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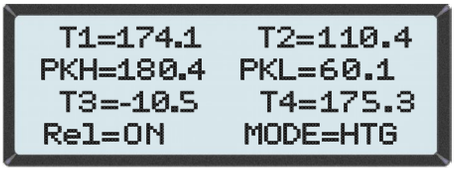
SERVICE AND INSTALLATION INSTRUCTIONS



IMC'S LCD MASTER DIGITAL DISPLAY PANEL FOR REMOTE INDICATION

MAIN FEATURES

EAGLE 2

SETPOINT

TEMPERATURE CONTROLLER

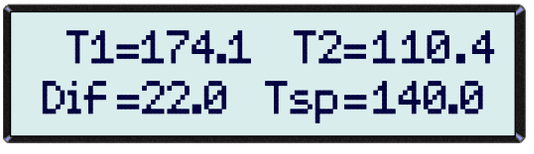
PR# HVAC-2ESC-10

- **Microprocessor** accuracy and dependability with ambient operation from -10 to 120°F
- **Large easy-to-read 40 character** (20x2) backlit LCD display showing every parameter measured and Controlled by the microprocessor.
- **PC DATA PORT** with built-in transmitter allows optional adapter and up to 500 ft. cable to interface with computers for ease in startup and remote diagnostics. Or, for adding an **Optional large 80 character** (4x20) backlit LCD display. Remote-mount up to 150 ft. distances with a CAT-5 cable.
- **Long-term diagnostics** and data logging is possible using communications software that is included in Windows' OS.
- **Fault LED indicators** for quick servicing and diagnostics
- **Selectable** Heating or Cooling mode, low or high Limit alarm and low or high SetPoint range.
- **Features for fast installation** and wiring
- **Electrostatic** discharge protected
- **One HP or 20 AMP** high reliability relay
- **Polyester coated 16 gage** rugged steel enclosure
- **Model available** with receptacle & power cord or with 1/2" conduit holes for higher current permanent wiring
- **industrial 400°F (204°C) rated 10 K thermistors** with +/- 1°F accuracy. One "bolt-on" probe is included with control.
- **Three auxiliary thermistor inputs** for optional sensors that can be located up to 1000' away.

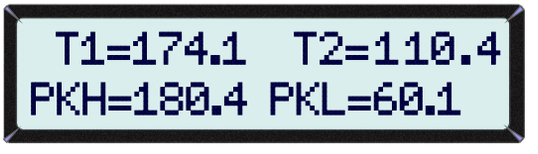
LCD DISPLAY

The LCD display has 2 lines of 20 characters each. The first line permanently displays the CONTROLLED temperature sensor T1. The second line can be paged by pressing the button located just below the LCD display. The following 4 pages display all system information including OVERRIDE messages.

PG 1

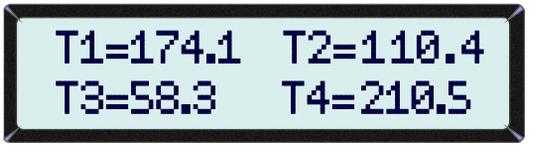


PG 2

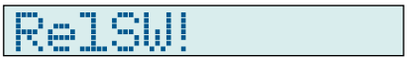


PG 3

PG 4



SYSTEM OVERRIDE MESSAGES FLASH on the LOWER LCD LINE as follows:



INSTRUMENTATION WITH QUALITY ENGINEERING

DATA-PORT

Requires an IMC Data Port ADAPTER that will allow interface to a standard computer's serial RS232 port. The ADAPTER can also accept a serial to USB converter to connect directly to portable computers that only have USB ports. If wireless operation is desired for short distances, BLUE TOOTH transceiver can also be connected. One complete line of "total system information" will be sent to the computer every 2 seconds which is necessary when performing diagnostics or a system startup. Long-term DATALOGGING or storing DATA can be done by setting up a "CAPTURE" file in the computer's communications program such as "Terminal" or "Hyper Terminal".

SAMPLE DATA PORT PRINT

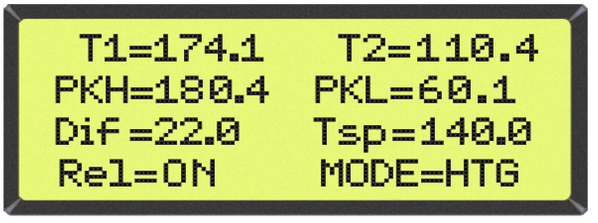
RUNTIME	T1	T2	T-dif	T-Spt	T3	T4	RELAY	FAULT		
0:00	125.9	73.7	08.0	110.0	212.2	205.4	ON	OFF		*System in normal operation*
0:06	25.9	73.7	08.0	110.0	212.2	205.4	OFF	OFF		
0:12	25.9	73.7	08.0	110.0	212.8	205.4	ON	OFF	RelSW!	*Pump switch ON*
0:18	OPEN.S	73.9	08.0	110.0	212.8	205.4	OFF	OFF	SENS!, RelSW!	*Open sensor, Relay OFF*
0:24	-16.0	74.7	08.0	110.0	25.9	184.6	ON	OFF		
0:30	SHRT.S	74.9	08.0	110.0	25.9	154.6	OFF	OFF		*Shorted sensor->Relay OFF*
0:36	125.9	173.7	08.0	173.0	112.2	95.4	OFF	ON		Storage reached UPPER LIMIT

An **IMC LCD MASTER DIGITAL DISPLAY PANEL** can also be connected to the DATA PORT. It has an RJ-45 jack and is supplied with a 3 foot long cable that can be substituted with a standard CAT5 cable up to150 feet long. These ethernet cables are available at most retail stores. The display panel also has a PEAK RESET button located on the side to reset previous STORAGE temperature peaks.

The Information on the **LCD MASTER DISPLAY PANEL** is displayed as follows:

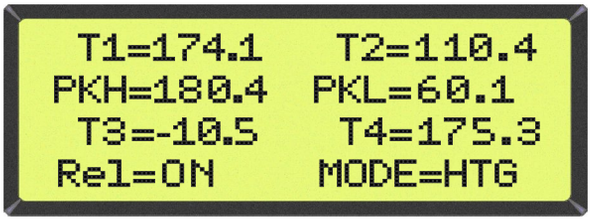
T1 CONTROLLED TEMPERATURE
T2, T3, T4 ADDITIONAL TEMPERATURES
PEAK HI= MAXIMUM T1 TEMPERATURE
PEAK LO= MINIMUM T1 TEMPERATURE
CONTROL T1 SET POINT TEMPERATURE
RELAY STATUS
CONTROL MODE (HEATING OR COOLING)
(HIGH OR LOW LIMIT)

PAGE 1



This Master LCD has a second page which will display sensor temperatures T3 and T4 on PG 2. To display, press and release the PAGE/RESET button on the side of the display housing. The additional sensors will be displayed within 2 seconds. To RESET the STORED PEAK temperatures of the storage tank, press and hold for 6 seconds the PAGE/RESET button. The current temperatures will appear after the button is released. The Master LCD display is updated every 2 seconds.

PAGE 2



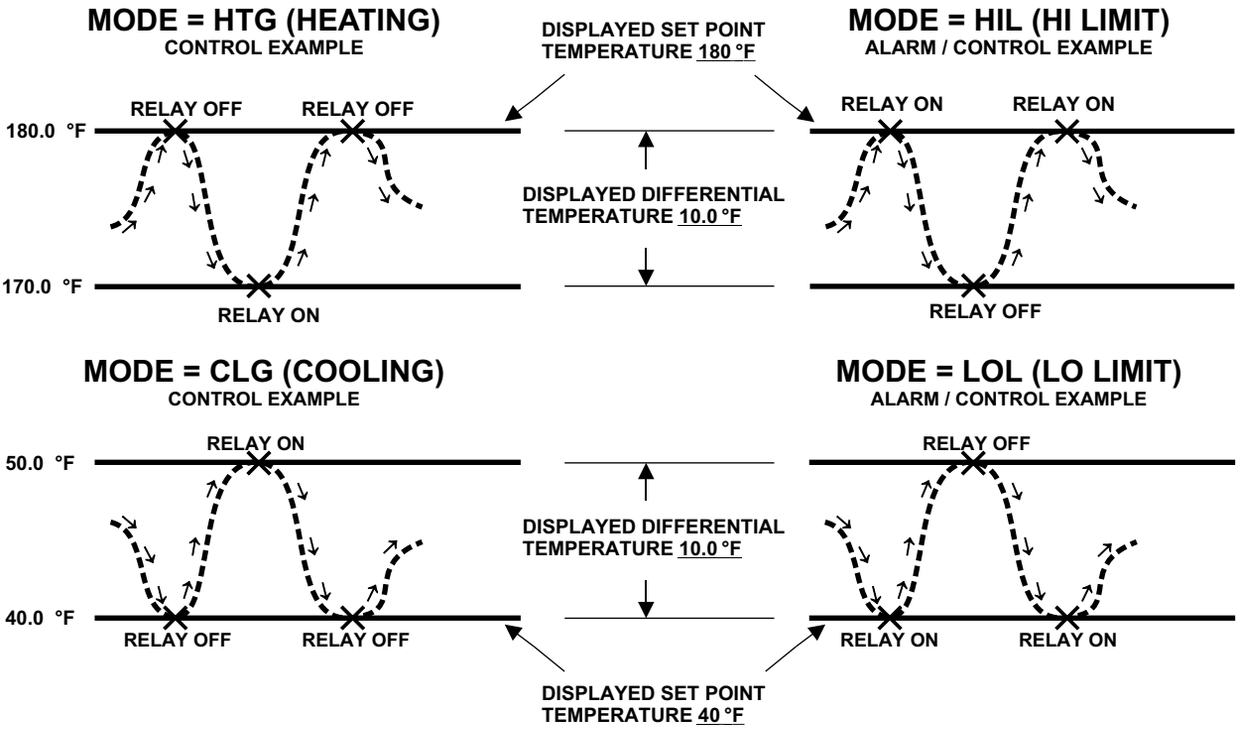
IMPORTANT NOTICE

These EAGLE Series Temperature Controls are intended to control equipment under normal operating conditions. Where failure or malfunction of EAGLE Series Control could lead to an abnormal operating condition that could cause personal injury or damage to the equipment or other property, other devices (limit or safety controls) or systems (alarm or supervisory) intended to warn of or protect against failure or malfunction of the EAGLE Series Control must be incorporated into and maintained as part of the control system.

CONTROLLER OPERATION

If the **HEATING** mode is selected controller operation is as follows: When the temperature at sensor T1 falls below the dialed **SETPOINT** temperature setting **MINUS** the dialed **DIFFERENTIAL** temperature, the relay will power ON after a 30 second delay. The BLUE LED indicator will also turn ON. When the temperature increases above the **SETPOINT** temperature, the relay and the BLUE LED indicator will turn off without delay. If the **COOLING** mode is selected, the control action is reversed as follows: When the temperature at sensor T1 exceeds the dialed **SETPOINT** temperature setting **PLUS** the dialed **DIFFERENTIAL** temperature, the relay will power ON after a 30 second delay. The BLUE LED indicator will also turn ON. When the temperature decreases and falls below the **SETPOINT** temperature, the relay and the BLUE LED indicator will turn off without delay. When the controller is set for **HI LIMIT** or **LO LIMIT** mode of operation, the action is the same as described above for HEATING & COOLING, however, the relay action is reversed as shown in these diagrams. LIMIT settings are often used for alarm applications. See MODE jumper settings on "specs" page.

CONTROL MODE DIAGRAMS:



STATUS INDICATION LEDS- There are three status indication LEDS. The GREEN LED indicates that the microprocessor is POWERED and the SOLAR controller is running. The BLUE LED indicates PUMP RELAY operation. When ON, the PUMP is operating and solar energy is being stored in the STORAGE tank. The RED LED indicates when there is a fault condition. The conditions that will cause the fault LED to turn ON are as follows: OPEN, SHORTED or OUT of RANGE temperature SENSORS; pump relay SWITCH not set to "AUT" (automatic) position; other internal component malfunctions. The RED LED will always be FLASHING when the FAULT indication is ON

SENSORS- Industrial 400°F (204°C) rated 10K IMC thermistors have +/- 1°F accuracy. When installed, they will not exceed ONE degree of additional error for cable distances up to 1000 feet of 18ga., 700 feet of 20ga. or 500 feet of 22ga.

SENSOR SCREW TERMINALS- There are 9 screws on a GREEN block located at the top edge of the board. These terminals accept solid or stranded wire from 18ga. to 22ga. These are NEC class 2 circuit connections.

POWER AND RELAY TERMINALS- The power terminals are for 120 vac operation (230 vac operation is optional). Use solid wire in 16 or 18 ga. and stranded (19 max) in 12 or 14 ga. The power RELAY is rated for 20 Amps and is designed to connect directly to PUMPS or FANS not exceeding a total of 1 hp. A 30 amp. (resistive load) board option is available. Current and voltage ratings will vary for models with cords and receptacles. See controller's model label for specific ratings.

INSTALLATION

MOUNTING- The Eagle line of SOLAR controllers are designed to be mounted indoors, protected from rain and condensing moisture. Use two #10 screws in the enclosure "keyholes" for mounting.

POWER WIRING- Hard wired models are designed for 120 vac operation unless special ordered. If relay is wired to switch any voltage other than 120 vac then the "20 AMP RELAY JUMPER" MUST BE REMOVED. Use solid wire in 16 or 18 ga. and stranded (19 max) in 12 or 14 ga. Same gage and stranding must be used under both sides of each clamping washer. All wiring must be done in accordance with local codes. Models supplied with line cords and receptacles are to be connected directly to power outlets without the use of extension cords. Line and power wires should NOT be bundled with or placed in the same conduit with sensor or data cables.

SENSOR INSTALLATION AND WIRING- Sensor installation should be in a manner as to permit proper sensor contact of the areas to be measured. Shield 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.

It is recommended in today's Radio interference "RICH" environment that all sensor wiring be shielded. Listed below are a few suggested wire part numbers. Wire selected must also meet local codes and be rated for indoor/outdoor use by its manufacturer.

1)	"PLTC" Belden # 9322 (22ga) or 9320 (20ga)	Best specifications
2)	"Control" Belden # 8761 (22ga) or 8762 (20ga)	Better specifications
3)	"Audio" Belden # 9451-10 Black (22ga)	Acceptable specifications

The cable SHIELDS must be brought to the shield grounding terminal that is the rightmost position on the GREEN terminal block. See controller layout diagram. For ease of shield installation, insert one short wire in the shield terminal labeled "SHLD" and connect all the shields together with a "wire-nut"or other reliable means. Ungrounded shields may result in damage to the Solar controller circuits. The shield requires grounding at the controller side ONLY. DO NOT attempt to ground the collector panel with the sensor shield.

For efficient and reliable wire connections, strip 3/8" (slightly shorter than block width) 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 pinched or 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, select the appropriate screw and 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 screw retaining edge of the hole will be scraped off allowing the screw 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. If the wire is stranded, make sure that ALL the strands are properly clamped in the terminal.

COLLECTOR GROUNDING- The Solar collector panel array "must be GROUNDED' directly to an earth ground line. This is necessary to prevent damage from nearby lightening strikes which induce very DAMAGING high voltages in all nearby ungrounded metallic surfaces. Please consult local, state and federal codes for proper grounding.

DATA LOGGING TO A COMPUTER- All the EAGLE Solar controllers can be connected to the serial port of a PC or Laptop computers. An IMC DATA PORT/RS232 adapter is required. The maximum recommended adapter cable length is 500 feet. All Windows operating systems have a communications programs such as "Terminal" or "Hyper Terminal" which are used to receive and/or CAPTURE data from the PC's serial port. This feature is "EXTREMELY" valuable in starting up newly installed SOLAR systems. Long-term data logging is now possible which can be very useful in service and diagnostics of intermittent malfunctions. Complete "system status" including temperature is presented in a line by line format including timer information. In applications were the computer's interface is going to be permanent it is recommended that the EAGLE WEB model be used in order to protect the connecting computer from electrical surges.

Please visit our website for news or more detailed instruction at **"www.solar.imcinstruments.com".**

INSTRUMENTS, INC.

SPECIFICATIONS

Input Power: 2 Watts @ 120VAC*
Relay Contact Ratings:
#832 UL #E88991, CSA #1429333
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)-
20A resistive*** @ 120VAC & 250VAC**
1/4 HP @ 120VAC; 1/2 HP @ 250VAC**
15A @ 30VDC**

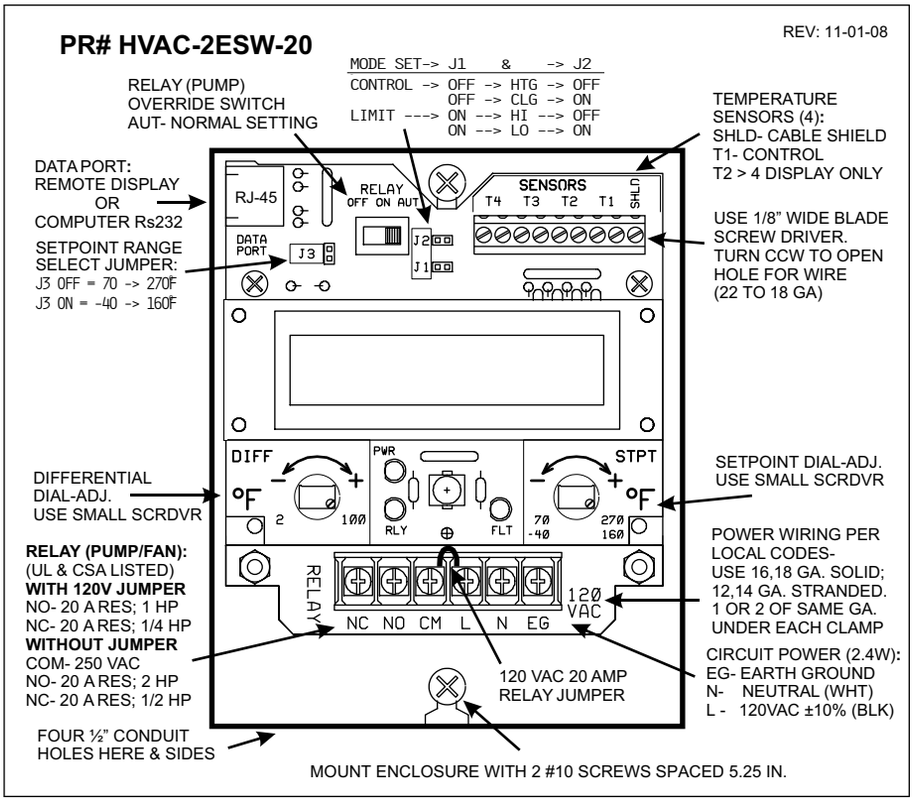
Relay Action: 30sec delay ON; no delay OFF
Control Modes: Selectable cooling, heating or limits
SetPoint Range: Select -40 to 160°F or 70 to 270°F
Accuracy: +/- 1 °F
Sensors: 10K @ 77°F (25°C) Rated to 400°F
Environmental: -10 to 120°F @ 0 to 95 %RH
Dimensions: 5.00"W x 6.12"H x 2.50"D
Weight: Appx. 2.0 lbs without power cord

* **230 VAC Input Power is optional**
** **120VAC Relay Jumper MUST be removed**
*** **30 Amp configured model is available**

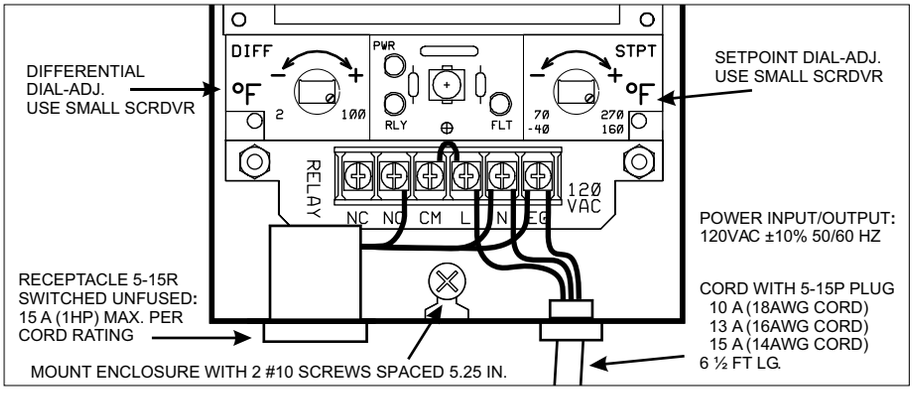
Product #
HVAC-2ESW-20
With Conduit Holes
for Hard Wiring

```
MODE   --->JMPR#1   --->JMPR#2
-----------------------------
CONTROL -> OFF -> HTG -> OFF
           OFF -> CLG -> ON
LIMIT ---> ON --> HI --> OFF
           ON --> LO --> ON

SETPOINT JUMPER ---> #3
-----------------------
RANGE -40 -> 160 --> ON
       70 -> 270 --> OFF
```



Product #
HVAC-2ESC-10, -15
With Line Cord &
Receptacle



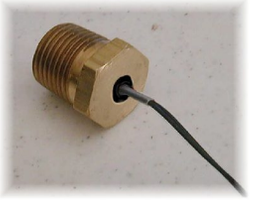
CONTROLLERS(120vac power)	**RATING**	**PRODUCT #**
With line cord & receptacle -	10 Amp	HVAC-2ESC-10
	15 Amp	HVAC-2ESC-15
With conduit holes for permanent wiring -	20 Amp	HVAC-2ESW-20
	30 Amp	HVAC-2ESW-30

ACCESSORIES

THERMISTOR TEMPERATURE SENSORS-

RATED TO 400°F:

Bolt-on style: SOLR-TS02



Screw-in style: SOLR-TS03
1/2-NPT threaded plug

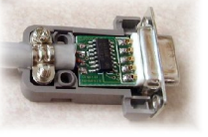
Immersion style:
4"long with 1/4NPT fitting- SOLR-TS04
1/2NPT fitting- SOLR-TS24
8"long with 1/4NPT fitting- SOLR-TS05
1/2NPT fitting- SOLR-TS25

PC Data-Port Adapter RS-232*: SOLR-DA10

Connects directly to the EAGLE controller DATA-PORT and permits serial PC communication at 2400 BAUD rate. * non-isolated

Adapter has a 7 foot cable terminated with an RJ-45 plug.

EAGLE “web” controller with a 2500 volt isolated PORT is recommended for long-term or permanent installations.



Includes electronic circuits inside the DB-9 connector housing.

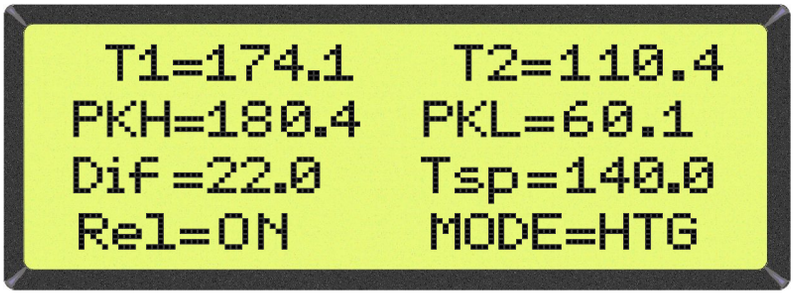
ACCESSORIES continued

LCD MASTER DIGITAL DISPLAY PANEL- SOLR-RD80

Displays temperature and status indication with 80 characters (4x20) 1/4" high.
Supplied with a 3' foot CAT-5 cable that connects directly to the EAGLE controller Data-Port*.
Housing dimensions are 4.33" (110mm) wide x 2.34" (82mm) high x 1.73" (44mm) deep.

*** IMPORTANT NOTICE**

Do NOT attempt to connect any ETHERNET device or any other non-IMC devices to the RJ-45 DATA-PORT of any IMC CONTROLLER or accessory. This will result in damage to the connected equipment. Connect ONLY devices specifically designed by IMC Instruments to be connected to these ports.



ACTUAL SIZE DISPLAY
when printed booklet size