide assortment of remote temperature sensors. These 10K ohm thermistor sensors are to be used with all Goldline temperature controls. General use and application specific sensors ensure that we have the sensor that will work best for your application.
**Goldline Temperature Sensors**

**Different styles to choose from**

- **Can be located up to 1000 feet away from controls**
- **Proven reliability**
- **Precision electronic accuracy within ±1°F**
- **Made in the USA!**

<table>
<thead>
<tr>
<th>SC-1/4</th>
<th>Screw-in for 1/4&quot; NPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC-1/2</td>
<td>Screw-in for 1/2&quot; NPT</td>
</tr>
<tr>
<td>SB</td>
<td>Bolt on for flat surfaces</td>
</tr>
<tr>
<td>PC</td>
<td>Pool Combo - can be used as drill-in or insulation type 10&quot; leads</td>
</tr>
<tr>
<td>PC-12</td>
<td>PC with 15' leads</td>
</tr>
</tbody>
</table>

**Description**
Goldline provides a wide assortment of remote temperature sensors. These 10K ohm thermistor sensors are to be used with all Goldline temperature controls. General use and application specific sensor housings ensure that we have the sensor that will work best for your application.

**Applications include**
- Pool/Spa automation controls (Aqua Logic)
- Pool/Spa solar heating controls (GL-235, Aqua Solar)
- Solar water heating controls (GL-30)
- Replacement sensors for setpoint temperature controls (SP-xx) and temperature displays (TD-xx)
GL-30 (-LCO)
Solar Control

Description
The GL-30 is a differential temperature control for solar heating. The control output is typically wired to a circulator pump or blower which is turned on when the collector sensor temperature is hotter than the storage sensor temperature. The control also provides an adjustable high limit function and selectable recirculate freeze protection.

Specifications

<table>
<thead>
<tr>
<th>Power:</th>
<th>105-130VAC, 50/60Hz, or 195-250VAC, 50/60Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output:</td>
<td>115VAC, 1HP, 20 A, or 240VAC, 2 HP, 20 A</td>
</tr>
<tr>
<td>LCO Output:</td>
<td>115VAC, 1/2 HP, 10 A</td>
</tr>
<tr>
<td>Sensors:</td>
<td>thermistor, 10K @ 25°C/77°F</td>
</tr>
<tr>
<td>On differential</td>
<td>8-24°F adjustable</td>
</tr>
<tr>
<td>Off differential</td>
<td>4°F</td>
</tr>
<tr>
<td>High limit:</td>
<td>110-230°F adjustable</td>
</tr>
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</table>

Installation

1. Mounting
The GL-30 is designed for mounting indoors, protected from the weather. Use the mounting screws supplied.

2. Power input
Refer to wiring diagram. The GL-30 may be used with either 115VAC or 240VAC.

   GL-30-LCO: Connect the line cord to a grounded (3 wire) outlet. Note that the GL-30-LCO is intended for use with portable systems. Do NOT use extension cords.

3. Output wiring
Refer to wiring diagram. The GL-30 may be used with either 115VAC or 240VAC.

   GL-30-LCO: Plug the circulator or blower into GL-30 outlet.

4. Sensor Mounting and Wiring
Refer to diagram for location of sensor wiring terminals. To maximize temperature measurement accuracy securely mount the sensor and then insulate it to protect it from the effects of ambient temperature. Sensor wiring run outdoors must be rated for outdoor use and ensure that wire connections are protected from the weather. For long runs or runs near other electrical wiring use shielded cable (Belden 8760 for indoor use or Belden 8428 for outdoor use). Ground the shield to one of the GL-30 cover screws.

5. Auxiliary Sensor (optional)
An auxiliary temperature sensor can be wired to terminals 5 and 6 when using an optional TD-GL temperature display. This sensor does not affect the function of the GL-30 and is used for display purposes only.

6. Collector Grounding
The collector array must be grounded to prevent damage from nearby lightning strikes that produce high energy static discharges. Ensure that there is a good electrical ground path between the collector array and the cold water service pipe. If you are relying on the copper plumbing for grounding, check for teflon taped fittings, dielectric unions, plastic fittings, etc. An 8AWG solid copper wire is best.

7. Adjustments
Adjust the turn on differential to the desired setting. When the collector sensor temperature is hotter than the storage sensor temperature by this amount, the GL-30 will turn the pump or fan on. The pump or fan off will turn off when the temperature difference is less the 4°.
Recirculate Freeze Protection

The GL-30 provide recirculate freeze protection. While this type of freeze protection has proven to be adequate in relatively mild climates, it is extremely important that the sensors be properly placed and that the homeowner realize that the system is unprotected in the event of a power failure. Recirculate freeze protection is NOT recommended in climates where freezing temperatures are common (more than 4 per year) or last for extended (more than 8 hours) periods.

Goldline strongly recommends a minimum of 1 GC-3 freeze snap switch for each 3 collectors in the system. The GC-3 should be wired in series with the collector thermistor sensor. Placement of the snap switch(es) at the coldest points of the collector array and exposed plumbing system will help assure that freeze protection starts early enough to protect the system. Freeze sensors should also be located to ensure that once recirculation has started, the entire collection system is heated before the sensors react to stop circulation.
Recirculate Freeze Protection

The GL-30 is shipped from the factory with recirculate freeze protection disabled. Jumper J2 is in the “OUT” position. To enable recirculation, move the J2 jumper to the “IN” position.

The GL-30 will start circulation when either the collector sensor drops to 40°F or any one of the snap switches drop to 38°F. Recirculation terminates when the collector is above 45°F and snap switches are above 43°F.

Operation

The GL-30 test switch should be left in the “AUTO” position in which case operation is completely automatic with no operator intervention required. The “Power” indicator should always be on, the “Solar” #1 indicator will show when the system is collecting solar heat and the “Freeze” #2 indicator will show when the system is recirculating to protect from freezing.

To test the system, push the test switch to “ON” and verify that the “Solar” #1 indicator is lit and that the pump or blower connected to the control output is on. Move the switch to “OFF” and verify that the “Solar” #1 indicator is off and that the pump or blower is off.

Digital Display

Plug the optional TD-GL digital temperature display into the connector provided. The TD-GL can be mounted directly into the GL-30 cover, remotely up to 50 feet away (use ABC-10F/10M cable) or used as a temporary plug-in troubleshooting tool.

Troubleshooting

The GL-30 is straightforward to troubleshoot. If you cannot determine the problem then refer to the “Technical Assistance” section below.

1. If solar collection (“Solar” #1 indicator) runs continuously

Check that the test switch is in the “AUTO” position. Next verify that the control circuitry is operating properly by temporarily shorting the storage sensor terminals. If the control continues to run there is an internal circuit failure and the GL-30 will have to be returned for repair. If the recirculation stops check both collector and storage sensors with an ohmmeter referring to the temperature vs. resistance chart on the back page.

2. If solar collection (“Solar” #1 indicator) never runs

Check that the test switch is in the “AUTO” position. Next, with the collector terminals shorted, disconnect the storage sensor. If the control does not turn on there is an internal circuit failure and the GL-30 will have to be returned for repair. If the control runs, check both the collector and storage sensors with an ohmmeter referring to the temperature vs. resistance chart on the back page.

3. Recirculate freeze protection (“Freeze” #2 indicator) runs continuously

Temporarily short the collector sensor terminals to force freeze recirculation off. If freeze recirculation continues, there is an internal circuit failure and the GL-30 must be returned for repair. If freeze recirculation does stop, verify that the collector sensor is warmer than 45°F using an ohmmeter and the temperature vs. resistance chart on the back page. Also check that all snap switches are closed (normally 43°F or above).

4. Recirculate freeze protection (“Freeze” #2 indicator) never runs

Check that the jumper J2 is in the “IN” position. Temporarily disconnect the collector sensor to force freeze recirculation on. If freeze recirculation doesn’t turn on, there is an internal circuit failure and the GL-30 must be returned for repair. Otherwise check the collector sensor and all GC-3 snap switches using an ohmmeter and the temperature vs. resistance chart on the back page.
**Technical Assistance**

For help in installing, operating, or troubleshooting this control, you may call for technical assistance at 800-343-0826. Goldline technicians are available from 8:00AM to 5:00PM Eastern Time, Monday through Friday. You may call at other times and leave a message, and a technician will call you back as soon as possible.

**Temperature vs. Resistance**

All Goldline controls use 10K thermistor sensors. When disconnected from the control the sensor will read 10 K ohms at 25°C/77°F. Refer to the chart below for the resistance at other temperatures. For a given temperature, the resistance reading should be accurate to +/- 1%. For a given resistance reading, the temperature reading should be accurate to +/- 0.5°F.

<table>
<thead>
<tr>
<th>°F</th>
<th>OHM</th>
<th>°F</th>
<th>OHM</th>
<th>°F</th>
<th>OHM</th>
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<th>OHM</th>
</tr>
</thead>
<tbody>
<tr>
<td>-50</td>
<td>491.1</td>
<td>-40</td>
<td>472.6</td>
<td>-30</td>
<td>454.9</td>
<td>-20</td>
<td>437.9</td>
<td>-10</td>
<td>421.6</td>
</tr>
</tbody>
</table>

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