

INSTALLATION AND OPERATION MANUAL FOR MULTI-INPUT TEMPERATURE MONITORS WITH ALARMS MODELS 4506/12 AND 4706/12

IMC temperature monitors are the results of American ingenuity and workmanship. Years of practical field experience helped design features to simplify installation and use, so please read all the instructions before proceeding. Our products have a full one year parts and labor warranty from the time of shipping. Improper installation, abuse, and tampering will void the warranty.

<u>CONTENTS</u>	<u>PAGE</u>
SPECIFICATIONS	1
OPERATION	2
FUNCTION KEYS	3
INSTALLATION	5
PROGRAM SETUP	6
PROBE CALIBRATION	9
MAINTENANCE	9
SERVICE	9
DATA LOGGING	10
DRAWINGS	11

"INSTRUMENTATION WITH QUALITY ENGINEERING"



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VER 3.0 released 03/05

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SPECIFICATIONS:

Selectable thermocouple ranges:

K=-418 to 2507 °F (-250 to 1375 °C) J= -310 to 1832 °F (-190 to 1000 °C)
T=-418 to 752 °F (-250 to 400 °C) E= -418 to 1832 °F (-250 to 1000 °C)

Resolution:

0.1°/ 1° selectable up to 999.9°; 1° above 1000°

Accuracy:

±0.25% of reading or ±0.7°F (0.4°C) whichever is greater

Display:

12 character vacuum fluorescent with adjustable display time from 2 to 999 seconds per input.

Scan rate:

4 seconds for all selected channels up to 12

Input channels:

6 or 12 fully isolated inputs, safe up to 120V; when voltage higher than 40 is applied between inputs, readings will not be accurate

Operating ambient:

Temperature, 32 to 122°F (0 to 50°C); Relative humidity 10% to 90% non-condensing; see enclosure rating

Power voltage:

Check label on actual unit, either 120VAC or 230 VAC ± 10% at 50/60 HZ

Power fuse:

5x20MM slow-blow rated @ 1/8(.125) AMP for 120V units or 1/16(.062) AMP for 230V units

Alarm relays:

Two "GLOBAL relays each configurable as high or low alarm action. Each relay is single-pole double-throw. The contacts are rated for 5 AMP (max) resistive load at 120 to 230 VAC or 28 VDC (max). Inductive loads can be 3 AMP (max) provided the contact arcing is "snubbed".

Digital output:

RS-232-C ASCII format @ 9600 baud rate set for 8-N-1; The PRN terminal is "TX DATA" to be connected to pin #2 of a standard serial 9 pin connector and the GND terminal connected to pin #5. If shielding is required, clamp to the metal shell of the serial connector. DO NOT connect to the monitor.

Enclosure:

Model 4712:

Polycarbonate enclosure is rated Nema-12 for use in high humidity environments while occasionally sprayed with compatible fluids. Enclosure is not designed for wash-down or hose-down areas. See MAINTENANCE section.

Model 4512:

Circuit board and display is mounted to an aluminum panel for the user to install in most enclosures.

Size and Weight:

Model 4712:

9"(229mm) wide X 7.5"(190mm) high X 5"(127mm) deep; 3 lbs(1.4 kg)

Model 4512:

Mainboard panel size: 6"(153mm) X 8"(203mm) X 1.8"(46mm) high; 1.5lbs (.7 kg)

Display panel size: 8.1"(206mm) wide X 4.65"(118mm) high X 1.4"(36mm) deep; .5 lbs (.23 kg)

See mounting instructions for cutout sizes.

Optional buzzer:

Piezo long-life and moisture-sealed construction produces 100 DB sound level at 1 meter.

Optional analog output:

Factory installed module for current or voltage signal for a single selectable channel

4 to 20 mA loop signal requires an external 18-35 voltage source.

0 to 1VDC signal is typically used for recorders. Connect with an 18-22GA wire-pair.

OPERATION

SCANNING

Each input channel selected during the SETUP procedure is measured for the TC READ INT (4 seconds to 99 minutes and 59 seconds). The monitor may be set to SCAN continuously or to display a specific channel. In either mode all alarm warnings will be flashing until the **[ALARM]** key is pressed.

SETUP PARAMETERS

PROGRAM SETUP can be performed at any time and the values selected will be stored in nonvolatile memory. Data that is being measured and stored in MEMORY is volatile and will be lost when power is interrupted. So, valuable data should be sent via optional digital output to a printer or to an external storage device. Parameters that can be changed are the READ LOG ON/OFF, TC READ INT 4SEC/99MIN, DATA OUT INT 4SEC/99MIN, SCALE F/C/R/K, DECIMAL 0.1/1, SCAN ON/OFF, ALARM MODES, TC BRK RLY, ACTION, SETPOINTS, HYSTERESIS, BUZZER, ANALOG OUTPUT, TC TYPE K/J/T/E AND TEMP. CAL. Consult the program setup section of this manual to change any of these parameters.

ALARMS

This instrument can be configured for up to 12 channels with 2 setpoints on each. The setpoint action which applies to all of the channels can be selected as one of 3 modes:

AUTO RESET MODE:

When an alarm occurs, the appropriate alarm relay is energized and the buzzer sounds, if present and enabled. The alarm characters will flash when the alarming channel is displayed. The **[^]** or **[v]** keys can be pressed to display all alarming channels. When the **[ALARM]** cancel key is pressed, the buzzer turns off and the alarm characters stop flashing for all alarms. When the temperature returns to a non-alarming range, the alarm characters turn off. When all the temperatures return to their non-alarming ranges, the alarm relay is de-energized, even if the **[ALARM]** cancel key is not pressed. This mode will not interrupt the scanning display.

LATCHED MODE:

When an alarm occurs, the appropriate alarm relay is energized and the buzzer sounds, if present and enabled. The display scanning stops and the alarming channel is displayed with the alarm characters flashing. When the **[ALARM]** cancel key is pressed, the alarm relay is de-energized, the buzzer turns off, and the alarm characters stop flashing for all alarms. The **[^]** or **[v]** keys can be pressed to display all the alarming channels. When the temperature returns to a non-alarming range, the alarm characters will turn off. If the **[ALARM]** cancel key is not pressed, the channel will continue in alarm condition until it is pressed even if all the temperature have returned to their non-alarming ranges.

SAFE LATCHED MODE:

This alarm mode works the same as "latched mode" except that the relay will not de-energize until both all temperatures return to non-alarm range and the **[ALARM]** cancel key has been held pressed for at least 3 seconds. If the **[ALARM]** cancel key is pressed for 3 seconds or longer before all the temperatures return to their non-alarming ranges, then the relay will de-energize the same as in "auto reset".

Note: when multiple alarms occur, the most recent one will be displayed.

SETPOINT ACTION	ALARM CHARACTERS	MEASURED TEMPERATURE	ACTIVE RELAY
HI/HH	HH	Above HH setpoint	HI+LO RLY
	HI	Above HI setpoint	HI RLY
HI/LO	HI	Above HI setpoint	HI RLY
	LO	Below LO setpoint	LO RLY
LO/LL	LO	Below LO setpoint	LO RLY
	LL	Below LL setpoint	HI+LO RLY

Monitors with optional buzzer will have the buzzer sound if it was enabled during SETUP. Pressing the **[ALARM]** key when there are no alarms, will cause the buzzer to sound out as a test.

Monitors will display "TC BROKE" instead of temperature several seconds after any thermocouple wire breaks or is disconnected. If the buzzer was enabled during SETUP it will also sound. If the HI or LO relay was enabled and ALARMS were turned on during SETUP the relay will activate. To cancel the flashing message and silence the buzzer press the **[ALARM]** cancel key.

DIGITAL OUTPUT (Remote on-line data logging)

The monitor's digital output (RS-232-C) will transmit, over a twisted-wire-pair, readings and alarm conditions for each channel at time intervals selected during SETUP. The output may be connected to a serial printer or to a serial port on an "IBM PC" or compatible computer (requires additional software). Sample DATA:

```

TIME 11:42:23 CH01: 73.8      CH02: 91.2      CH03: BROKE     CH04: 112.1 HI
                CH05: BROKE     CH06: *****  CH07: 75.6      CH08: 98.1
                CH09: BROKE     CH10: 83.1     CH11: 80.1     CH12: 101.4

```

**** indicates channel was not selected for scanning in SETUP. **HH, HI, LO, LL** indicates temperature alarm condition. **BROKE** indicates either a faulty or disconnected thermocouple.

ON-BOARD LIMITED DATA LOGGING*

Data logging will begin as soon as the LOG is selected ON in SETUP. For each scan the data is stored on all 12 channels, for up to 255 scans. After the 255 scans a message, "LOG FULL" will be displayed until the **[ALARM]** key is pressed, scanning will continue but no new data will be stored. To vary the length of time the unit stores a set of data, adjust the TC READ INT in SETUP from 4 seconds to 99 minutes 59 seconds between scans.

To view the data for a channel select the channel and press **[RECALL]** then the **[^]** **[v]** keys can be used to scroll through the data, press the **[ALARM]** or **[SCAN]** to escape, or **[RECALL]** again to select another channel. To send the stored data to a printer, or computer press **[RECALL]** then **[PRINT]**. The data will be in the following format:

```

TIME 11:42:23 CH01: 73.8      CH02: 91.2      CH03: BROKE     CH04: 112.1 HI
STORE 99      CH05: BROKE     CH06: *****  CH07: 75.6      CH08: 98.1
                CH09: BROKE     CH10: 83.1     CH11: 80.1     CH12: 101.4

```

Caution: If power loss occurs or if LOG is turned OFF all data will be lost.

ANALOG OUTPUT

Monitors with optional analog output for any single channel selected during SETUP. The analog output can be either 0-1V or 4-20mA. The analog output will be equal to 0V (4mA) when the temperature reaches the start temperature, selected in SETUP, and will be proportional to temperature up to 1V (20mA) when the end temperature is reached, also selected in SETUP.

FUNCTION KEYS

Pressing the **[SETUP]** key will initiate selection of parameter values used during the program operation of the MONITOR. Once in SETUP mode, Pressing the **[SETUP]** key will advance the program step by step without changing values.

Pressing the **[SCAN]** key at any time causes the unit to begin displaying each input for 2 second time intervals. The **[SCAN]** key also exits the SETUP mode.

Pressing the **[STORE]** key will store readings on all active channels simultaneously. "STORE" along with the entry number will be displayed momentarily. Only measured readings can be stored. Pressing the **[CLEAR]** key while in STORE mode will clear all the stored readings. Up to 255 sets of readings can be stored and reviewed with the **[RECALL]** key.

Pressing the **[RECALL]** key will display the last channel displayed followed by "AVG", the calculated average of all stored readings for this channel. While the "AVG" is displayed, pressing the **[v]** key will display the different stored readings for the selected channel, in descending order. The display will show the channel number, order number, and stored reading. If no temperatures have been stored, the display shows "EMPTY". Pressing the **[RECALL]** key again will start the channel number flashing. The channel can then be sequenced using of the **[^]** or **[v]** keys. Pressing the **[RECALL]** key again will start the "order number" flashing so it can then be sequenced. Pressing the **[CLEAR]** key while in RECALL MODE will clear all stored readings. Pressing **[RECALL]** then **[PRINT]** will cause the stored data to be sent through the serial port. Pressing the **[SCAN]** key will restore the display to normal scanning operation.

Pressing the **[MAX-P]** key will display the highest readings stored during the current time period. "P" will be displayed along with the readings. Pressing **[MAX-P]** again will resume normal operation. Pressing the **[CLEAR]** key while in MAX MODE will clear the stored maximum reading and initiate a new time period.

Pressing the **[MIN-V]** key will display the lowest readings stored during the current time period. "V" will be displayed along with the readings. Pressing **[MIN-V]** again will resume normal operation. Pressing the **[CLEAR]** key while in MIN MODE will clear the stored minimum reading and initiate a new time period.

Pressing the **[HOLD]** key will store all channel readings at the same time. Then, pressing **[^]** or **[v]** will display the stored readings of each channel. Pressing the **[HOLD]** key again will return the display to normal scanning.

Pressing the **[ALARM]** key halts the buzzer (if selected ON), cancels the TC BROKE, ALARMS and LOG FULL display warnings, and changes the flashing "A" following the channel number to a steady "A". In MANUAL RESET mode, **[ALARM]** also resets the alarm relays. Pressing the **[ALARM]** key when no alarms are present will sound the buzzer for testing purposes.

When the MONITOR is setup to PRINT DATA at selected intervals then data will be automatically transmitted via the RS-232 terminals. Pressing the **[PRINT]** DATA key causes an additional transmission to occur. Data can be transmitted to any computer by using communications software.

INSTALLATION

IMPORTANT INFORMATION:

The transformer is designed to filter out common low energy voltage spikes, however, if location is prone to lightning, then a voltage arrestor should be incorporated on the power input side. Route all WIRING through areas that are free from strong magnetic fields, such as large transformers or transmitters. If unavoidable, then use metallic conduit. Electrostatic discharges into the circuits can cause damage, so avoid handling unit with access covers removed. If installing outdoors, locate in shaded area. Do not locate MONITOR within air streams that have large temperature fluctuations. After installation, allow 30 minutes for the circuits to stabilize before taking critical readings.

INSTALLATION FOR 4712 OR 4706:

If installing in high humidity area, all conduit holes must be properly sealed, the access cover properly fastened and the clear door properly latched. All connections will be made through conduit openings on the lower wall of the enclosure.

ENCLOSURE MOUNTING:

- 1) Remove the lower access COVER exposing the screw terminals and the lower mounting holes (locate the slotted holes at each corner).
- 2) Select a wall area that is temperature stable. Install one # 8 PAN HEAD screw into the wall. Leave 1/8" gap between the head of the screw and wall.
- 3) Hang the MONITOR onto the screw using the upper center keyhole of the enclosure.
- 4) level the MONITOR using a level or approximate by sight and place marks for the two lower mounting screws.
- 5) Drill pilot holes, if required, and install two more # 8 PAN HEAD screws.
- 6) Proceed with the WIRING instructions.

POWER WIRING:

- 1) Install all wiring per local ELECTRICAL CODES.
- 2) Remove the HIGH VOLTAGE shield from wiring compartment and note the voltage requirements either 120 VAC or 230 VAC. DO NOT POWER UNITS WITH INCORRECT VOLTAGE.
- 3) Connect FLEXIBLE CONDUIT to the lower-left side of the enclosure.
- 4) Route 22-20 GA solid wire or 18 GA stranded copper wires for MONITOR power (1/8 AMP @ 120 VAC or 1/16 AMP @ 230 VAC).
- 5) Connect an earth GROUNDING WIRE to the terminal block to insure proper safety.
- 6) If optional relays are installed, connect wires to the Normally Open or Normally Closed relay terminals. Contact ratings are 5 AMP @ 230 VAC max. or 5 AMP @ 24 VDC max.
- 7) Reinstall the HIGH VOLTAGE shield.

INSTALLATION FOR 4512 OR 4506

This unit is designed to be mounted inside of the users enclosure.

PANEL MOUNTING:

- 1) The main board panel has mounting holes located in a rectangular pattern 6 x 5.5 inches
- 2) The display panel requires a panel cut out of 7.0 x 3.62 inches and the mounting holes are located on a pattern of 7.6 x 4.13 inches.

POWER WIRING:

- 1) Install all wiring per local ELECTRICAL CODES.
- 2) Note the voltage requirements either 120 VAC or 230 VAC. DO NOT POWER UNITS WITH INCORRECT VOLTAGE.
- 3) Route 22-20 GA solid wire or 18 GA stranded copper wires for MONITOR power (1/8 AMP @ 120

VAC or 1/16 AMP @ 230 VAC).

- 4) Connect an earth GROUNDING WIRE to the terminal block to insure proper safety.
- 5) If optional relays are installed, connect wires to the Normally Open or Normally Closed relay terminals. Contact ratings are 5 AMP @ 230 VAC max. or 5 AMP @ 24 VDC max.

INSTALLATION FOR ALL MODELS:

THERMOCOUPLE WIRING:

Use "THERMOCOUPLE GRADE" wire not "EXTENSION GRADE" for the most accurate performance. Do not splice wire that is not the same TYPE as the thermocouple probe. If the thermocouples will be exposed to electrostatic discharges, Attach a grounded drain wire to each probe. Select probe construction and insulation that has satisfactory life-expectancy in the application.

- 1) Conduit may be required by electrical codes or for mechanical protection. If so, install conduit (FLEXIBLE CONDUIT if a plastic enclosure) to the lower-right side of the enclosure and use for low voltage wires only.
- 2) Install 24-22 GA solid or 20 GA stranded thermocouple wire. Connect The RED insulated wire to the negative screw terminal.
- 3) Connect thermocouple wires to each corresponding probe. Connections must remain oxide-free.

ACCESSORY WIRING:

- 1) Digital output: Connect the PRN (TX DATA) terminal to pin #2 and the GND terminal to pin #5 of a standard 9 pin serial connector. If shielding is required, clamp to the metal shell of the serial connector. DO NOT connect to the monitor. Install 22-24 GA solid or 20 GA stranded copper wire.
- 2) Analog output: Loop signal is a proportional 4-20 MA current that requires an external 18-35 voltage source. Install 22-24 GA solid or 20 GA stranded copper wire-pair.
- 3) Alternate recorder signal is a proportional 0-1 DC voltage. Cable resistance will attenuate signal, so use 18GA stranded copper wire for the longest distances.

PROGRAM SETUP

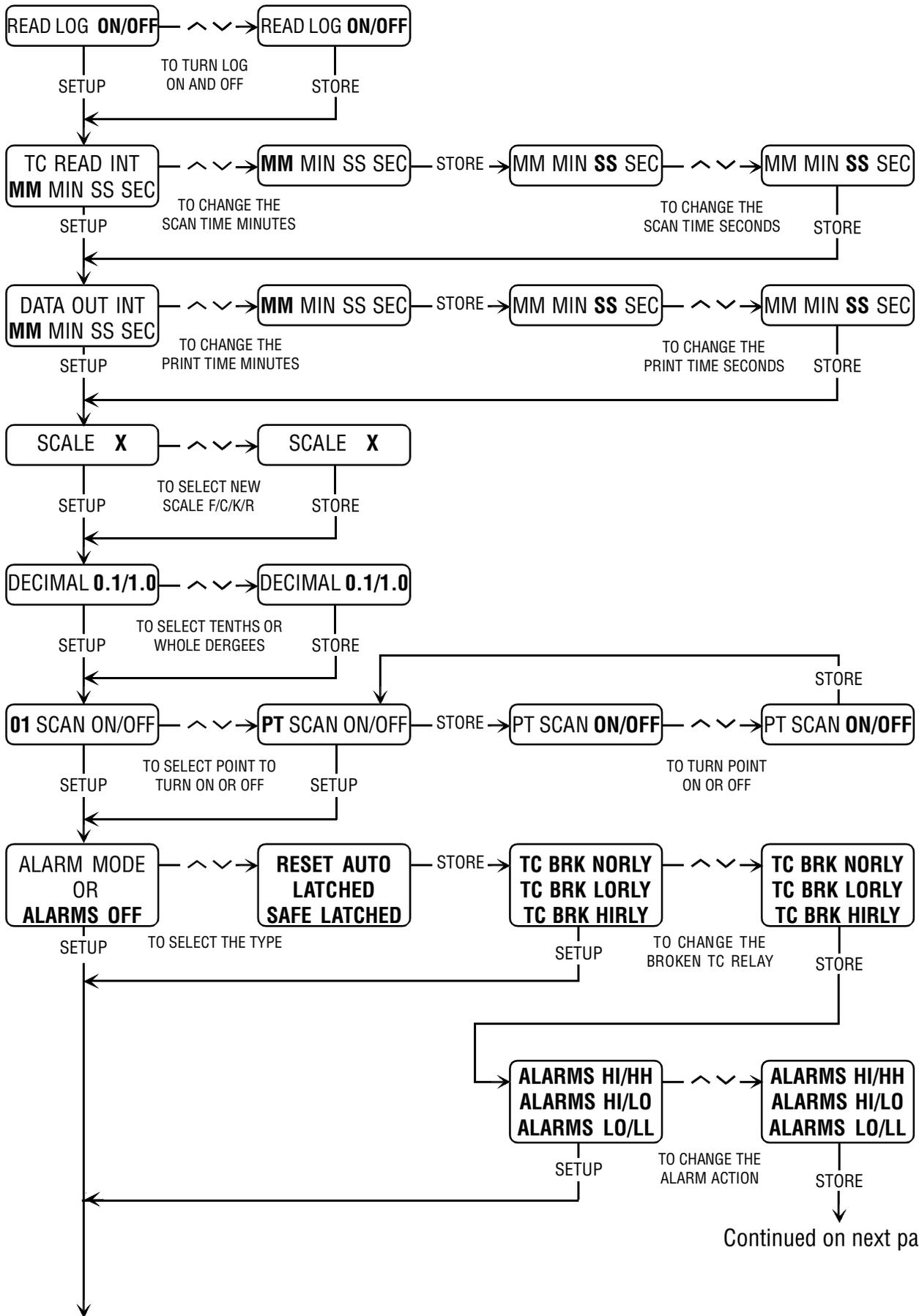
Open the clear DOOR to access the keypad by depressing the two latches on the right side of the enclosure. The door swings open to the left. If the locking pins are keeping the latches from depressing, then turn each 1/4-turn clockwise. Energize power and wait for the SYSTEM TEST to complete. If an ALARM condition occurs, press the **[ALARM]** cancel key. The following parameters may be set according to the options ordered.

Monitors without buzzer set BUZZER OFF

Monitors without analog output, do not set 4-20mA

NOTE: Display characters shown **BOLD** are parameter values that need to be selected. These values will be flashing on the actual display. Use the **[^]** or **[v]** keys to change these values and press the **[STORE]** key to SELECT and continue SETUP, or press the **[SETUP]** key to leave value as is and continue SETUP, or press the **[SCAN]** key at exit SETUP.

To change any parameters on the scanner press SETUP and follow this flowchart. Press SCAN to end at any time.

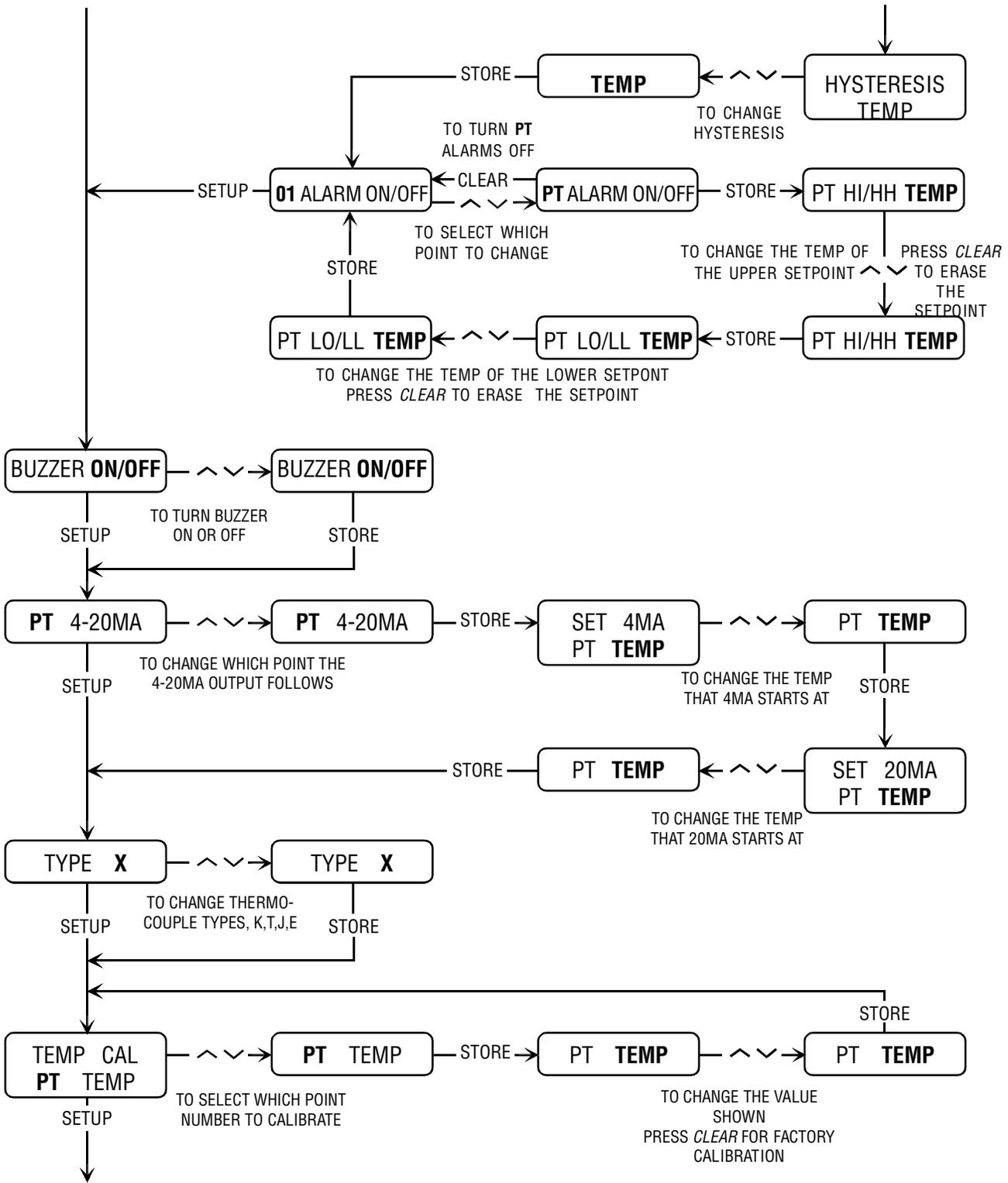


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Back to normal scanning

PROBE CALIBRATION

This procedure may be required due to probe error. Yearly recalibration is suggested. If thermocouple departs more than 5°F at ambient readings, it may be defective and should be replaced. For proper calibration, prepare an insulated container with well mixed water or oil deep enough for the probe to be immersed at least 3". Certified glass/mercury thermometers or a calibrated PT-100 meter will be required to measure the fluid temperature. At the very least, use a "fever" thermometer. After the monitor is installed with the probes connected, press the **[SETUP]** key until the display alternates between "TEMP CAL" and the channel number. The PROGRAM SETUP will store a separate calibration value for each probe. A "C" after the channel number indicates the channel has been field calibrated. Insert the probes into the prepared container while the liquid is at the desired temperature. Allow sufficient time for a stable reading. If the reading does not agree with the temperature of the liquid, then adjust the reading with the **[^]** or **[v]** keys until the reading agrees. After the reading agrees press **[STORE]** to advance to the next channel number. While the channel number is flashing use the **[^]** or **[v]** keys to select the next probe to calibrate press **[STORE]** to begin the next calibration. The measured reading will now be flashing ready for the calibration adjustment. After the last channel is calibrated press **[SCAN]** to exit the PROGRAM SETUP mode.

If ICE POINT calibration is desired, construct an ice bath using finely crushed ice (made with distilled water) and a small amount of distilled water to form a 32.0°F slush in the insulated container. place the probe in the slush, press setup until TEMP CAL appears, then select the desired channel. Allow time for the measured reading to stabilize, then press **[STORE]** so the temperature is flashing and press **[STORE]** again to get the new reading of 32.0 F.

MAINTENANCE

Model 4712 has an enclosure with a NEMA-12 rating and is not sealed sufficiently for constant contact with propelled liquids (such as in wash-down rooms or out in direct rain). If the MONITOR is located in high humidity environments, monthly inspections of seepage should be made. Keep rubber gaskets clean and replace if cracked or worn. Cleaning the external surfaces of the instrument should be done with water, a non-abrasive cleaner, and a soft cloth. Cleaning the clear door should be done with non-abrasive tissue or cloth and an ammonia-free cleaner. Any commercial product used must state it is safe for use on plastics. DO NOT allow cleaning liquids to seep into the enclosure.

SERVICE

If display does not turn on, the fuse should be checked. To do so, TURN POWER OFF to the monitor, remove the lower access cover and the HIGH VOLTAGE shield. Then carefully remove the fuse from the clips and check with an OHM meter . Replace fuse if reading is more than 5 ohms (10 ohms for 1/16AMP fuse), be sure to re-install the HIGH VOLTAGE shield. There are no other user serviceable components in these monitors. Proceed as Follows, If any of these messages appear on the display; "BAD EPROM", "BAD UP RAM", "BAD EXT RAM", "BAD EEPROM", "DEFAULTS SET", "BAD SAVE" or "BAD RELAY".

- 1) Refer to operation for possible error in usage.
- 2) Check the installation instructions, trace all wiring, and check probes.
- 3)* Make a clear and detailed note of the malfunction and call or fax to our service dept.
- 4) If problem cannot be corrected in the field, package the product for shipping.
- 5)* Include the detailed problem note, UPS or delivery address, mailing address, phone number and name to contact.
- 6) Ship via insured carrier to our address listed on front page - mark ATTN: SERVICE DEPT.
- 7)* If product is not in warranty, a purchase order or written authorization will help expedite the repair, otherwise an estimate notice will be mailed out within 2 weeks.

* **FOLLOWING THESE INSTRUCTIONS WILL EXPEDITE THE REPAIR PROCEDURE.**

REMOTE DATA LOGGING

Items Required:

- A) Optional serial cable for DB-9 computer "COM" port
- B) Disk 3 1/2" 1.44 Meg with T-LOG-F.EXE program

Instructions:

With power removed to the temperature scanner, remove the lower access cover to view the wiring compartment. Locate the terminals marked "PRN" and "GND". Insert the serial cable through the conduit hole in the enclosure and terminate the wire ends, as labeled, into the matching terminals. Tighten the screws firmly, but do not over-tighten (use small screwdriver). Replace the access cover.

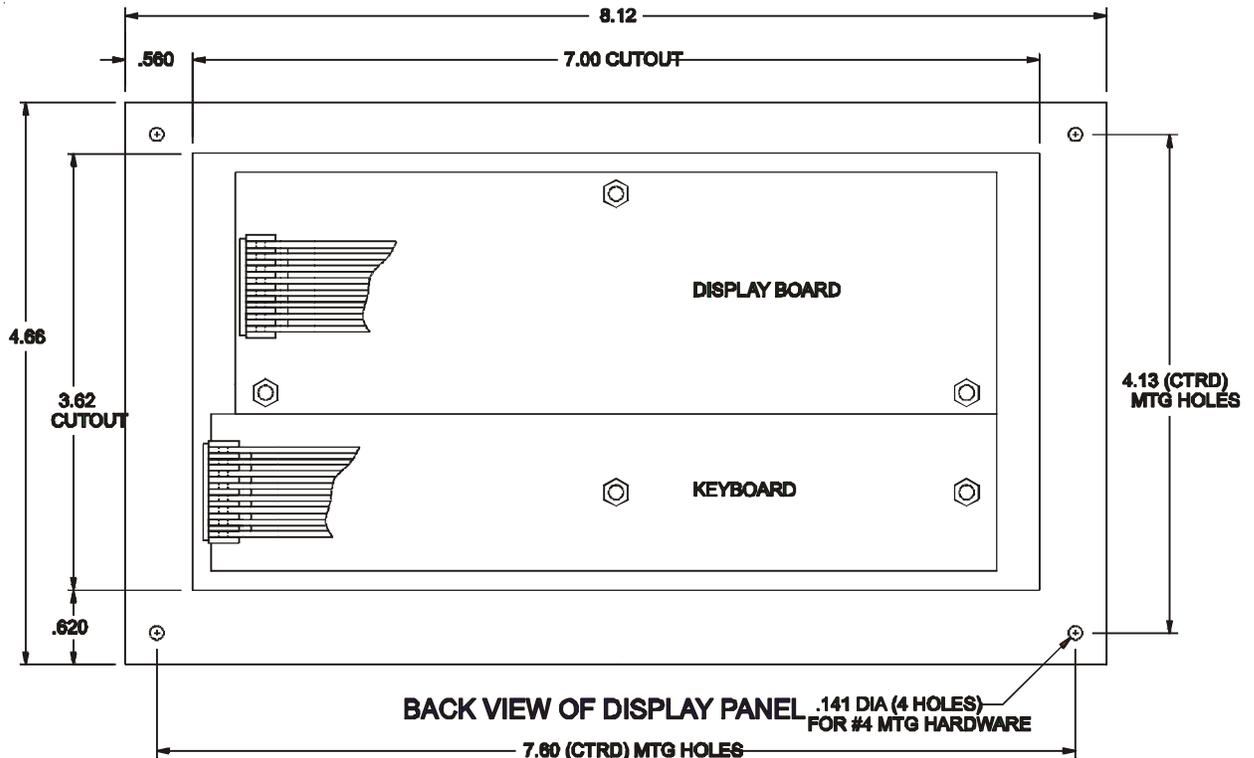
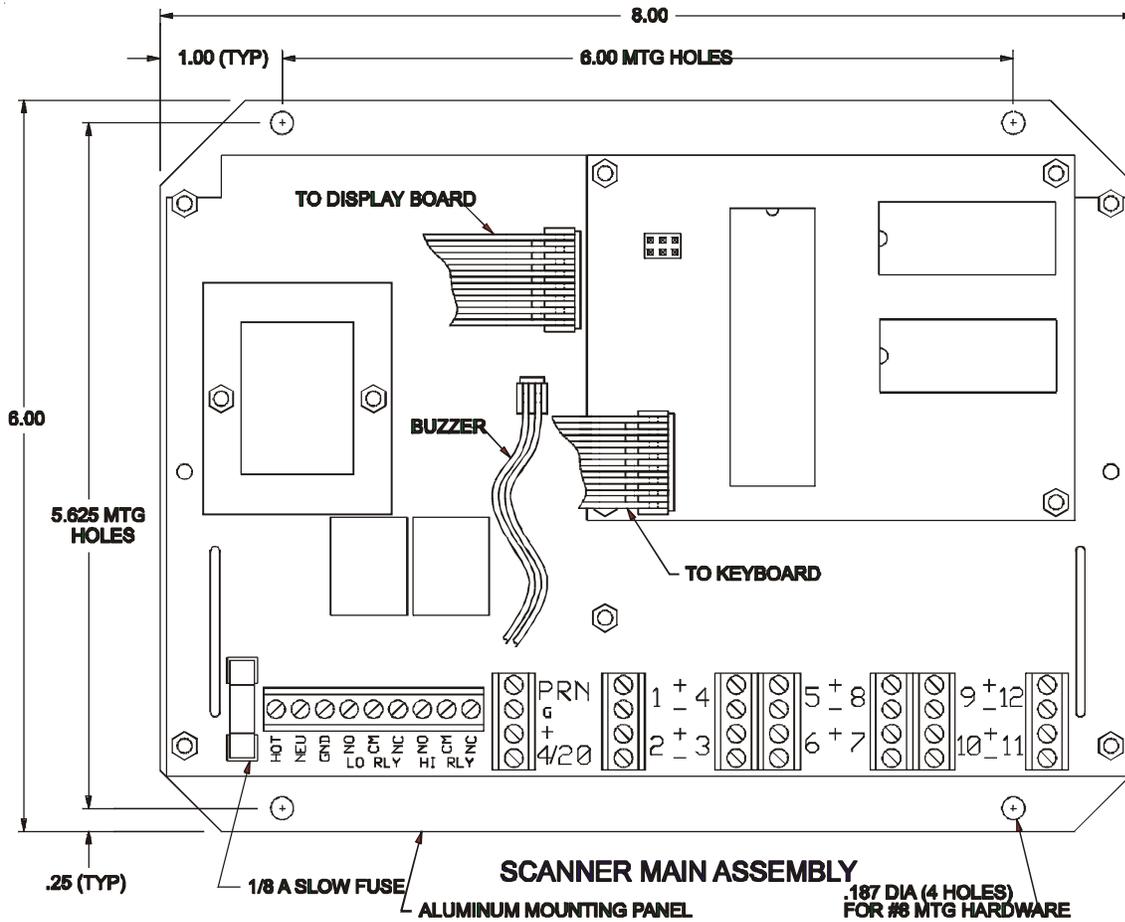
With power turned off to the computer (any IBM compatible using Dos 2.0 or higher), locate a free serial port (connector). Check if the cable connector matches, if not use an adapter, then connect the 9 pin end to the computer. Make sure all the connections are completely engaged. Make sure the computer does not use this "COM" port for a modem or a "mouse" and be sure that DOS can find it.

Turn power ON to both, the computer and the Scanner. Once the computer has "booted" and is displaying the Dos prompt, insert the diskette in the drive. If you do not have a hard drive, or if you wish to collect the data onto the program diskette, enter A:\ then enter T-LogDos or T-Log-Win98-Me or T-Log-Win2000 to start the program. This program will prompt all the information needed. Allow enough disk space for the "LOG" file at the rate of 12KB per 100 scans. If you wish to use a hard drive, then create a directory and copy all the diskette files on to it. The "LOG" file will be created on the active drive and directory. The program disk is not bootable.

Program T-LOG-F.EXE Features:

- A) Automatic data File Naming and Creation
- B) Built-in Viewer for current and last file
- C) Comments Entry and Save while scanning
- D) Custom Location Labels saved in data file
- E) Host computer Date and Time saved in file
- F) Data File Format compatible with Ms Excel
- G) Duplicate file on diskette in drive "A"

MODEL 4506/4512



FIBOX CARDMASTER

FP 21/18 ALU FRONT PLATE
INCLUDED IN 21/18-1 USA ONLY

