TA 2100

Control Module

Operating Guide

HeatChek and TraceView are tradenames of Thermon Manufacturing Company.

TA 2100

Control Module

Index

TA 2100 Control Module

THE TA 2100 MODULE . . .

The TA 2100 is a microprocessor-based temperature control and monitoring module developed specifically for heat tracing. The single circuit module provides heat tracing control, digital information display and alarms for high temperature, low temperature, high current, low current, high ground leakage current and damaged temperature sensor. Minimum and maximum temperatures monitored during a given period are retained for display on demand, independent of temperature alarm setpoints. The TA 2100 module is provided with dual RTD inputs and is suitable for use in either process sensing or in an ambient/process sensing combination. When used for process sensing mode only, each RTD provides independent sensing of the heated surface and as a safety feature, can activate a high temperature alarm shut down of the heater.

In an ambient/process sensing combination mode, the TA 2100 can control the heat tracing circuit based on ambient sensing by the first RTD and can utilize the second RTD to sense the process and alarm in the event of a high temperature condition.

Operating Guide

DATA DISPLAY

The TA 2100 module utilizes a backlit LCD display for reporting temperatures and operating parameters. Separate LED's indicate status of power to the TA 2100, power to the heat tracing circuit and any alarms affecting the system.

ALARM RELAY

The TA 2100 is provided with a normally open, held closed on alarm, solid state alarm relay contact, which is used to turn on a red alarm light on the door.

CONTROL RELAY

When heaters are to be switched with a solid state power relay, the TA 2100 is configured with one DC logic output having a sink current capability of 15 mA.

CURRENT TRANSFORMERS

Each TA 2100 is provided with two current transformers. One current transformer continuously monitors the heater current. The other monitors the ground leakage current present in the heater and associated wiring.

TA 2100 Control Module

The TA 2100 is designed to be an integral part of a HeatChek™ control and monitoring unit. Each unit typically includes one or more TA 2100 modules, two or more current transformers, relays, and terminal blocks for field wiring; all prewired in an electrical enclosure suitable for the environment.

SOLID STATE RELAYS

The TA 2100 module is configured with solid state power relays. The single switch SSR30 relays are zero crossing solid state with a single cycle surge capacity of 600A and a one second overcurrent capacity of 80A. The dual switch SSR15 relay is a zero crossing solid state with a single cycle surge capacity of 500A and a one second overcurrent capacity of 80A. These relays are required when enabling the Power Clamp, Soft Start, and Proportional control features available in the TA 2100. Design current rating limits for these relays are shown in the table below.

Table 1: Current Rating

Amperage Ratings[1]		
Configuration/ Voltage	Max. Energized Operating Temp.	Enclosure Size 14" x 12" x 8" (355 x 305 x 152 mm)
Single Pole[2] 120 or 277	40°F (4°C) 104°F (40°C)	30 amps 19 amps
Double Pole[3] 208 or 240	40°F (4°C) 104°F (40°C)	22 amps 9 amps

[1] The current ratings are based on 40°F (4°C) or 104°F (40°C) outdoor ambients with solar loading. For ratings at different ambient conditions or for ratings in larger enclosure sizes, contact the factory.
[2] The SSR30 is a single switch relay and is suitable for controlling up to 30 amperes per switch.
[3] The SSR15 is a dual switch relay and is suitable for controlling up to 15 amperes per switch. The values given allow for the doubling of the heat generation which occurs in a dual switch type solid state relay.

A HeatChek control and monitoring unit utilizing the TA 2100 module, solid state power relay and a NEMA 4 or 4X enclosure is approved for use in Class I, Division 2 Hazardous (Classified) Locations as well as Ordinary (Non-classified) Locations.

Operating Guide

TA 2100 MODULE SPECIFICATIONS . . .

The TA 2100 module has the general specifications as detailed below:

Control and Monitoring Capacity:	One resistive heat tracing circuit up to 30A per circuit (depending on switch type)
Module Supply Voltage:	110-120 Vac, 208-240 Vac or 277 Vac
Module Power Consumption:	6 watts per TA 2100 module
Module Operating Ambient:	-40°F to +140°F (-40°C to +60°C)
Maximum Storage Ambient:	158°F (70°C)
Data Retention:	Non volatile EEPROM
Power Clamp Function (Solid State Relay Only):	Programmable for power levels from 20% to 100% max.
Input:	Two 3 wire 100 ohms at 32°F (0°C) platinum RTD's
Temperature Range (control):	-40°F to 932°F or -40°C to 500°C with programmable control band in increments of one degree
Control:	On/Off, On/Off with Softstart, Proportional
Module Dimensions:	8-3/4" x 5-1/8" x 2-5/8" (222 mm x 130 mm x 67 mm)
Ground Leakage Alarm/Trip:	30 to 150 mA in 1 mA increments

Self-Test Frequency: Programmable from 2 to 99 hours

TA 2100 Control Module
PROGRAMMING . . .

ACCESSING THE PROGRAM MODE

Press the PROG key to enter the programming mode.

```
PROG
```

The TA 2100 will then display the following message:

```
TC201a PROGRAM MODE
SELECT FUNCTION KEY
```

Then select the desired function key e.g. MAINTAIN TEMP (note that pressing any green key causes the controller to exit the programming mode).

```
MAINTAIN
  TEMP
```

Operating Guide

MAINTAIN TEMPERATURE (PROGRAM MODE)

Pressing the PROG key and then the MAINTAIN TEMP function key allows the maintain
temperature and RTD trip mode to be set. The following is a typical message which might
appear:

```
PROG        MAINTAIN       MAINTAIN TEMP=104°F
            TEMP           NEW VALUE=104°F
```
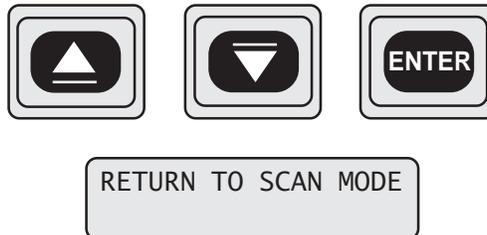
Momentarily pressing the UP or DOWN arrow keys will cause the NEW VALUE to change
by 1 degree increments. Holding the key down results in a 10 degree incremental
change. If an upper or lower limit is reached, a MAX or MIN message will appear on the
second line. This indicates that either the absolute maximum or minimum value has been
reached or that the value has reached another alarm value.

```
▲   ▼          MAINTAIN TEMP=104°F
               NEW VALUE= 40°F
```

Once the desired temperature value is set, press the ENTER key to save the value or
PROG key to retain the old value. The following message will appear:

```
ENTER       RTD FLT TURN CKT ON
            CHANGE? (Y/N)_
```

A "Yes" entry will result in an "Open" relay condition in the event of a RTD sensor failure.
Press the UP arrow key for "Yes" or DOWN arrow key for "No". Then press the ENTER
key to save. A "NO" entry will result in a closed relay condition in the event of a RTD
sensor failure. The controller will then exit the programming mode and return to the Scan
Mode.

```
▲   ▼   ENTER

RETURN TO SCAN MODE
```

9

TA 2100 Control Module
PROGRAMMING . . .

HIGH TEMPERATURE ALARM (PROGRAM MODE)

Pressing the HIGH TEMP ALARM function key results in a display message such as the following:

```
PROGRAM RTD= 1
```
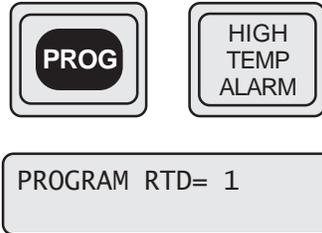
Select the desired RTD by pressing the UP or DOWN arrow keys and pressing the ENTER key.

The following message now appears.

```
HI TEMP ALARM=160˚F
NEW VALUE=160˚F
```

The TA 2100 is set to alarm at 160°F on the current RTD number. Should the control temperature reach 160°F, the red alarm LED on the TA 2100 will begin to flash. In addition, the alarm relay contact will close (depending on configuration, inverse action may occur).

To change the current value, press the UP or DOWN arrow keys to increase or decrease the current HIGH TEMP ALARM setpoint.
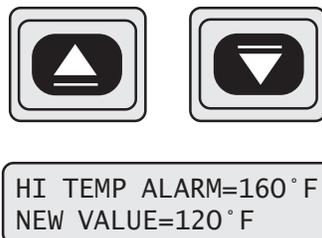
```
HI TEMP ALARM=160˚F
NEW VALUE=120˚F
```

Once the desired temperature value is set, press the ENTER key to save the value. Next, the following typical message will appear:

```
HI TEMP SEEN=200°F
RESET? (Y/N)_
```

At some point since this controller was last reset, the temperature has attained 200°F. Press the UP arrow key and ENTER to clear this value and begin anew at the current value. Pressing ENTER or PROG key results in the current value of 200°F being retained. Subsequently, another message appears as typically shown below:

```
HI TEMP TRIP OFF
CHANGE? (Y/N)_
```

The TA 2100 is currently set to NOT trip the heater circuit if a high temperature alarm condition is reached, but rather to only "flash" the red alarm LED and close the common alarm relay contact (open if configured for inverse operation).

To retain the present mode of HIGH TEMP ALARM operation, press the ENTER or PROG key. Pressing the UP arrow key and ENTER will result in the TA 2100 setting being changed to HIGH TEMP TRIP ON.

Once set in this manner, the heater circuit will trip (open heater relay contacts) should a high temperature alarm condition occur. The TA 2100 will now require that 1) the operator press the ACKNOWLEDGE key, 2) and the high temperature alarm condition be cleared prior to automatic control being restored.

Subsequently, the TA 2100 returns to the Scan Mode.

```
RETURN TO SCAN MODE
```
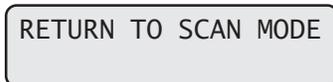
TA 2100 Control Module
PROGRAMMING . . .

LOW TEMPERATURE ALARM (PROGRAM MODE)

Pressing the LOW TEMP ALARM function key in the following display prompt.

[PROG] **[LOW TEMP ALARM]**

```
LOW TEMP ALARM= 50°F
NEW VALUE= 50°F
```

The TA 2100 is set to alarm at 50°F on both RTD's. Should the control temperature drop to 50°F, the red alarm LED on the TA 2100 will begin to flash. In addition, the alarm relay contact will close (depending on configuration, inverse action may occur). To change the present value, press the UP or DOWN arrow keys to increase or decrease the present LOW TEMP ALARM setpoint.

[▲] **[▼]**

```
LOW TEMP ALARM= 50°F
NEW VALUE= 38°F
```

Once the desired temperature value is set, press the ENTER key to save the value. Since the lowest temperature seen is retained for both RTD's, the following display message will appear:

[ENTER]

```
PROGRAM RTD= 1
```

To change the RTD, press the UP arrow key and press ENTER. Otherwise, simply press the ENTER key to continue to the next programmable function. The following display will appear:

[▲] **[ENTER]**

```
LOW TEMP SEEN= 35°F
RESET? (Y/N)_
```

At some point since this controller was last reset, the control temperature has dropped to 35°F. Pressing the ENTER or PROG key results in the present value of 35°F being retained. Press the UP arrow key and ENTER to clear the stored value and begin anew at the current value.

[▲] **[ENTER]**

```
RETURN TO SCAN MODE
```

HEATER CURRENT (PROGRAM MODE)

Pressing the HEATER CURRENT key can yield a number of responses depending on the control method being used.

```
PROG        HEATER
            CURRENT
```

ON/OFF CONTROL

When the TA 2100 is operating in the ON-OFF control mode, the TA 2100 indicates no power clamping is available and the heater will operate at full power whenever it is energized.

```
CONTROL= ON/OFF
NO CLAMPING
```
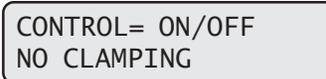
SOFT-START CONTROL

When operated in the SOFT-START control mode, the TA 2100 displays the following information.

```
POWER AT M.TEMP=100%
NEW VALUE=100% MAX
```
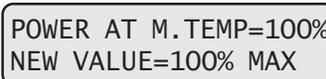
In this case, the TA 2100 is set to allow full power to the heater at the maintain temperature (after the 3.5 minute soft-start ramp up).

To change the setting, press the DOWN arrow key. The TA 2100 has now been adjusted to clamp the heater to a maximum power level of 70%.

```
▼          POWER AT M.TEMP=100%
            NEW VALUE= 70%
```

Press the ENTER key to set the new value and return to Scan Mode.

```
ENTER       RETURN TO SCAN MODE
```
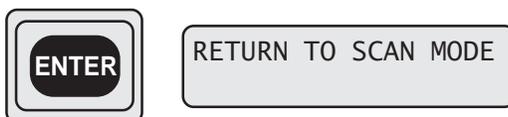
TA 2100 Control Module
PROGRAMMING . . .

HEATER CURRENT (PROGRAM MODE) continued...

PROPORTIONAL CONTROL MODE

When operated in the PROPORTIONAL control mode, the TA 2100 displays the following information.

```
POWER AT M.TEMP= 70%
NEW VALUE= 70%
```

In this case, the TA 2100 is set to allow only 70% of the full heater power at the maintain temperature. The power will linearly reduce (using cycle omission techniques) once the temperature climbs above the maintain temperature. This power reduction can reduce to as low as 20% at the maintain temperature setpoint plus control band. In most tracing operating conditions, the power turn down will be such that the controller attains an equilibrium controlled operation within the control band. If equilibrium is not reached, and the temperatures climb above the maintain temperature plus control band, the heater will turn off. Once temperatures drop below the maintain temperature setpoint plus control band, power will begin to ramp back up and will return to the power clamp percentage at the maintain temperature. Should the temperature fall below the maintain temperature and the power clamp percentage is less than 100%, power will continue to ramp up at the same linear rate until 100% power is attained.

Press the UP or DOWN arrow key to change the current value.
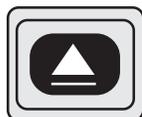
```
POWER AT M.TEMP= 70%
NEW VALUE= 90%
```

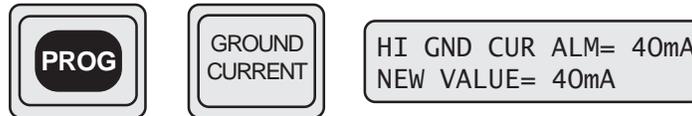Press the ENTER key to set the new value and return to Scan Mode.

```
RETURN TO SCAN MODE
```

GROUND CURRENT (PROGRAM MODE)

Pressing the GROUND CURRENT function key results in a display message such as the following:

PROG   GROUND CURRENT

```
HI GND CUR ALM= 40mA
NEW VALUE= 40mA
```

The TA 2100 is set to alarm at a heater and associated wiring ground leakage current of 40mA. Should the ground leakage value reach 40mA, the red alarm LED on the TA 2100 will begin to flash. In addition, the alarm relay contact will close (depending on configuration, inverse action may occur).

To change the value, press the UP or DOWN arrow keys to increase or decrease the HI GND CUR ALM setpoint.

▲   ▼

```
HI GND CUR ALM= 40mA
NEW VALUE= 30mA
```

Once the desired new value is set, press the ENTER key to save the value. Subsequently, another message appears as typically shown below:

ENTER

```
HI GND CUR TRIP OFF
CHANGE? (Y/N)_
```
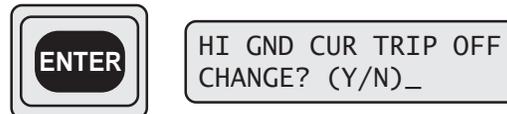
The TA 2100 is currently set to NOT trip the heater circuit if a high ground leakage condition occurs, but rather will only "flash" the red alarm LED and close the common alarm relay contact (open in inverse operation).

To retain the present mode of HI GND CUR TRIP operation, press the ENTER or PROG key. Pressing the UP arrow key and ENTER will result in the TA 2100 setting being changed to HI GND CUR TRIP ON. Subsequently, the TA 2100 returns to the Scan Mode.

▲   **ENTER**

```
RETURN TO SCAN MODE
```

TA 2100 Control Module
PROGRAMMING . . .

HIGH CURRENT ALARM (PROGRAM MODE)

Pressing the HIGH CURRENT ALARM function key results in a display message such as the following:

```
PROG        HIGH          HI CUR ALARM= 20.0A
            CURRENT       NEW VALUE= 20.0A
            ALARM
```
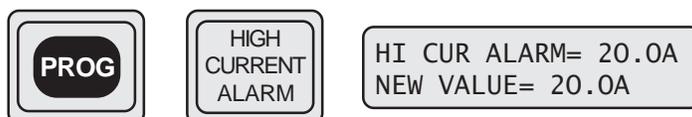
The TA 2100 is set to alarm at heater current levels above 20 Amperes. Should the heater current reach 20A, the red alarm LED on the TA 2100 will begin to flash. In addition, the alarm relay contact will close (depending on configuration, inverse action may occur).

To change the value, press the UP or DOWN arrow keys to increase or decrease the HIGH CURRENT ALARM setpoint.

```
▲      ▼        HI CUR ALARM= 20.0A
                NEW VALUE= 25.0A
```

Once the desired new value is set, press the ENTER key to save the value. Subsequently, another message appears as typically shown below:

```
ENTER        HI CURRENT TRIP OFF
             CHANGE? (Y/N)_
```

The TA 2100 is currently set to NOT trip the heater circuit if a high heater current alarm condition occurs, but rather will only "flash" the red alarm LED and close the common alarm relay contact. To retain the present mode of HIGH CURRENT ALARM operation, press the ENTER or PROG key. Pressing the UP arrow key and ENTER will result in the TA 2100 setting being changed to HI CURRENT TRIP ON. Subsequently, the TA 2100 returns to the Scan Mode.

```
▲      ENTER        RETURN TO SCAN MODE
```

Once set in this manner, the heater circuit will trip (open heater relay contacts) should a high heater current alarm condition occur. The TA 2100 will now require that the operator 1) press the ACKNOWLEDGE key, 2) and the high current alarm condition be cleared prior to automatic control being restored.

LOW CURRENT ALARM (PROGRAM MODE)

Pressing the LOW CURRENT ALARM function key results in a display message such as the following:

```
PROG
```
```
LOW
CURRENT
ALARM
```
```
LOW CUR ALARM= 1.0A
NEW VALUE= 1.0A
```
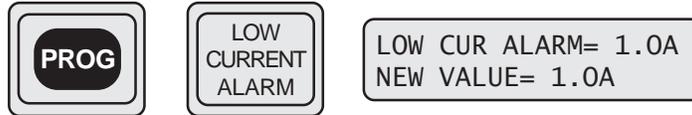
The TA 2100 is set to alarm at heater current levels below 1 Ampere. Should the heater current drop to 1A, the red alarm LED on the TA 2100 will begin to flash. In addition, the alarm relay contact will close (depending on configuration, inverse action may occur).

```
△
```
```
▽
```
```
LOW CUR ALARM= 1.0A
NEW VALUE= 2.0A
```

Once the desired new value is set, press the ENTER key to save the value. Subsequently, the TA 2100 returns to the Scan Mode.
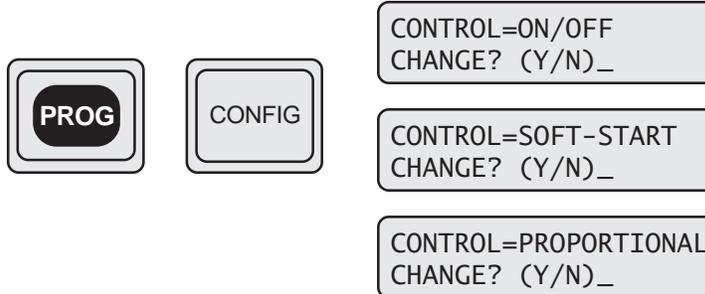
```
ENTER
```
```
RETURN TO SCAN MODE
```

TA 2100 Control Module
PROGRAMMING . . .

<u>CONFIG (PROGRAM MODE)</u>

Pressing the CONFIG key results in one of the following display prompts below:

```
CONTROL=ON/OFF
CHANGE? (Y/N)_
```

```
PROG        CONFIG
```

```
CONTROL=SOFT-START
CHANGE? (Y/N)_
```

```
CONTROL=PROPORTIONAL
CHANGE? (Y/N)_
```

<u>SOFT-START CONTROL MODE</u>

The TA 2100 is currently programmed to turn on the heater at the maintain temperature setpoint. In this control mode the TA 2100 on "turn on" will ramp up to the specified power clamp percentage at the maintain temperature (using cycle ommission techniques) over a span of 3.5 minutes. Upon reaching the maintain temperature setpoint plus control band, the heater circuit will then turn off. This ramp up feature is designed to specifically address a) cold start power surges associated with self-regulating and power limiting heaters, and b) reduce overshoot which may sometimes be present when utilizing high output heaters in low heat loss applications.

<u>ON/OFF CONTROL MODE</u>

The TA 2100 is currently programmed to turn on the heater at the maintain temperature setpoint. Upon reaching the maintain temperature setpoint plus control band, the heater circuit will then turn off.

<u>PROPORTIONAL CONTROL MODE</u>

The TA 2100 is currently programmed to power the heater circuit to the power clamp percentage at the maintain temperature setpoint. The power will linearly reduce (using cycle ommission techniques) once the temperature climbs above the maintain temperature. This power reduction can reduce to as low as 20% at the maintain temperature setpoint plus control band. In most tracing operating conditions, the power turn down will be such that the controller attains an equilibrium controlled operation within the control band. If equilibrium is not reached, and the temperatures climb above the maintain temperature plus control band, the heater will turn off. Once temperatures drop below the maintain temperature setpoint plus control band, power will begin to ramp back up and will return to the power clamp percentage at the maintain temperature. Should the temperature fall below the maintain temperature and the power clamp percentage is set to a value less than 100%, power will continue to ramp up at the same linear rate until 100% power is attained.

18

To change control method, press the UP arrow key and press ENTER. Otherwise, simply press the ENTER key to continue to the next programmable function.

Once having set the control mode of operation, the TA 2100 prompts for a selection of the alarm relay action most appropriate.

```
ALRM SSR NORM OPEN
CHANGE? (Y/N)_
```

Press the UP or DOWN arrow keys and then the ENTER key to change the alarm relay action setting. If no change is desired, simply press the ENTER key to proceed to the next programmable function.

The TA 2100 next prompts for the selection of the self-test time interval.

```
AUTO SELF TEST=OFF
NEW VALUE=OFF
```

To activate the SELF TEST option, press the UP arrow key until the desired time interval is reached and then press the ENTER key. To retain the present setting, simply press the ENTER key and the TA 2100 will exit the programming mode.

```
RETURN TO SCAN MODE
```

During a self test, the TA 2100 will perform a power/continuity check by turning the heater circuit on and off and will alarm if a current of less than 300 mA difference is detected during the on-off cycle. In addition, the TA 2100 will alarm should high ground leakage and low heater current conditions occur during the ON period.

19

TA 2100 Control Module
PROGRAMMING . . .

CONTROL BAND (PROGRAM MODE)

Pressing the CONTROL BAND key results in the following display prompt.

```
CONTROL BAND=   3˚F
NEW VALUE=   3˚F
```

[PROG] [CONTROL BAND]
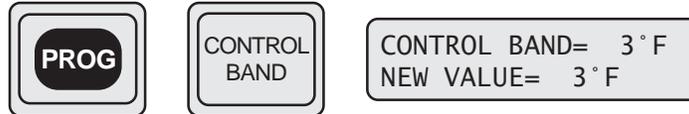
ON/OFF OR SOFT-START CONTROL MODE

The TA 2100 is currently programmed to turn on the heater at the maintain temperature setpoint and will turn off when sensing a temperature 3°F above this value.

PROPORTIONAL

The TA 2100 is currently programmed to operate the heater at the programmed power clamp percentage at the maintain temperature. The power is currently set to reduce from the power clamp percentage at the maintain temperature to 20% at 3˚F above and then to turn off. As an example, if the power at the maintenance temperature is set at 100% and that heater delivers 10 watt/ft, the ramp down of power will be:

$$\text{Ramp Down} = (10\text{-}0) \text{ watt/ft/3˚F}$$
$$= 3.33 \text{ watt/ft-˚F}$$

The ramp down will cease once power drops to 20% and the power level will hold at this level. Once the temperature climbs 3˚F above the maintain temperature, the heater will turn off.

In the event that temperatures drop below the maintain temperature, the power will ramp up to 100% power at the same ramp rate.

To retain the present control band setting, press the ENTER or PROG key. Press the UP or DOWN arrow key to increase or decrease the controlband and press ENTER to save the new value.

[▲] [▼] [ENTER]

Subsequently, the following message will appear:

```
ALARM BAND= 5°F
NEW VALUE=  5°F
```

The TA 2100 is programmed to start preventing a temperature alarm condition at the high alarm condition less the alarm band or above low temperature alarm setpoint plus the alarm band. To retain the present alarm band setting, press the PROG key. Press the UP or DOWN arrow key to increase or decrease the alarm band and press ENTER to save the new value.

Subsequently, the TA 2100 returns to the Scan Mode.

```
RETURN TO SCAN MODE
```

HEATER ENABLE (PROGRAM MODE)

Pressing the HEATER ENABLE key results in the following display prompt:

```
HEATER ENABLED
CHANGE? (Y/N)_
```

This heater circuit is currently enabled and the TA 2100 wil both monitor and control the heater output.

To retain the present heater status, press the ENTER or PROG key. Press the UP arrow key to disable the heater circuit and press ENTER to confirm the change. The heater is now disabled and will not turn on. Any alarms will be cleared. The controller is now in a monitor only mode of operation and will only alarm. Subsequently the TA 2100 returns to the Scan Mode.

```
RETURN TO SCAN MODE
```

TA 2100 Control Module
PROGRAMMING . . .

SECURITY (PROGRAM MODE)

Once the TA 2100 is fully programmed, it is possible to restrict access to further programming of the unit by disabling the program mode. In order to secure the programmed settings from further change, press the PROG key and then the ALARM ACK key.
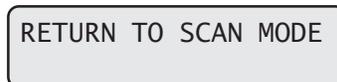
```
┌────────┐   ┌────────┐
│  PROG  │   │ ALARM  │
│        │   │  ACK   │
└────────┘   └────────┘
```

The following display message will appear.

```
┌─────────────────────┐
│ SECURITY OFF        │
│ CHANGE? (Y/N)_      │
└─────────────────────┘
```

In order to restrict programming access, press the UP arrow key and ENTER key.

```
┌────────┐   ┌────────┐
│   ▲    │   │ ENTER  │
│        │   │        │
└────────┘   └────────┘
```

Subsequently the TA 2100 returns to the Scan Mode.

```
┌─────────────────────┐
│ RETURN TO SCAN MODE │
│                     │
└─────────────────────┘
```

Pressing the PROG key now yields the following display:

```
┌─────────────────────┐
│ SECURITY ON         │
│                     │
└─────────────────────┘
```
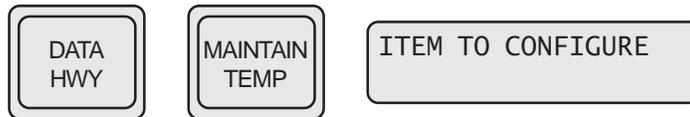
Press the ALARM ACK, UP arrow, and ENTER keys sequentially to revert back to unrestricted programming access or simply press ENTER to leave the "SECURITY ON" and return to Scan Mode.
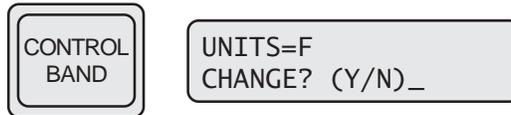
CONFIGURE FAHRENHEIT/CELSIUS TEMPERATURE SCALES

To enter the configure mode press the DATA HWY key and then press and hold the MAINTAIN TEMP key until the TA 2100 displays the following screen.

```
┌──────────┐  ┌──────────┐   ┌─────────────────────────┐
│  DATA    │  │ MAINTAIN │   │  ITEM TO CONFIGURE      │
│  HWY     │  │  TEMP    │   │                         │
└──────────┘  └──────────┘   └─────────────────────────┘
```

Then select the CONTROL BAND key. The following display message will appear.

```
┌──────────┐   ┌─────────────────────────┐
│ CONTROL  │   │  UNITS=F                │
│  BAND    │   │  CHANGE? (Y/N)_         │
└──────────┘   └─────────────────────────┘
```

To retain the present temperature scale, press the ENTER or PROG key. Press the UP arrow key to change and press ENTER to confirm the change. Subsequently the TA 2100 displays the following screen before returning to scan mode.

```
┌──────────┐   ┌──────────┐   ┌─────────────────────────┐
│   ▲      │   │  ENTER   │   │  VRS 2x3-6-7            │
│          │   │          │   │                         │
└──────────┘   └──────────┘   └─────────────────────────┘
```

23

TA 2100 Control Module
THE TA 2100 IN OPERATION . . .

POWER UP (SCAN MODE)

On power up, the TA 2100 will display the following two start-up screen messages.

```
      THERMON
COPYRIGHT 1994, 1996
```

Subsequently, a message indicating that a power loss occurred is given as typically shown.

```
RTD 2 TEMP=120°F
POWER OFF 4 MIN AGO
```

This message will automatically clear after 30 minutes or can be manually cleared by pressing the ALARM ACK key. Then the TA 2100 will go into Scan Mode.

```
ALARM
 ACK
```

After the power loss message has been cleared, the TA 2100 will sequentially display the temperature reading along with the maintain temperature, heater status, and alarm status.

```
RTD 1 TEMP=121°F
MAINT TEMP=120°F
```

```
RTD 1 TEMP=121°F
HEATER ON
```

```
RTD 1 TEMP=121°F
NO ALARMS
```

```
RTD 2 TEMP=123°F
MAINT TEMP=120°F
```

```
RTD 2 TEMP=123°F
HEATER ON
```

```
RTD 2 TEMP=123°F
NO ALARMS
```

Operating Guide

If alarms occur, the order in which they are displayed in the scan mode is as follows:

```
RTD 1 TEMP=121°F
MAINT TEMP=120°F
```
Skips if there is an
Alarm to Acknowledge

```
RTD 1 TEMP=121°F
HEATER ON
```
Only if in Alarm

```
RTD 1 TEMP= -----
RTD FAULT ALARM
```
Only if in Alarm

```
RTD 1 TEMP=121°F
LO TEMP ALARM
```
Only if in Alarm

```
RTD 1 TEMP=121°F
HI TEMP ALARM
```
Only if in Alarm

```
RTD 1 TEMP=121°F
POWER OFF 15 MIN AGO
```
Only if in Alarm

```
RTD 1 TEMP=121°F
HI CURRENT ALARM
```
Only if in Alarm

```
RTD 1 TEMP=121°F
HI GND CUR ALARM
```
Only if in Alarm

```
RTD 1 TEMP=121°F
LO CURRENT ALARM
```
Only if in Alarm

```
RTD 1 TEMP=121°F
CKT FAULT ALARM
```
Only if in Alarm

TA 2100 Control Module

POWER UP (SCAN MODE) continued...

Subsequently the Status Report for RTD #2 then follows.

```
RTD 2 TEMP=123°F
MAINT TEMP=120°F
```
Skips if there is an
Alarm to Acknowledge

```
RTD 2 TEMP=123°F
HEATER ON
```
Only if in Alarm

```
RTD 2 TEMP= -----
RTD FAULT ALARM
```
Only if in Alarm

```
RTD 2 TEMP=123°F
LO TEMP ALARM
```
Only if in Alarm

```
RTD 2 TEMP=123°F
HI TEMP ALARM
```
Only if in Alarm

```
RTD 2 TEMP=123°F
POWER OFF 15 MIN AGO
```
Only if in Alarm

```
RTD 2 TEMP=123°F
HI CURRENT ALARM
```
Only if in Alarm

```
RTD 2 TEMP=123°F
HI GND CUR ALARM
```
Only if in Alarm

```
RTD 2 TEMP=123°F
LO CURRENT ALARM
```
Only if in Alarm

```
RTD 2 TEMP=123°F
CKT FAULT ALARM
```
Only if in Alarm

26

WHEN IN ALARM (SCAN MODE)

Un-Acknowledged Alarms

When an alarm condition occurs, the ALARM ON indicator will begin to flash, the alarm relay will close (open in inverse operation), and the module display will indicate the alarm condition.

Acknowledged Alarms

To acknowledge an alarm condition, press the ALARM ACK key when the alarm message is displayed (if the alarm message is not currently on the display, pressing the ALARM ACK key will activate the first alarm message). Acknowledged alarms are indicated by the suffix "ACK" appearing when the alarm condition is displayed. Acknowledged alarms will continue to be displayed alternating with the other Main Operation displays until the alarm condition clears. When all alarms have been acknowledged then the alarm light on the controller will cease flashing but will stay ON until all alarm conditions have cleared.

Manual Reset

If a TRIP option has been set on a circuit, then all alarms for that circuit must be acknowledged before they will clear. When TRIP has been triggered, the alarm for that trip must be acknowledged and the alarm condition must clear before automatic control is restored.
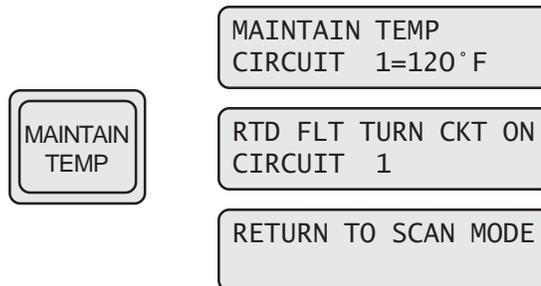
Automatic Reset

When no TRIP options have been set, the alarms will automatically clear when the alarm condition has cleared.

TA 2100 Control Module
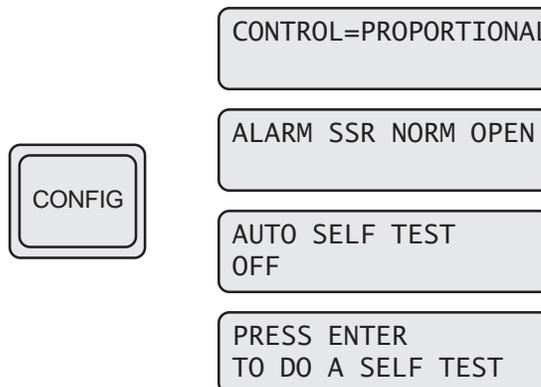
ACCESSING DATA (DISPLAY MODE)

Press the MAINTAIN TEMP key to display the Maintain Temperature and the
programmed mode of heater operation in the event of an RTD fault.

```
MAINTAIN TEMP
CIRCUIT  1=120°F
```

MAINTAIN
TEMP

```
RTD FLT TURN CKT ON
CIRCUIT  1
```

```
RETURN TO SCAN MODE
```

Press the HEATER CURRENT key to display the heater amperage as typically shown.

HEATER
CURRENT

```
HEATER CURRENT
CIRCUIT  1 =  0.1A
```

```
RETURN TO SCAN MODE
```
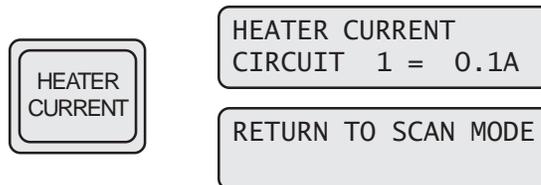
Press the CONFIG key to display the control method, alarm relay action, and the self test
settings of all enabled circuits. A typical display sequence is shown.

```
CONTROL=PROPORTIONAL
```

```
ALARM SSR NORM OPEN
```

CONFIG

```
AUTO SELF TEST
OFF
```

```
PRESS ENTER
TO DO A SELF TEST
```

28

Pressing the ENTER key at this point will result in a SELF TEST being performed. Otherwise the TA 2100 will automatically return to Scan Mode.

```
RETURN TO SCAN MODE
```

Press the CONTROL BAND key to display the control band settings as typically shown.

```
CONTROL BAND
CIRCUIT  1 =  3˚F
```

```
CONTROL
BAND
```

```
ALARM BAND
CIRCUIT  1 =  5˚F
```

```
RETURN TO SCAN MODE
```

Press the GROUND CURRENT key to display ground leakage current from heater and associated wiring as well as the ground leakage alarm setting and the alarm trip setting as typically shown.

```
GROUND CURRENT
CIRCUIT  1 = 15mA
```

```
GROUND
CURRENT
```

```
HI GND CUR ALARM
CIRCUIT  1 = 30mA
```
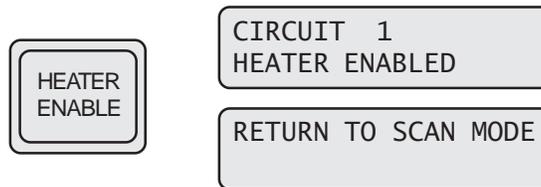
```
HI GND CUR TRIP OFF
CIRCUIT  1
```
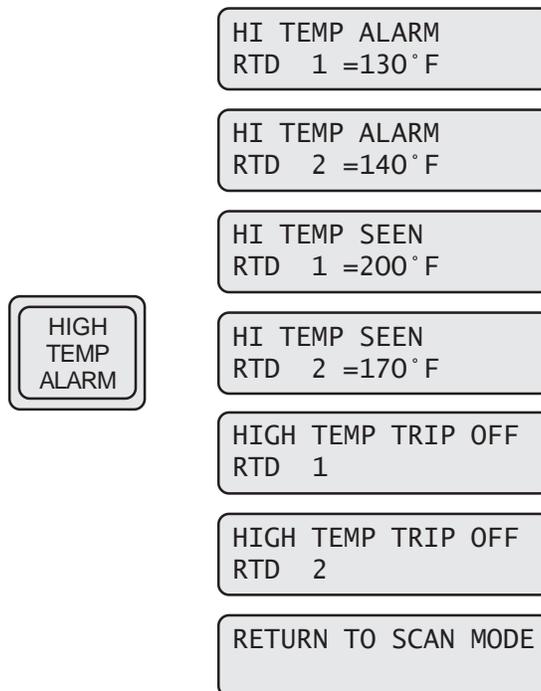
```
RETURN TO SCAN MODE
```

TA 2100 Control Module

ACCESSING DATA (DISPLAY MODE) continued...

Press the HEATER ENABLE key to display the heater operating status. The heater status can be enabled, disabled, or tripped.

```
HEATER
ENABLE
```

```
CIRCUIT  1
HEATER ENABLED
```

```
RETURN TO SCAN MODE
```

Press the HIGH TEMP ALARM key to display the high temperature alarm setpoint, the highest temperature seen, and the high temperature alarm trip setting as typically shown.

```
HI TEMP ALARM
RTD  1 =130°F
```

```
HI TEMP ALARM
RTD  2 =140°F
```

```
HI TEMP SEEN
RTD  1 =200°F
```

```
HIGH
TEMP
ALARM
```

```
HI TEMP SEEN
RTD  2 =170°F
```

```
HIGH TEMP TRIP OFF
RTD  1
```

```
HIGH TEMP TRIP OFF
RTD  2
```
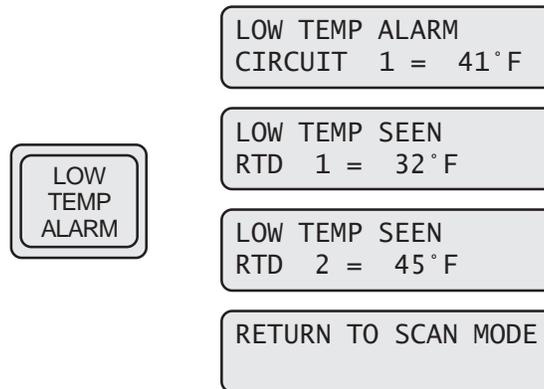
```
RETURN TO SCAN MODE
```

30

Operating Guide

Press the HIGH CURRENT ALARM key to display the high heater current alarm setpoint and the high current alarm trip setting as typically shown.

```
HI CUR ALARM
CIRCUIT  1 = 20.0A
```

HIGH CURRENT ALARM

```
HI CURRENT TRIP OFF
CIRCUIT  1
```

```
RETURN TO SCAN MODE
```
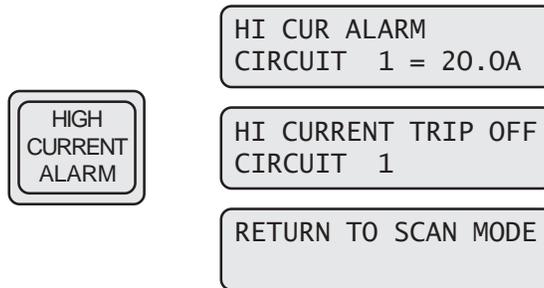
Press the LOW TEMP ALARM key to display the low temperature alarm setpoint and lowest temperature seen as typically shown.

```
LOW TEMP ALARM
CIRCUIT  1 =  41°F
```

LOW TEMP ALARM

```
LOW TEMP SEEN
RTD  1 =  32°F
```

```
LOW TEMP SEEN
RTD  2 =  45°F
```

```
RETURN TO SCAN MODE
```

Press the LOW CURRENT ALARM key to display the low heater current alarm setpoint as typically shown.

LOW CURRENT ALARM

```
LOW CUR ALARM
CIRCUIT  1 =  1.0A
```

```
RETURN TO SCAN MODE
```
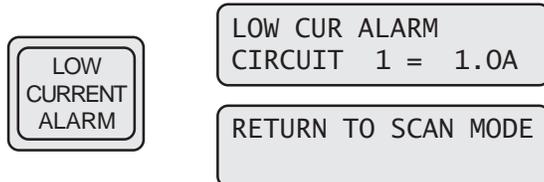
TA 2100 Control Module

UNDERSTANDING ALARM CONDITIONS . . .

When temperature related alarm conditions do occur, the below information may be useful in establishing the cause and appropriate action.

POWER OFF

Cause: Loss of voltage to unit
Controller Action
Taken: None
Reset Procedure: Power off message will clear itself after 30 minutes or can be
                    manually cleared with the ALARM ACK key

HIGH TEMPERATURE (HI TEMP)

Low Limit: Maintain temperature plus controlband value
High Limit: 932°F or 500°C
Range: -40°F to 932°F or -40°C to 500°C
Cause: Sensed temperature exceeds programmed
                    high temperature alarm setpoint
Controller Action
Taken: Alarm Only or Alarm and Trip Heater (if trip is set)

LOW TEMPERATURE (LOW TEMP)

Low Limit: -40°F or -40°C
High Limit: Maintain temperature value or minimum ambient when used in
                    ambient sensing mode
Range: -40°F to 932°F or -40°C to 500°C
Cause: Sensed temperature is below programmed
                    low temperature alarm setpoint
Controller Action
Taken: Alarm Only

RTD FAULT

Cause: RTD resistance not in the 86.27 to 280.75 ohms range
Controller Action
Taken: Alarm and Heater is Energized or Alarm and
                    Heater is Tripped (if trip is set)

Operating Guide

HIGH CURRENT (HI CUR)

Low Limit:	Low current alarm value
High Limit:	30.0A
Range:	30A plus
Cause:	Heater current is more than high current alarm value
Controller Action Taken:	Alarm Only or Alarm and Trip Heater (if trip is set)

LOW CURRENT (LOW CUR)

Low Limit:	0.0A
High Limit:	High current alarm value
Range:	30A plus
Cause:	Heater current is less than low current alarm value
Controller Action Taken:	Alarm Only

HIGH GROUND CURRENT (HI GND CUR)

Low Limit:	20mA
High Limit:	150mA
Range:	20 to 150mA
Cause:	An excessive heater/wiring leakage current is present
Controller Action Taken:	Alarm Only or Alarm and Trip Heater (if trip is set)

CIRCUIT FAULT (CKT FAULT)

Checks For:	Damaged relay
Cause:	Relay locked open or closed
Controller Action Taken:	Alarm Only

TA 2100 Control Module

TYPICAL CONTROL APPLICATIONS . . .

The TA 2100 has two RTD sensors and may be used to sense two separate locations on the heated surface (or ambient). The value of temperature read by RTD 1 and RTD 2 and the programmed alarm settings determine the control action taken by the TA 2100. The below describes the control strategy which the TA 2100 employs in response to the sensors.

> NORMAL CONTROL - When either RTD 1 or RTD 2 senses a temperature below the maintain temperature, the heat tracing circuit will energize. When both RTD 1 and RTD 2 temperatures climb above the maintain temperature plus control band, the circuit de-energizes.

> SINGLE RTD IN HIGH TEMPERATURE ALARM - If either RTD 1 or RTD 2 senses a temperature which falls within its respective alarm control band, the RTD in alarm automatically assumes control.

> BOTH RTD 1 AND RTD 2 IN HIGH TEMPERATURE ALARM - Should both RTD 1 and RTD 2 sense a temperature that falls in or exceeds the respective programmed alarm control band range, the heat tracing circuit control is dictated by the value read by RTD 1.

> RTD IN HIGH TEMPERATURE ALARM/TRIP - When either RTD senses a temperature which requires a trip function to be implemented, control will automatically divert to that RTD and hence allow the trip to have priority.

> RTD SENSOR FAULT - In the event of a sensor fault on either RTD 1 or RTD 2 and the programming of "RTD FLT TURN OFF", the heat tracing circuit will turn off (trip). If the "RTD Sensor Fault" is programmed such that the "RTD FLT TURN ON" option is selected, the heat tracing circuit will turn on unless one of the afore mentioned events dictate otherwise.

Operating Guide

HELP . . .

This HeatChek control and monitoring unit is intended to be used with only the support of this instruction booklet. If special support needs do arise, Thermon provides local support through its area representatives and affiliate companies as well as through a toll free user support line.

For toll free support dial 1-800-820-HEAT(4328).