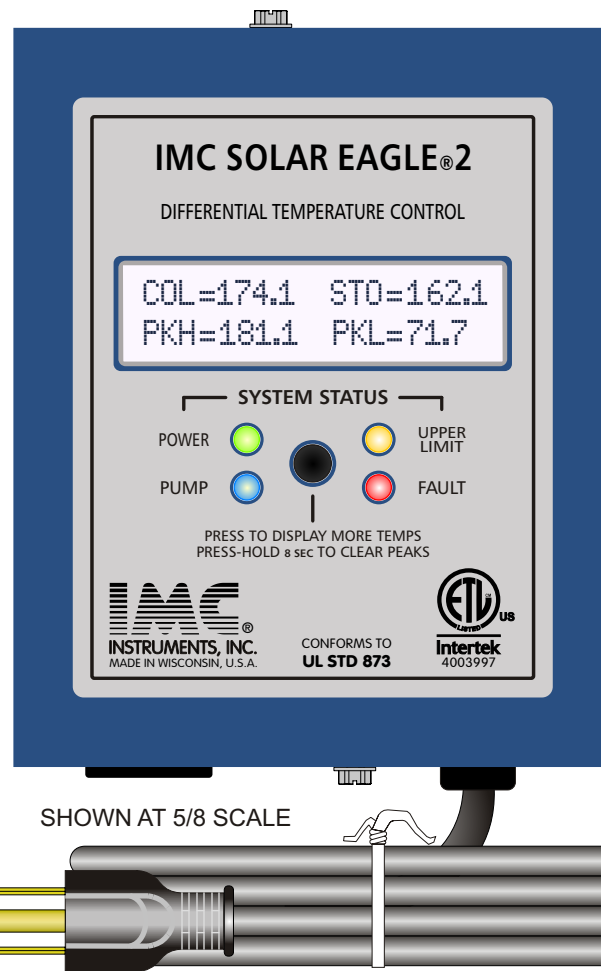


IMC SOLAR EAGLE®2 DIFFERENTIAL TEMPERATURE CONTROLLERS

MAIN FEATURES

- **Microprocessor** programed specifically for optimal performance of "DRAINBACK" systems*.
 - **Large easy-to-read 40 character** (2x20) backlit LCD display showing every parameter measured and controlled by the onboard microprocessor.
 - **With IMC's exclusive "DATA PORT"** designed for use with one of these optional devices:
 - REMOTE 4 LINE LCD DISPLAY
 - DATA ADAPTER TO PC'S RS-232
 - DATA ADAPTER TO PC'S USB
 - SD CARD RECORDER
 - BACNET INTERFACE
- This unique transmitter allows these devices to be located up to 500 feet away connected with a conventional CAT-5 cable.
- **Model "IP" has an electrically isolated DATA PORT** to maximize reliability for systems requiring permanent monitoring.
 - **Power relay** that can handle 3/4 HP or 10 amps for "E2C1-" models and 1 HP or 15 amps for "E2C2-" models**. See specifications on page 3.
 - **Fault LED indicators** for simple diagnostics
 - **Electrostatic** discharge protected electronics
 - **Polyester coated 16 gage** rugged steel enclosure with features for efficient installation.
 - **Reliable operation** when installed where the ambient swings do not exceed -10 to 120 °F
- * Models are available with 2 relays for non-drainback, 2-loop or closed loop systems.
 ** Models are available with conduit holes for wiring that can control higher current and voltage.

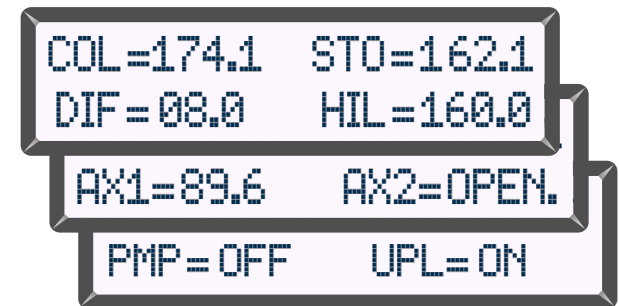


LOCAL LCD DISPLAY

The LCD display has 2 lines of 20 characters each. The first line permanently displays the COLLECTOR and the STORAGE temperatures. The bottom line can be paged (switched) by pressing the black button. These pages display all system information* including OVERRIDE messages.

Page 1 is shown to the left.

Pages 2, 3 & 4 are shown below:



* ALL TEMPERATURES ARE IN DEGREES FAHRENHEIT
 COL= COLLECTOR; STO= STORED HOT WATER
 PKH= WATER PEAK HIGH; PKL= WATER PEAK LOW
 DIF= DIFFERENTIAL; HIL= HIGH LIMIT (SETTINGS)
 AX1; AX2= AUXILIARY SENSORS (OPTIONAL)
 PMP= STATUS; UPL= WATER UPPER LIMIT (OFF/ON)

SYSTEM OVERRIDE MESSAGES FLASH on the LOWER LCD LINE are shown below:



CONTROLLERS conform to UL STD 873 with Cord and Receptacle:

Product #

E2C1-1000-DB & E2C2-1500-DB
with NON-isolated DATA PORT

E2C1-1000-DBIP & E2C2-1500-DBIP
with isolated DATA PORT

Web: www.solar.imcinstruments.com



INSTRUMENTS, INC.

Tel: 715- 253-2801 Fax: 715- 253-2811
 468 Liberty Drive Wittenberg, WI 54499 U.S.A.

E2C1-1000 & C2-1500 -DB
 Rev 12-16-11 PG- 1

CONTROLLER OPERATION

TEMPERATURE DIFFERENCE CONTROL-

When the temperature difference between the sensor on the solar collector and the sensor in the storage tank exceeds the dialed temperature setting on "ON DIF", the PUMP relay will actuate after a 30 second delay. The BLUE LED "RLY" indicator will also turn ON. When the storage tank temperature falls 4 degrees below the dialed setting on "ON DIF", the PUMP relay and the BLUE LED indicator will turn off without delay. See "High Limit Control" below.

HIGH LIMIT CONTROL-

When the temperature in the storage tank exceeds the dialed setting on "HI LIM", the PUMP relay will turn OFF without delay regardless of the temperature difference that exists between the STORAGE tank and the solar COLLECTOR. The BLUE LED indicator will turn OFF and the AMBER LED "ULT" indicator will turn ON. When the storage tank temperature falls 4 degrees below the dialed setting on "HI LIM", the controller will resume normal operation. The PUMP relay will always have a 30 second delay before switching ON and the BLUE LED will always show its STATUS.

POWER & FAULT INDICATORS "LEDs"-

The GREEN LED "PWR" indicator is ON when the microprocessor is POWERED and the SOLAR controller is operating. The RED LED "FLT" indicator will be FLASHING when there is a FAULT condition. Faults occur when either storage or collector sensor is OPEN or missing, or if any sensor has resistance OUT of RANGE, or when the pump RELAY SWITCH is NOT set to "AUT" (automatic) position. It is also possible that an internal circuit malfunction initiates the FAULT condition.

EXTENDED "PUMP relay ON" OPERATION-

This feature is available to extend the PUMP ON operation by **five minutes** prior to turning the pump relay OFF. This will allow hydronic system components to achieve thermal equilibrium and eliminate short cycling at the beginning of the solar cycle or when low levels of solar insolation exist. To enable this feature, a jumper must be placed onto the pins marked "DEL" on the circuit board.

FREEZE PROTECTION OVERRIDE "FZ"-

This feature is available to prevent a "non-drain back" water system from freezing when the outdoor temperature drops too low. If this feature is enabled normal operation will stop when the COLLECTOR temperature falls below 40°F. The PUMP relay will then be turned ON until the COLLECTOR temperature reaches 55°F. Normal control operation will resume above this temperature. To enable this feature, a jumper must be placed onto the pins marked "FZ" on the circuit board. Only 1 override can be enabled.

DATA-PORT

This PORT transmits data ONLY, it is NOT bi-directional. The frequency at which the data transmissions occur is selected by the data refresh jumper labeled "2S 6M" on the circuit board (see drawing). Set jumper position to 2S for one complete line of "total system information" to be sent to the computer every 2 seconds, or set to 6M for 6 minutes. Complete instructions are supplied with accessories required to connect to a computer. **DO NOT CONNECT THIS PORT DIRECTLY TO ANY ETHERNET DEVICE OR COMPUTER PORT!**

TYPICAL RANDOM SAMPLE DATA collected from PORT- (not all controllers output the same format)

RUNTIME	COLL - T	STOR - T	DIFF - T	HILI - T	AUX - 1	AUX - 2	PUMP	UPLim	FAULT	THESE COMMENTS ARE NOT TRANSMITTED-
0:00	125.9	73.7	08.0	110.0	212.2	205.4	ON	OFF		System collecting solar HEAT
0:06	25.9	73.7	08.0	110.0	212.2	205.4	OFF	OFF	LO-TMP->OFF	System in LO TEMP shut down PUMP->OFF
0:12	25.9	73.7	08.0	110.0	212.8	205.4	ON	OFF	PmpSW!	Pump switch ON
0:18	OPEN.S	73.9	08.0	110.0	212.8	205.4	OFF	OFF	SENS!, PmpSW!	Open sensor, pump switch OFF
0:24	-16.0	74.7	08.0	110.0	25.9	184.6	ON	OFF	FREZE-PMP->ON	System in Freeze protect mode PUMP->ON
0:30	SHRT.S	74.9	08.0	110.0	25.9	154.6	OFF	OFF		Shorted sensor->System OFF
0:36	125.9	173.7	08.0	173.0	112.2	95.4	OFF	ON		Storage reached UPPER LIMIT

IMPORTANT NOTICE-

If a malfunction of an E2 series controller could cause personal injury or damage to equipment or property, other limit or safety controls, or alarm or supervisory systems, intended to warn and or protect against such occurrences must be incorporated into and maintained as part of the control system. This redundant built-in safety is required.

SPECIFICATIONS

Controller Power Input:

2.5 Watts Minimum @ 120VAC +/- 10% 50/60HZ

Relay Internal Connections*:

HOT cord's black wire to relay common (CM),
Receptacle's HOT black to normally open (NO),
Earth grounding green wire to enclosure (EG),
and NEUTRAL cord's white wire to neutral (N)
of receptacle.

* Altering these connections is not recommended
and may result in lowering these ratings.

Models E2C1-1000-DB & -DBIP

Will control 120VAC +/- 10% resistive loads that are
10AMP max. or 3/4 HP max. motor loads.

Models E2C2-1500-DB & -DBIP

Will control 120VAC +/- 10% resistive loads that are
15AMP max. or 1HP max. motor loads.

Relay Action:

30sec delay ON; no delay OFF

Differential:

Adjustable 8 to 24°F; fixed 4°F reset

High Limit:

Adjustable from 110 to 200°F

Accuracy: +/- 1 °F

Sensors:

10K @ 77°F (25°C) Rated to 400°F

Environmental:

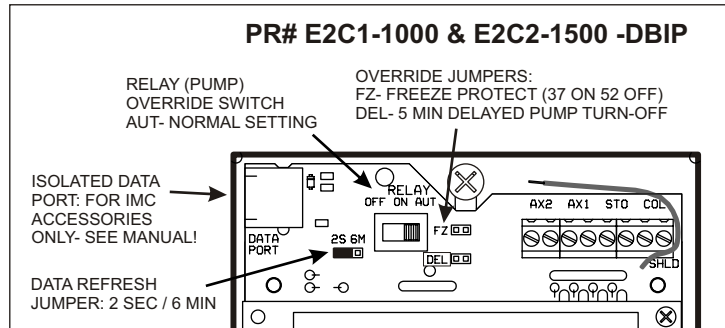
-10 to 120°F @ 0 to 95 %RH

Dimensions:

5.00"W x 6.12"H x 2.50"D

Weight:

Appx. 2.5 lbs with 6' 14 ga. power cord



SENSORS are Industrial grade 10K IMC thermistors rated for
400°F with +/-1°F accuracy. When sensors are installed
properly, the additional error is ONE degree max. for these
cable lengths:

1000 ft. of 18 ga.; 700 ft. of 20 ga.; 500 ft. of 22 ga.

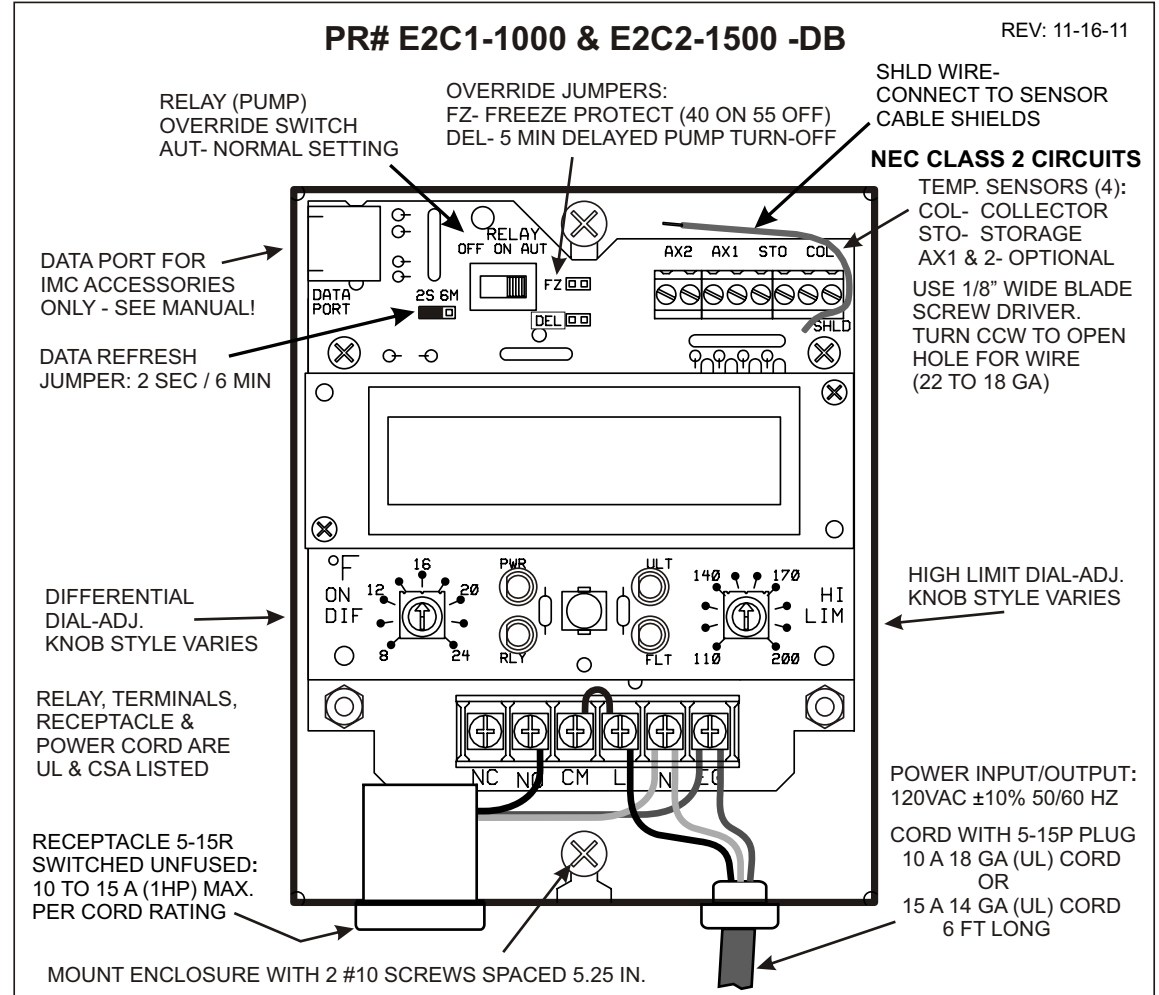
Two "BOLT-ON" sensors are included with each controller.
Contact factory for availability of other probe types and sizes.



"BOLT-ON" sensors

NOTICE:

The **DATA PORT**'s "RJ-45" is **NOT** an Ethernet or network connection!



CONTROLLER INSTALLATION

MOUNTING- The IMC SOLAR Eagle line of controllers are designed to be mounted indoors, protected from rain and condensing or dripping moisture. Overhead sensor wires may provide a path for dripping liquids, so form a “drip loop” before wires enter the enclosure opening. Use two #10 screws in the enclosure “keyholes” for mounting on a vertical wall with the power receptacle facing down to the floor. After wiring and adjustments are done, replace the metal cover and tighten both screws tightly.

SENSOR INSTALLATION AND WIRING- Sensor installation should be done in a manner as to permit proper sensor contact of the areas to be measured. Cover and/or insulate the sensors to prevent them from being affected by the surrounding ambient temperatures. Sensor wiring installed outdoors must be rated for OUTDOOR use. All connections exposed to the weather must be made with waterproof “outdoor rated” connectors. Today’s strong radio interference “RI” environment requires that all sensor wiring be shielded. Listed below are a few suggested cable/wire part numbers. Any other cable/wire selected must also meet local codes. Wiring exposed to outdoor weather must be rated for outdoor use by its manufacturer.

Minimum recommended specifications-
“Audio” Belden # 9451-10 Black (22ga)

Better specifications-
“PLTC” Belden # 9322 (22ga) or 9320 (20ga)

Best specifications-
“PLTC” Belden # 9322 (22ga) or 9320 (20ga)

The cable’s shielding wires must be connected to the green wire that is identified as “SHLD” on the cover’s backside label or the controller’s drawing on page 3. Connect all the shields together with the “wire-nut” (supplied) or other reliable means. Ungrounded shields may result in damage to the controller’s circuits. The wiring shields require grounding at the controller side ONLY. DO NOT attempt to ground the collector panel with this wiring.

SENSOR SCREW TERMINALS- There are 8 or 10 screws on a GREEN block labeled “TEMPERATURE SENSORS”- see drawing on page 3. These terminals accept solid or stranded wire 18 to 22 ga. These are low voltage NEC class 2 circuit connections. For efficient and reliable wire connections, strip 3/16” to 3/8” of insulation from an undamaged wire end. Use a strip tool that will not nick the conductors. If wire is solid, make sure that the tip is NOT deformed so that it will fit into the terminal hole easily. If the wire is stranded, make sure the strands are tightly twisted. Using a 1/8” (3mm) wide blade screwdriver, turn CCW to open the terminal hole fully. Then guide the wire into the terminal hole and hold while tightening (turn CW) the screw to clamp the wire. **WARNING-** If a 5/32” (4mm) wide screwdriver blade is used, the plastic ridge that retains the screws will be scraped off allowing them to fall out. DO NOT reverse the screw turning directions and place the wire outside the metal “cage” creating an unreliable connection. DO NOT slip off the screw and damage any circuit components. Inspect that ALL the strands are clamped in the terminal’s “cage”.

POWER WIRING- These pre-wired or corded models do not require installation by an electrician. Plug the pump’s 120vac cord into the controller’s receptacle (outlet) and plug the 120vac power cord to a U.S. wall outlet located closer than cord length minus 6” (5ft typical).

Do NOT use extension cords unless properly rated.

Do NOT remove the H-V wiring compartment cover while power is ON.

Do NOT modify internal power wiring. All external wiring must be done in accordance with local codes.

Do NOT modify the plug in any way. To reduce the risk of electric shock, this product has a grounding type plug with a round pin that must connect to “earth ground”. It will only fit into a grounding type power outlet. If no such outlet is available, contact a qualified electrician to install the proper outlet.

Line and power wires should NOT be bundled with or placed in the same conduit with sensor or data cables.

COLLECTOR GROUNDING- The Solar collector panel array must be GROUNDED directly to an earth-ground rod. This is necessary to prevent damage from nearby lightning strike which induce very DAMAGING high voltages in any ungrounded metal surface. Please consult local, state and federal codes for proper grounding.

Please visit our website for news or recently released product information: “www.solar.imcinstruments.com”.