# IMC SOLAR EAGLE®2 DIFFERENTIAL TEMPERATURE CONTROLLERS

MAIN FEATURES

- **Microprocessor** is programed with one of four selectable programs designed specifically for controlling pressurized systems* with heat dump cycles or additional supplemental space heating.

- **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.

- **Dual Power relays** that can handle up to 2HP or 20 A each. See specifications on page 7.

- **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 for typical "drainback" systems
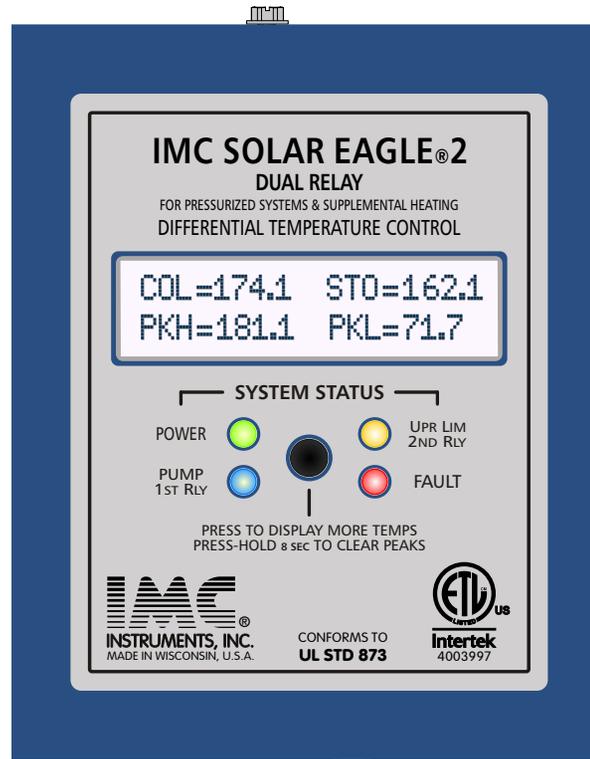
SHOWN AT 5/8 SCALE

CONTROLLERS conform to UL STD 873 with 1/2" conduit holes for permanent wiring "hard wired":

Product #
E2W1-2020-PR
   with **NON-isolated DATA PORT**

E2W1-2020-PRIP
   with **isolated DATA PORT**

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. More paging is detailed on pages 3 and 4.

Page 1 is shown to the left.

Pages 2, 3 & 4 are shown below:
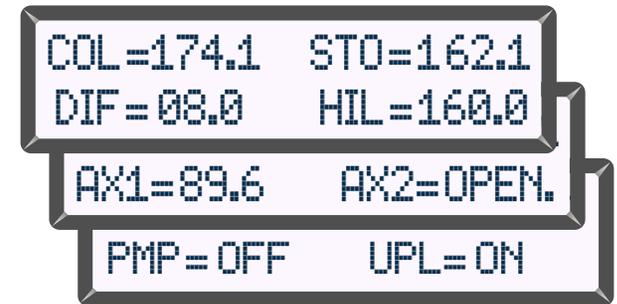

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* ALL TEMPERATURES ARE IN DEGREES FAHRENHEIT
COL= COLLECTOR;   STO= STORED HOT WATER
PKH= WATER PEAK HIGH;   PKL= WATER PEAK LOW
DIF= DIFFERENTIAL; HIL= HIGH LIMIT(SETTINGS)
AX1; AX2= AUXILIARY SENSORS (OPTIONAL)
PMP= STATUS; UPL= WATER UPPER LIMIT (OFF/ON)
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SYSTEM OVERRIDE MESSAGES FLASH on the LOWER LCD LINE are shown below:

Web: www.solar.imcinstruments.com

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

IMPORTANT NOTICE-

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

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!

SAMPLE DATA collected from this PORT (in random order)-

RUNTIME	COLL-T	STOR-T	DIFF-T	HILI-T	AUX-1	AUX-2	Pmps	UPLim	FAULT SYS=2	....SYSTEM 2 selected
0:00	125.9	73.7	08.0	110.0	212.2	205.4	ON	Ofp1		*System collecting solar heat-> tank 1 - Priority 1*
0:03	157.1	144.3	08.0	139.9	145.7	65.1	=2	Onp2		*System collecting solar heat-> tank 2 - Priority 2*
0:36	125.9	173.7	08.0	173.0	119.2	95.4	OFF	Onp2		*DHWStorage reached UPPER LIMIT- Priority 2*
0:07	188.3	149.3	08.0	140.0	266.0	76.4	OFF	ONp2	HiAX1-REL2>OFF	*Tank 2 Storage reached UPPER LIM- Priority 2*
0:12	25.9	73.7	08.0	110.0	212.8	205.4	1,2	OFF	PmpSW!	*Pump switch ON -> Pmps 1,2 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	=1	OFF	FREZE-Pmp1->ON	*System in Freeze protect mode PUMP->ON*
0:30	SHRT.S	74.9	08.0	110.0	25.9	154.6	OFF	OFF	SENS!,	*Shorted sensor->System OFF*
RUNTIME	COLL-T	STOR-T	DIFF-T	HILI-T	AUX-1	AUX-2	Pmps	UPLim	FAULT SYS=?	*System NOT INITIALIZED ->Controller*
0:02	110.5	95.0	08.0	139.9	107.8	76.6	OFF	ONp2	Error	*is DISABLED*

CONTROLLER OPERATION

The Eagle 2 DUAL-relay controller has 2 modes of operation, **PRIORITY ONE** and **PRIORITY TWO**. PRIORITY ONE operates RELAY #1 using the same control sequence as our E2 "SINGLE RELAY" controller and is described below in PRIORITY ONE section. PRIORITY TWO operates the RELAY #2 and is initiated in Hydronic system PROGRAMS 1, 2 and 3 when the primary domestic hot water (DHW) tank reaches a HI LIMIT condition. When SOLAR HEAT is still available, it will be diverted by the relays action to a SECONDARY tank in accordance with the Hydronic system PROGRAM selected during INITIAL SETUP. Every 2 minutes, the control program will check the temperature of the primary DHW tank. If this temperature falls 5°F below the dialed HI LIMIT temperature, then the control program will return to PRIORITY ONE. For safety reasons, there is a programed HI LIMIT (without dial) on the SECONDARY tank that will prevent it from exceeding 180°F. When this limit is reached, the control program will no longer operate in PRIORITY TWO mode until the SECONDARY tank temperature drops below 175°F.

See pages 5 and 6 for additional details on the specific hydronic system program.

PRIORITY ONE

TEMPERATURE DIFFERENCE CONTROL-

When the temperature difference between the sensor on the solar collector and the sensor in the DHW 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 DHW storage tank temperature falls 4°F 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 DHW 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 (STO) and the solar COLLECTOR (COL). The BLUE LED indicator will turn OFF and the AMBER LED "ULT" indicator will turn ON. When the storage tank temperature falls 4°F 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.

PRIORITY ONE (Continued)

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

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.

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.

IMPORTANT NOTICE

Before powering up the controller it is important to read this manual thoroughly. The control PROGRAM ALGORITHM must be initialized before allowing operation of the DUAL RELAY CONTROLLER. The available SYSTEM PROGRAMS are outlined on pages 5 and 6. Please read them carefully and make sure that they satisfy your system requirements. From time-to-time these products will be updated and new PROGRAM ALGORITHMS will be added. Please check our website or call our technical support department for updated information.

    CONTACT INFORMATION:
        Technical support for this product line:
   Email: loui@tds.net   Phone: 715 445 4946
        Factory: . 715 253 2801
        Website: www.solar.imcinstruments.com

SYSTEM OPERATION

INITIAL SETUP

To select the SYSTEM OPERATION required for your SOLAR installation, the controller must have the power OFF initially. Then, PRESS the black PAGING button and hold it down while turning controller power ON. keep the button pressed during power up and the initial 4 seconds the display screen will take to light up and display the SYSTEM = # that you require, then RELEASE the button.
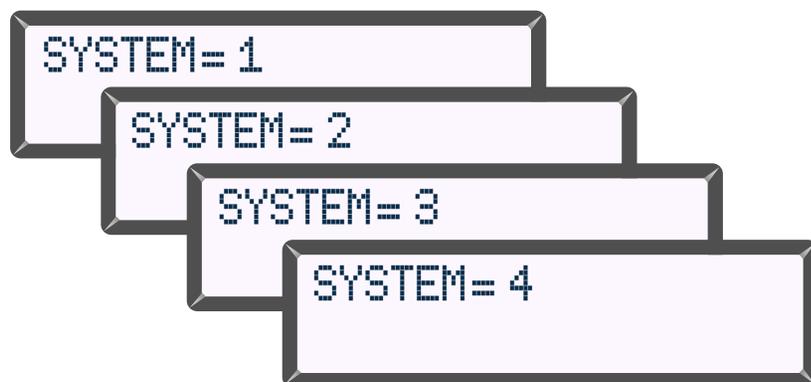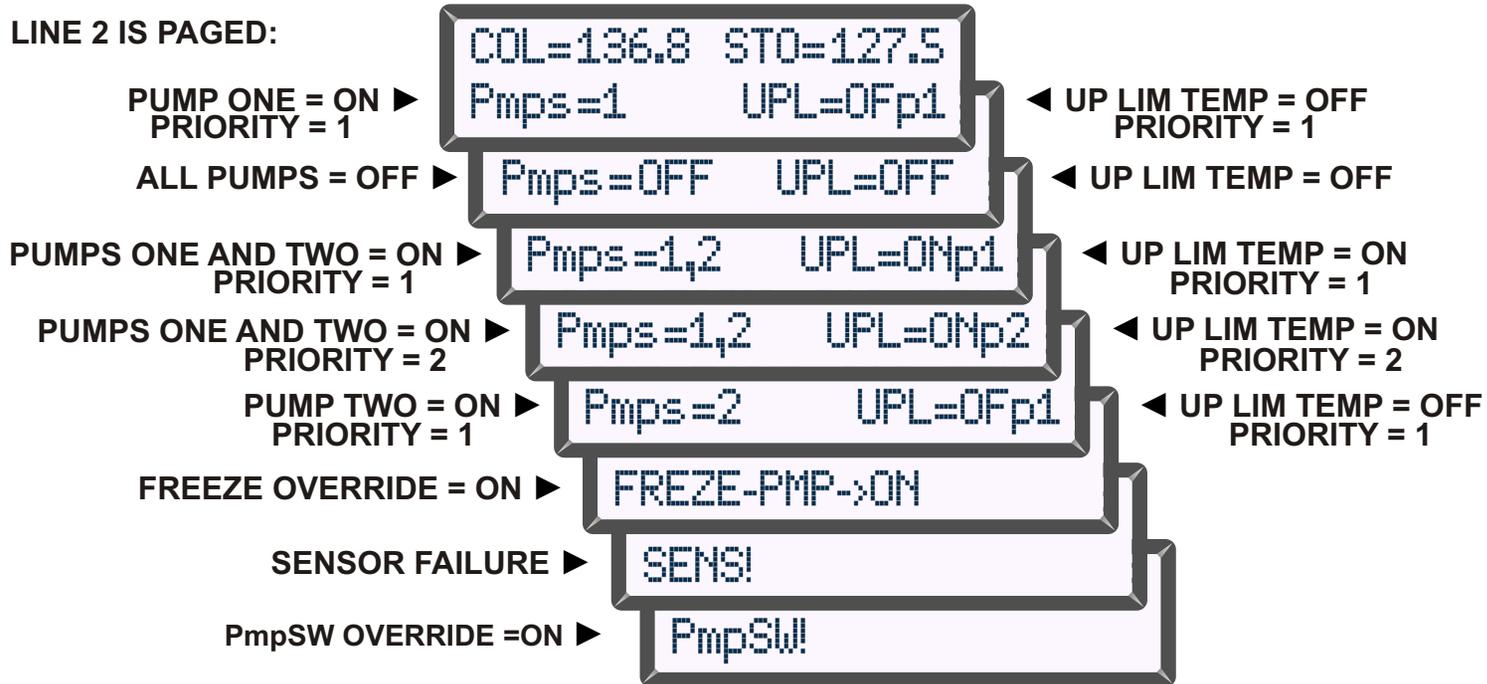

For example, if the controller is programed for SYSTEM 1 and you wish to change it, keep the black PAGING button pressed and observe that the numbers increase until the desired system number appears. To select it simply release the black PAGING button while it is displayed. Then turn power OFF and back ON without pressing the button. The controller will now operate in accordance with the SYSTEM 4 program which is described on page 6.

IMC SOLAR EAGLE®

CONTROLLER DISPLAY

Examples of different STATUS and INFORMATIONAL messages are shown below:

LINE 1 CONTINUOUSLY DISPLAYS COLLECTOR & DHW STORAGE TANK TEMPERATURES

LINE 2 IS PAGED:

	Display	
PUMP ONE = ON ▶ **PRIORITY = 1**	`COL=136.8  STO=127.5` `Pmps=1        UPL=OFp1`	**◀ UP LIM TEMP = OFF** **PRIORITY = 1**
ALL PUMPS = OFF ▶	`Pmps=OFF      UPL=OFF`	**◀ UP LIM TEMP = OFF**
PUMPS ONE AND TWO = ON ▶ **PRIORITY = 1**	`Pmps=1,2      UPL=ONp1`	**◀ UP LIM TEMP = ON** **PRIORITY = 1**
PUMPS ONE AND TWO = ON ▶ **PRIORITY = 2**	`Pmps=1,2      UPL=ONp2`	**◀ UP LIM TEMP = ON** **PRIORITY = 2**
PUMP TWO = ON ▶ **PRIORITY = 1**	`Pmps=2        UPL=OFp1`	**◀ UP LIM TEMP = OFF** **PRIORITY = 1**
FREEZE OVERRIDE = ON ▶	`FREZE-PMP->ON`	
SENSOR FAILURE ▶	`SENS!`	
PmpSW OVERRIDE =ON ▶	`PmpSW!`	

SELECTABLE PROGRAMS FOR HYDRONIC SYSTEMS 1 & 2

PROGRAM FOR SYSTEM 1

CONTROL SEQUENCE:

PRIORITY ONE is active when the DHW storage tank temperature sensor (STO) is below the temperature setting on the HI LIM dial. This control sequence is as described in the "PRIORITY ONE" section of the controller operation on page 2.

PRIORITY TWO becomes active when the DHW storage tank sensor (STO) has exceeded the temperature setting on the HI LIM dial. The AMBER indicator will turn ON and the N.O. contacts of RELAY #2 will close to actuate a 3-way valve that allows a heat-dump cycle to remove the excess unusable heat from the system. The AMBER light will flash ON & OFF momentarily while RELAY #2 is energized. RELAY # 1 N.O. contacts that supply power to "PMP1" will close and remain closed until priority TWO expires. Priority TWO returns to ONE when the DHW storage tank sensor (STO) falls below the HI LIM dialed setting MINUS 5°F. This "minus 5°F" is NOT adjustable. Also, priority TWO returns to ONE when the temperature difference between the collector sensor (COL) and the DHW storage tank temperature (STO) falls below the ON DIF dialed setting MINUS 4°F. This "minus 4°F" is NOT adjustable.
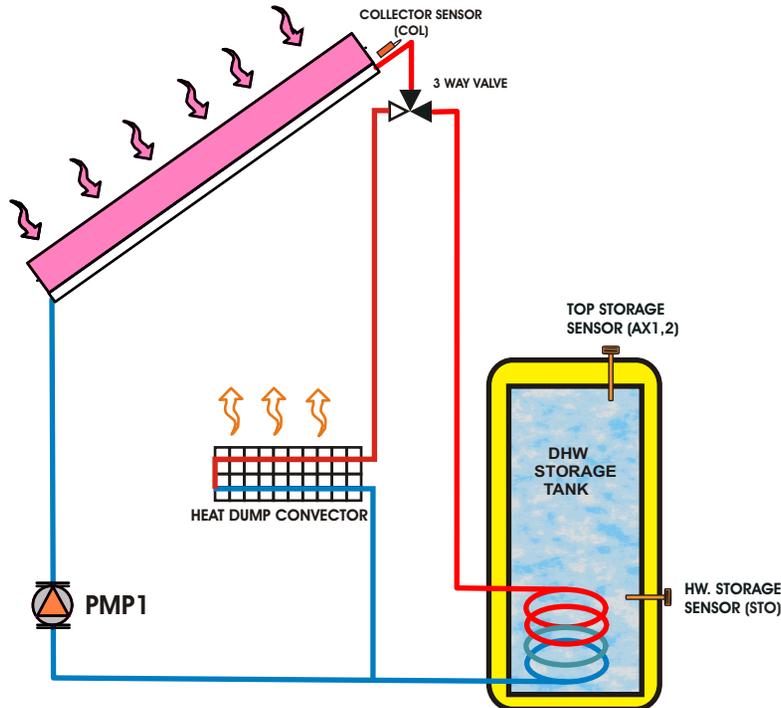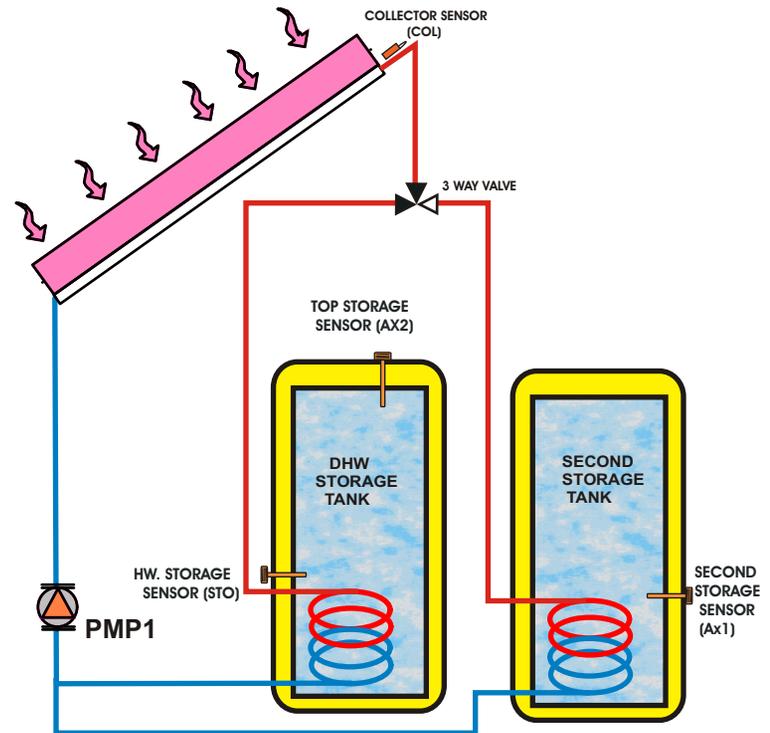
PROGRAM FOR SYSTEM 2

CONTROL SEQUENCE:

PRIORITY ONE is active when the DHW storage tank temperature sensor (STO) is below the temperature setting on the HI LIM dial. This control sequence is as described in the "PRIORITY ONE" section of the controller operation on page 2.

PRIORITY TWO becomes active when the DHW storage tank sensor (STO) has exceeded the temperature setting on the HI LIM dial. The AMBER indicator will turn ON and the N.O. contacts of RELAY #2 will close to actuate a 3-way valve that allows excess heat to be delivered to a second STORAGE TANK. The AMBER light will flash ON & OFF momentarily while RELAY #2 is energized. While this priority TWO is active, the controller will be operating using priority ONE program control sequence, except the active storage sensor is on the second storage tank (AX1). The controlling temperature difference will be between the (COL) and the (AX1) sensors. Priority TWO returns to ONE when the DHW storage tank sensor (STO) falls below the HI LIM dialed setting MINUS 5°F. This "minus 5°F" is NOT adjustable. Also, priority TWO returns to ONE when the temperature difference between the collector sensor (COL) and the second storage tank temperature (AX1) falls below the ON DIF dialed setting MINUS 4°F. This "minus 4°F" is NOT adjustable.

SELECTABLE PROGRAMS FOR HYDRONIC SYSTEMS 3 & 4

PROGRAM FOR SYSTEM 3

CONTROL SEQUENCE:

PRIORITY ONE is active when the DHW storage tank temperature sensor (STO) is below the temperature setting on the HI LIM dial. This control sequence is as described in the "PRIORITY ONE" section of the controller operation on page 2.

PRIORITY TWO becomes active when the DHW storage tank sensor (STO) has exceeded the temperature setting on the HI LIM dial. The AMBER indicator will turn ON and the N.O. contacts of RELAY #2 will close to supply power to "PMP2" and allow excess heat into a second STORAGE TANK. The AMBER light will flash ON & OFF momentarily while RELAY #2 is energized. RELAY # 1 N.O. contacts that supply power to "PMP1" will open and remain open until priority TWO expires. While this priority TWO is active, the controller will be operating using priority ONE program control sequence, except the active storage sensor is on the second storage tank (AX1). The controlling temperature difference will be between the (COL) and the (AX1) sensors. Priority TWO returns to ONE when the DHW storage tank sensor (STO) falls below the HI LIM dialed setting MINUS 5°F. This "minus 5°F" is NOT adjustable. Also, priority TWO returns to ONE when the temperature difference between the collector sensor (COL) and the second storage tank temperature (Ax1) falls below the ON DIF dialed setting MINUS 4°F. This "minus 4°F" is NOT adjustable.
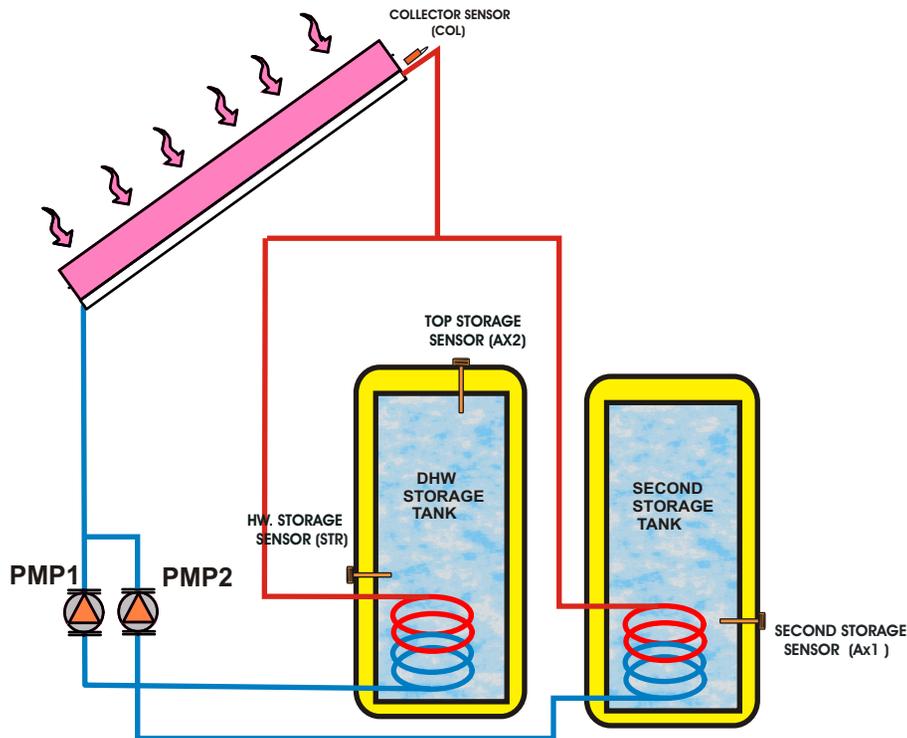
PROGRAM FOR SYSTEM 4

CONTROL SEQUENCE:

This control sequence operates is as described in the "PRIORITY ONE" section of the controller operation on page 2.

In addition, RELAY #2 will be used to power an additional PMP2 that is intended for DRAINBACK systems that require a HIGH LIFT. This PMP2 will be used only during the initial hydraulic lift required for the fluid to fill the entire plumbing. When the temperature difference between the Collector sensor (COL) and the DHW storage tank sensor (STO) reaches the ON DIF dialed setting then both RELAY's N.O. contacts will close to supply power to PMP1 and PMP2 for 5 minutes. This will provide sufficient time for the circulating fluid to fill all the plumbing and return back to the drainback tank. After the 5 minutes, relay #2 contacts will open and "PMP2" will be turned OFF to reduce fluid circulation and power consumption. It is Recommended the use the **EXTENDED-PUMP ON-OPERATION** feature for this control sequence to prevent possible short cycling that may occur at HIGH PUMP volumes. See page 3 for explanation
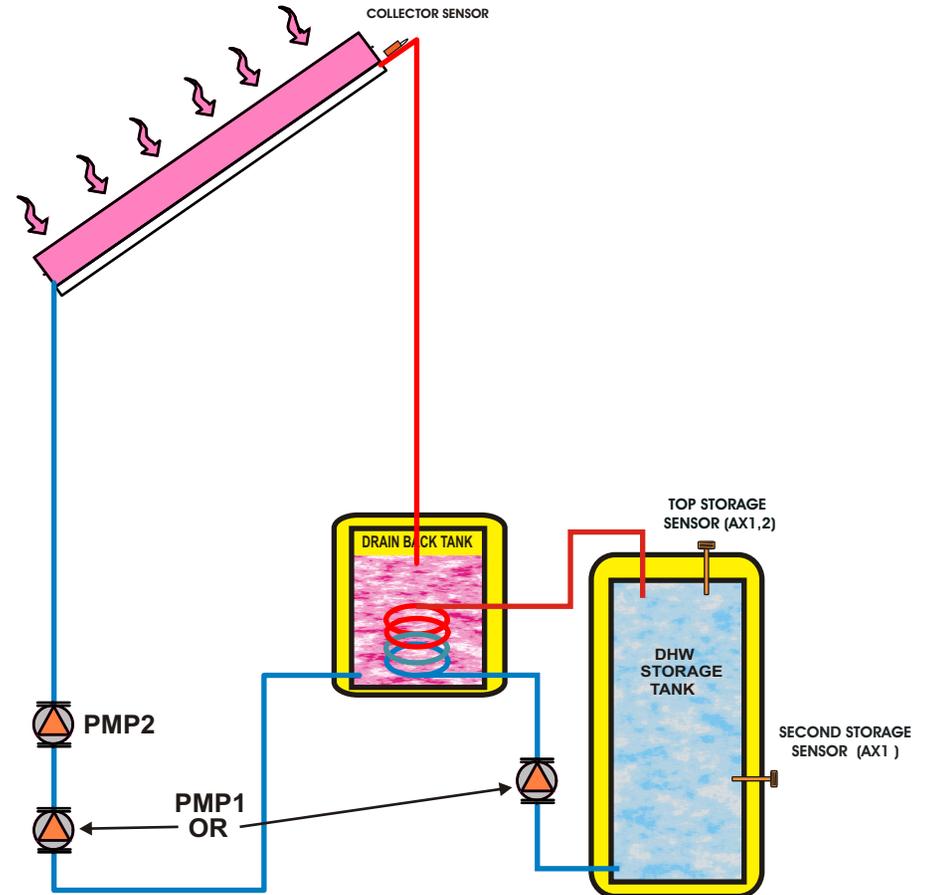
SPECIFICATIONS

Controller Power Input:
 6 Watts Minimum @ 120VAC+/-10% 50/60HZ

Power Relays (2) Contact Ratings:
 Common (CM)-
  30VDC MAX. or 250VAC MAX.
 Normally Open (NO)-
  20A Resistive @ 120VAC & 250VAC
  1 HP @ 120VAC; 2 HP @ 250VAC
  20A @ 30VDC; TV-5
 Normally Closed (NC)-
  15A Resistive @ 120VAC & 250VAC
  1/4 HP @ 120VAC; 1/2 HP @ 250VAC
  15A @ 30VDC

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
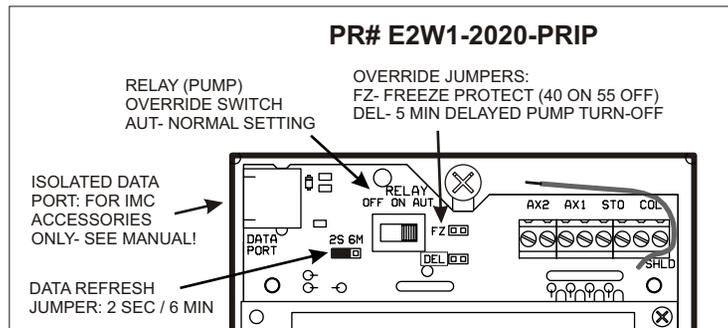**Accuracy:** +/- 1 °F
Sensors:
 10K @ 77°F (25°C) Rated to 400°F
Environmental:
 -10 to 120°F @ 0 to 95 %RH
Dimensions & Weight:
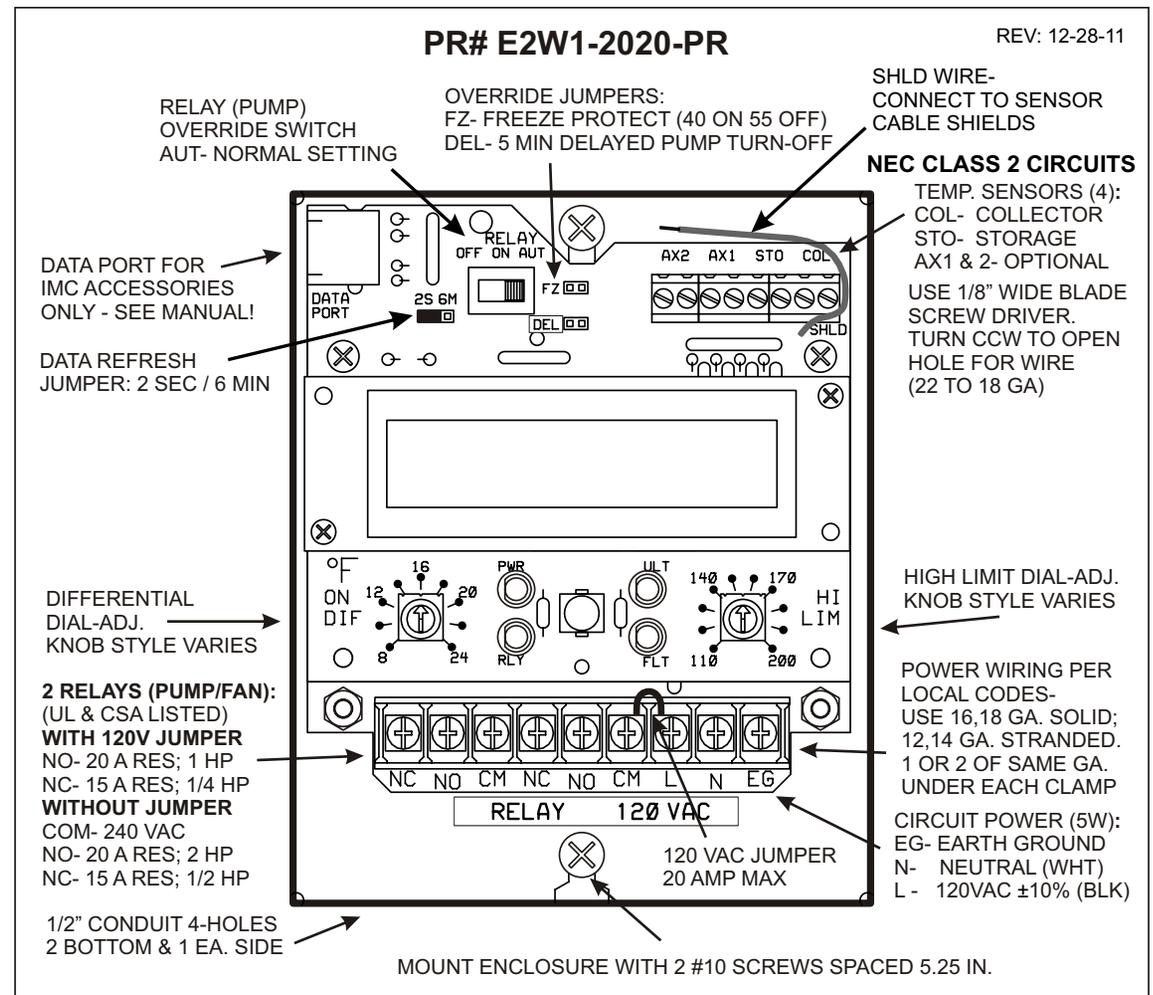 5.00"W x 6.12"H x 2.50"D; Appx. 2.75 lbs

SENSORS are Industrial grade 10K IMC thermistors rated for 400°F with +/-1°F accuracy. When installed properly, they will not exceed ONE degree of additional error for cable distances up to 1000 ft. of 18 ga., 700 ft. of 20 ga. or 500 ft. of 22 ga. Two "BOLT-ON" sensors are included with each controller (except -WA & -SP). See "Accessories" section for available probe types and sizes.

"BOLT-ON" sensors

NOTICE:
The DATA PORT's "RJ-45" is NOT an ethernet or network connection!

PR# E2W1-2020-PR

REV: 12-28-11

RELAY (PUMP) OVERRIDE SWITCH AUT- NORMAL SETTING

OVERRIDE JUMPERS:
FZ- FREEZE PROTECT (40 ON 55 OFF)
DEL- 5 MIN DELAYED PUMP TURN-OFF

SHLD WIRE- CONNECT TO SENSOR CABLE SHIELDS

NEC CLASS 2 CIRCUITS

TEMP. SENSORS (4):
COL- COLLECTOR
STO- STORAGE
AX1 & 2- OPTIONAL

DATA PORT FOR IMC ACCESSORIES ONLY - SEE MANUAL!

USE 1/8" WIDE BLADE SCREW DRIVER. TURN CCW TO OPEN HOLE FOR WIRE (22 TO 18 GA)

DATA REFRESH JUMPER: 2 SEC / 6 MIN

DIFFERENTIAL DIAL-ADJ. KNOB STYLE VARIES

HIGH LIMIT DIAL-ADJ. KNOB STYLE VARIES

2 RELAYS (PUMP/FAN):
(UL & CSA LISTED)
WITH 120V JUMPER
NO- 20 A RES; 1 HP
NC- 15 A RES; 1/4 HP
WITHOUT JUMPER
COM- 240 VAC
NO- 20 A RES; 2 HP
NC- 15 A RES; 1/2 HP

POWER WIRING PER LOCAL CODES- USE 16,18 GA. SOLID; 12,14 GA. STRANDED. 1 OR 2 OF SAME GA. UNDER EACH CLAMP

CIRCUIT POWER (5W):
EG- EARTH GROUND
N- NEUTRAL (WHT)
L - 120VAC ±10% (BLK)

NC NO CM NC NO CM L N EG

RELAY 120 VAC

120 VAC JUMPER 20 AMP MAX

1/2" CONDUIT 4-HOLES 2 BOTTOM & 1 EA. SIDE

MOUNT ENCLOSURE WITH 2 #10 SCREWS SPACED 5.25 IN.

5/8TH SCALE INTERNAL DRAWING WITH METAL COVER AND H-V WIRING ACCESS COVER REMOVED

PR# E2W1-2020-PRIP

RELAY (PUMP) OVERRIDE SWITCH AUT- NORMAL SETTING

OVERRIDE JUMPERS:
FZ- FREEZE PROTECT (40 ON 55 OFF)
DEL- 5 MIN DELAYED PUMP TURN-OFF

ISOLATED DATA PORT: FOR IMC ACCESSORIES ONLY- SEE MANUAL!

DATA REFRESH JUMPER: 2 SEC / 6 MIN

DATA PORT 2S 6M FZ AX2 AX1 STO COL
DEL SHLD

CONTROLLER INSTALLATION

MOUNTING- The Eagle line of SOLAR 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 wire enters the enclosure opening. Use two #10 screws in the enclosure "keyholes" for mounting on a vertical wall with the two conduit holes facing down to the floor. After wiring and adjustments are done, replace the metal cover and tighten screws firmly.

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-	Better specifications-	Best specifications-
"Audio" Belden # 9451-10 Black (22ga)	"PLTC" Belden # 9322 (22ga) or 9320 (20ga)	"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 shielding wires together with the "wire-nut" (supplied) or other reliable means. Ungrounded shields may result in damage to the Solar controller circuits. The shielding wires requires 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 <u>undamaged</u> wire end. Use a strip tool that will <u>not nick</u> 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 <u>tightly twisted</u>. 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".

HIGH VOLTAGE (H-V) WIRING- Wiring within the H-V compartment must be performed by an electrician or a trained technician. Make certain that power is OFF or disconnected when the H-V access cover is removed. POWER relay terminals are rated for 20amps max at 240vac max. The "120VAC 20A RELAY JUMPER" on the "CM" terminal MUST be removed for relay operation other than 120VAC. See SPECIFICATION section for complete relay contact ratings. All connections must be made with copper wires properly inserted and tightened. All wiring used within this H-V compartment must have insulation rated for the highest voltage used on any connection, typically that would be 300 volt. E2 controllers are manufactured with one of two types of terminal blocks. The black "US" barrier type with a clamping washer & safety cover or the green "EU" type with recessed screws & square wire holes. Wire gauge used must be in accordance with local codes.

Instructions for connections to the "US" type terminals (black)- Strip 1/2" of insulation off. DO NOT nick wire or strands. Use one wire 18 or 16 solid or 18 to 12 AWG stranded. Or use two same size wires in one terminal so the washer clamps them with equal pressure. Tighten terminal screw with a #2 Phillips or a 1/4" wide x .035 thick blade tipped screwdriver to a max. torque of 10 in-lbs. After inspecting, remember to snap on the safety cover.

Instructions for connections to the "EU" type terminals (green)-Strip 3/8" of insulation off. DO NOT nick wire or strands. Use one wire 18 or 16 solid or 18 to 10 AWG stranded. Or use two 14 or 12 AWG wires in one terminal. When using solid wire, they must fit side-by-side so they clamp with equal pressure. Tighten terminal screw with a 3/16" wide x .025 thick blade tipped screwdriver to a max. torque of 5 in-lbs.

If three or more wires require a common connection, it should be done in accordance with accepted methods by an electrician and may require additional space in a separate junction box. Avoid using solid wire thicker than 16 AWG, because the circuit board can be damaged when forcing the wires into the H-V compartment. <u>Line or power wires should NOT be bundled with or placed in the same conduit with sensor or data cables.</u>
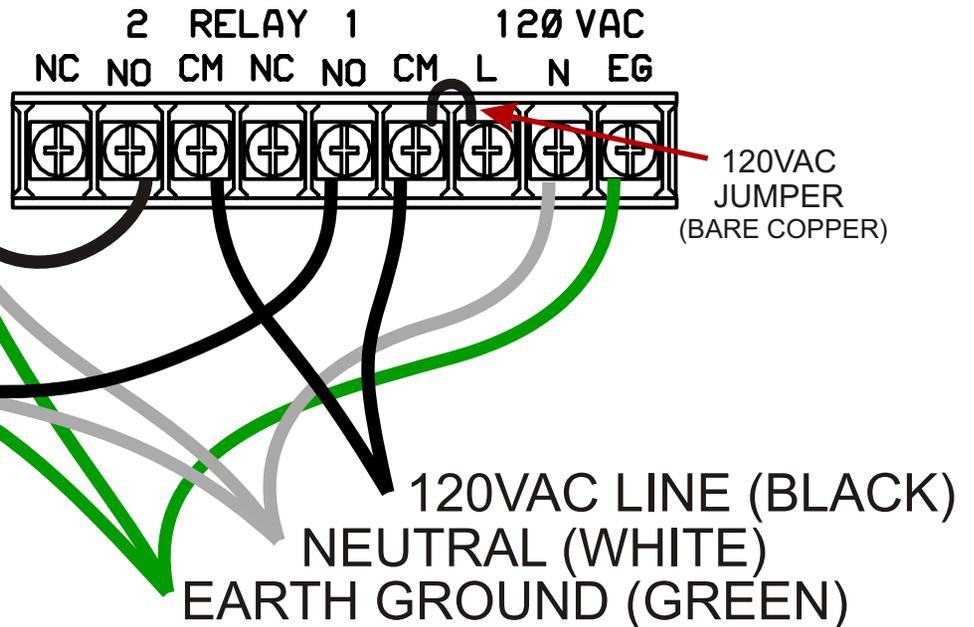
COLLECTOR GROUNDING- The Solar collector panel array must be GROUNDED directly to an earth ground rod. This is necessary to prevent damage from nearby lightening strikes which induce very DAMAGING high voltages in any ungrounded metal surface. Please consult local, state and federal codes for proper grounding. Please visit our website for news or recently released product information: **"www.solar.imcinstruments.com".**

120VAC
VALVE
OR
PUMP 2

120VAC
PUMP 1
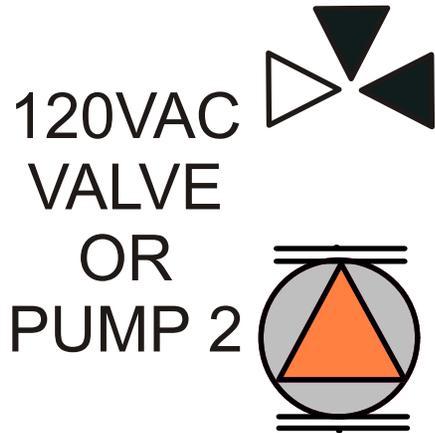
MAX. WIRE GAGE AT TERMINAL IS 12AWG STRANDED
MAX. QUANTITY OF WIRES AT ANY TERMINAL IS TWO
MAX. CURRENT AT N.O. TERMINAL IS 20 AMP OR 1HP
TERMINALS ARE FOR COPPER WIRE ONLY

TERMINAL BLOCK SHOWN IS "US" BARRIER STYLE WITH
CLAMPING WASHERS AND SAFETY COVER.
ALTERNATE USED IS "EU" STYLE WITH CLAMPING "CAGES"
AND RECESSED SCREWS.

CONTROLLER POWER
TERMINAL CONNECTIONS

2 RELAY 1 120 VAC
NC NO CM NC NO CM L N EG

120VAC
JUMPER
(BARE COPPER)

120VAC LINE (BLACK)
NEUTRAL (WHITE)
EARTH GROUND (GREEN)
TO POWER PANEL OR JUNCTION BOX