TRACER 1

Installation and Operating Manual For Industrial Digital Heat Trace Controller Software Revision 0.18/1.00 (& Higher) Hardware revision A and B

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UL 60730-2-9 STANDARD FOR AUTOMATIC ELECTRICAL CONTROLS - PART 2-9: PARTICULAR REQUIREMENTS FOR TEMPERATURE SENSING CONTROLS- Edition 4 - Issue Date 2017/02/14

This standard is applicable to automatic electrical temperature sensing controls forming part of a building automation control system within the scope of ISO 16484. This standard also applies to automatic electrical temperature sensing controls for equipment that may be used by the public, such as equipment intended to be used in shops, offices, hospitals, and commercial and industrial applications. This component complies with UL requirements.

THERMOSTAT
E508882

PENDING

Controller Part Number Series: 7300-13002-XX
Document Part Number: 7200-00002-00
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1. Safety Precautions

Your safety and the safety of others are very important.

This Section of the Manual was developed for general education purposes only and is not intended to replace an electrical safety-training program or to serve as a sole source of reference. The information herein is also not intended to serve as recommendations or advice for specific situations. It is the responsibility of the user to comply with all applicable safety standards, including the requirements of the U.S. Occupational Safety and Health Administration (OSHA), the National Fire Protection Association (NFPA), and other appropriate governmental and industry accepted guidelines, codes, and standards.

We have provided many important safety messages in this manual and on your appliance. Always read and obey all safety messages.

⚠️	This is the safety alert symbol. This symbol alerts you to potential hazards that can kill or hurt you and others. All safety messages will follow the safety alert symbol and either the word "DANGER" or "WARNING." These words mean: C'est le symbole d'alerte de sécurité. Ce symbole vous avertit des dangers potentiels qui peuvent vous tuer ou blesser, ainsi que d'autres personnes. Tous les messages de sécurité suivront le symbole d'alerte de sécurité et le mot «DANGER» ou «AVERTISSEMENT». Ces mots signifient:
⚠️ DANGER	You can be killed or seriously injured if you don't immediately follow instructions. Vous pouvez être tué ou gravement blessé si vous ne suivez pas immédiatement les instructions.
⚠️ WARNING	You can be killed or seriously injured if you don't follow instructions. Vous pouvez être tué ou gravement blessé si vous ne suivez pas les instructions.
⚠️ WARNING	The system designer is responsible for the safety of this equipment and should install adequate back-up controls and safety devices with their electric heating equipment. Where the consequences of failure could result in personal injury or property damage, back-up controls are essential. Le concepteur du système est responsable de la sécurité de cet équipement et doit installer des commandes de secours adéquates et des dispositifs de sécurité avec son équipement de chauffage électrique. Lorsque les conséquences d'une défaillance peuvent entraîner des blessures corporelles ou des dommages matériels, des contrôles de sauvegarde sont essentiels.
⚠️ DANGER	ELECTRIC SHOCK HAZARD. Disconnect all power before installing or servicing heater. Failure to do so could result in personal injury or property damage. Heater must be installed by a qualified person in accordance with the National Electrical Code, NFPA 70. RISQUE D'ÉLECTROCUTION. Coupez l'alimentation électrique avant d'installer ou d'entretenir le radiateur. Ne pas le faire pourrait entraîner des blessures corporelles ou des dommages matériels. Le radiateur doit être installé par une personne qualifiée conformément au National Electrical Code, NFPA 70.

2. Product Overview

The *TRACER 1* digital thermostat is a microprocessor-based temperature control and power connection kit. It is used for freeze protection or process temperature maintenance of pipes or tanks protected by heat tracing products.

This thermostat can be used with Constant Wattage, Mineral Insulated or Self-Regulating heating cables.

This unit is designed to provide local temperature control and monitoring for heat traced pipes or tanks across a variety of industries and applications and will switch 30 amperes of current.

The *TRACER 1* provides easy programming of the temperature set point, Ground Fault Equipment Protection (GFEP) set points, high and low temperature alarms, high and low current alarms, hysteresis, temperature units, Real Time Clock Calendar (RTCC), Timer Scheduled functions and the alarm state through the front panel push buttons. LED lights are provided for indication of power to the unit, heater power on (load) and alarm status, set point display or actual temperature display. Measured values are displayed through a simple user interface.

Two Fail-Safe solid-state alarm relays are included for wiring to your building management system to indicate alarm status. The normal condition of the two form C relays can be individually configured to be normally energized or normally de-energized. When set to normally energized, the relay will serve as a power failure relay. The programmable alarms include high and low temperature, high and low load current, GFEP pre-alarm, GFEP fault alarm, and sensor failures. Limits are programmable, and each error can be mapped to either single relay, both relays, or no relay.

The minimum operating ambient temperature is -40°F. This unit has programmable high and low temperature alarm set points from -80°F to 999°F (-62°C to 537°C).

The *TRACER 1 is* enclosed in an IP66, NEMA 4X FG enclosure measuring 6.9" x 6.9" x 3.9". The TRACER 1 enclosure is made from Polycarbonate rated (f1) Suitable for outdoor use with respect to exposure to Ultraviolet light, Water Exposure and Immersion in accordance with UL 746C.

3. Technical Specifications

Input:

Sensor	3-wire RTD, 100 W PT, 0.00385 W/W/˚C 12-24AWG wire.
Number of sensors	1 or 2
Sensor Configuration	Probe 1, Probe 2, Average, Low, High, Ambient
DIP Switch S1-1	Change display mode
DIP Switch S1-2	Enable or disable PROGRAM key (lockout mode)
DIP Switch S1-3	Display or hide RTCC Timer parameters
DIP Switch S1-4	Not used
User Interface-Five Tactile Switches	MENU, ENTER, UP, DOWN, PROGRAM
Line Voltage	100 to 277VAC 50/60Hz
Fuse	CERAMIC 1A 500VAC 400VDC *UL E10480* P/N 6200-00003-01

Output

User Interface	4 x 7 segment Red display .56"
Normal Mode Display Toggles:	Setpoint/Actual
RTCC	Real Time Clock Calendar for Auto-Schedule
Power Switching	Mechanical Relays Switch One or Both Sides of Line
Number of Circuits	1
Output Rating	30 Amps
Control Types	On/Off
Mechanical Alarm Relays:	
Alarm Relay 1	1.8A, 120 / 240 VAC, 50/60Hz 1.8A, 80 VDC N.O., N.C., and COM
Alarm Relay 2	1.8A, 120 / 240 VAC, 50/60Hz 1.8A, 80 VDC N.O., N.C., and COM
LED's (6)	Set Temp, Act Temp, Alarm, Power, Load, Heartbeat
Audible Alarm	Beeper
USB	Bootloader, Import/Export Parameters with approved USB Memory Stick (See Accessories)
Modbus Communications	RS485 2/4 wire
Operating Ambient	-35°F to 131°F (-35°C to +55°C)
Battery	CR2032
Protection Rating	IEC IP66
Enclosure Rating	NEMA 4X enclosure is made from Polycarbonate rated (f1) Suitable for outdoor use with respect to exposure to Ultraviolet light, Water Exposure and Immersion in accordance with UL746C.

4. Models and Part Numbers

Model Number 7300-13002-XX, where XX can be any number designating custom customer configuration.

Part Number	Model Number	Overlay	Customer Options
7300-13002-01	TBA	Standard	None
7300-13002-02	TBA	Custom	Custom parameters

5. Pre-Check

In the box, you should have the following items:

- Operating Manual
- TRACER 1 control box

Before proceeding, please verify the items, and verify that the proper unit has been purchased and received.

Once the installation has begun, the TRACER 1 is not returnable other than for items covered under warranty which include defects in material and workmanship.

Once these items have been verified continue with installation. Remember to inspect the **TRACER 1** installation as follows:

These precautions must be adhered to when the product is installed as well as before every season or on an annual basis, whichever is shortest.

All service must be performed by experienced professionals.

Check wiring and connections as follows:
a) Inspect wiring for wear, fraying, chipping, nicks, and evidence of overheating. Repair minor defects with a good grade of electrical tape or replace if needed.
b) Inspect for loose electrical and mechanical connections. Tighten or replace defective crimp-style lugs. Tighten or replace all loose or missing hardware.

6. Wiring and Mechanical Specifications

a) Torque Specifications and Wire Gauge Information

Item	Value
Torque Value for Terminal Block Connections	11-15 in/lbs. (97.3 to 132.7 Nm)
Power Terminal Block AWG Range	6-18 AWG
Alarm and Sensor Terminal Block Range	12 – 24 AWG
Torque Value for Alarm and Sensor Terminal	3.1 – 3.5 in. lbs. (.35 to .4 Nm)
Torque Value for Enclosure Cover Screws	8.8 – 13.2 in/lbs. (1 – 1.5Nm)
Optional Wall Mount Bracket P/N 3400-00002-03	8.8 – 9.7 in/lbs. (1 – 1.1Nm)
Load 30A	10 AWG Wire
Load 20A	12 AWG Wire
Load 15A	14 AWG Wire

b) Front Panel Label

7200-00002-00_v0_18_and_1_00_august_2020.docx
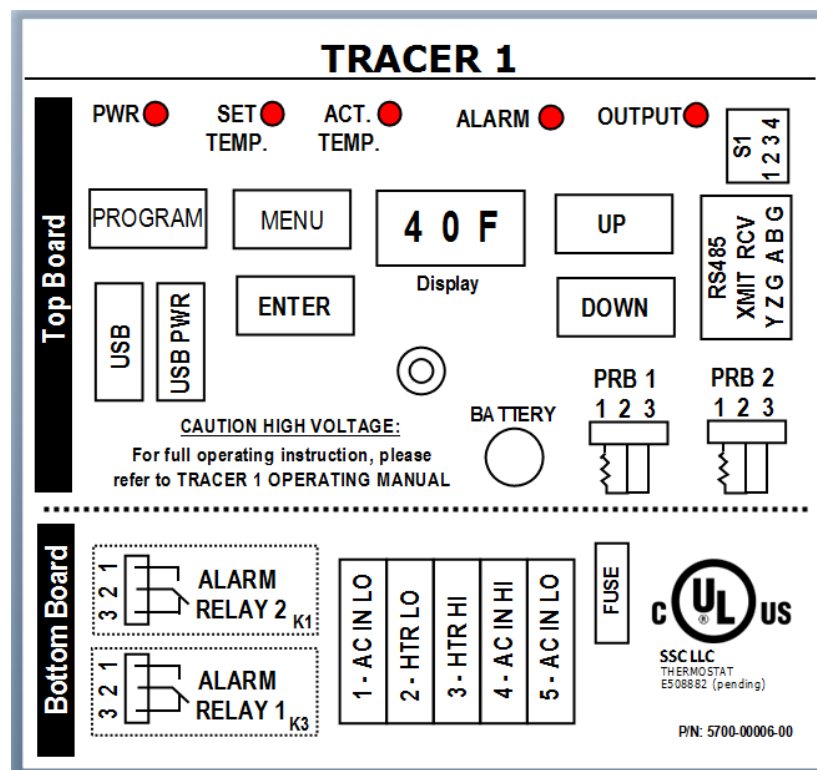
c) User Wiring Top / Microprocessor Board
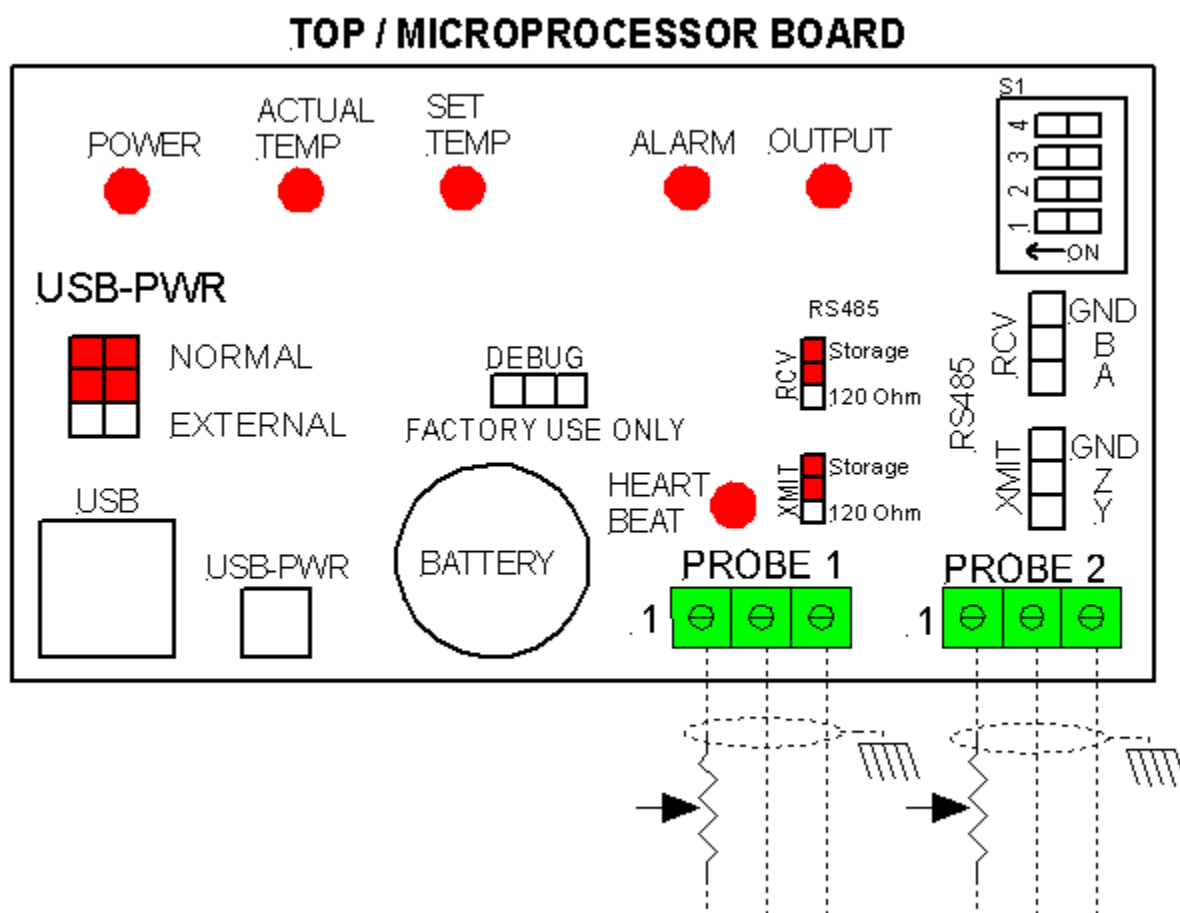
d) <u>User Wiring Bottom / Power Board</u>

BOTTOM / POWER BOARD

7. Normal Operation

a) Temperature Regulation and Timer
     The **Tracer 1** will regulate temperature in one of two modes depending on how the Timer
     Feature is configured. If the Timer Feature is set to off, then the **TRACER 1** will regulate
     temperature using the fixed Set Point and the Dead Band Values stored in the parameter table.
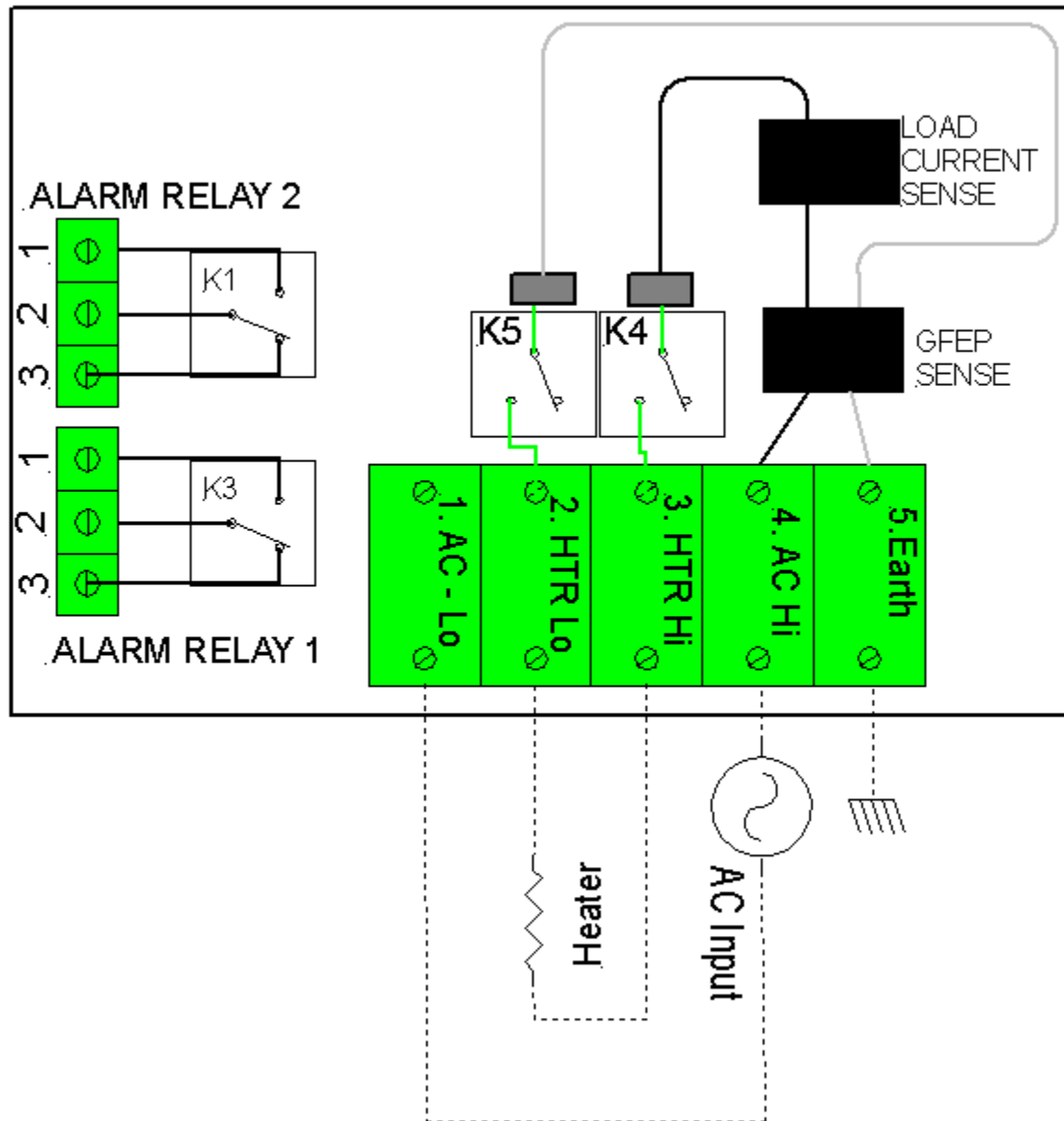   If the Timer Feature is not set to off, then the **TRACER 1** will regulate temperature using the
     values stored in the selected timer program. Please refer to Timer Feature section of the manual
     for detailed information.
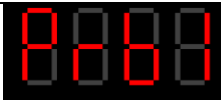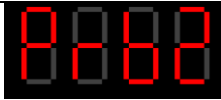
b) Normal Display Operation
     The normal display (S1-1 = OFF) will cycle between Set Temperature for 10 seconds and Actual
     Process Temperature for 10 seconds. To display only Actual Process Temperature, set S1-1 to
     ON.

c) User Interface for Manual Display Operation
     When display is in normal operation, press MENU key to cycle through controller data. Each
     press of the MENU key will display the next value. If no key is pressed for 5 seconds, revert to
     normal display. On each press, the display will flip between the value name and the actual value
     as follows:

Display	Value
	Load Current in amps
	GFEP current in mA
	Probe 1 Value
	Probe 2 Value
	Set Temperature
	Actual Process Temperature

d) <u>Probe Error and Error Output Management</u>

If any Alarm exists and the controller is still operating in Normal Mode, the display will cycle between Set Temperature and Error Message as described in later sections of the manual. If the controller is running in "Probe Error Mode", the display will show the Probe Error as described in later section of the manual. The controller can be configured to manage output in different ways based on parameter setting. See details in manual for these parameters.

The process temperature will be calculated based on the parameter settings for probe. The process or probe temperature can be set to one of the following: Low, High, Average, Probe 1, Probe 2 or Ambient. See details in manual for further details.

e) <u>Dead band Operation</u>

Output is Off when process temperature is greater than set point.
Output will then turn On when process temperature is less than set point minus dead band.

f) <u>Alarm Relays and Relay Mapping</u>

The **TRACER 1** has a robust alarm output feature set. The **TRACER 1** alarms include High Temperature, Low Temperature, High Current, Low Current, and Ground Fault Equipment Protection (GFEP) Alarm and a second GFEP Health Monitor alarm. These alarm values are adjustable using Programming Mode. The alarms can be set to a value or may be turned off.

The two Alarm relays are configurable and can be set to open or close on alarm. Alarms can be mapped to either, both, or no relay. This feature allows for optimal configuration of relays. Relays can also be configured as power loss relay for an added degree of protection. Additionally, if an alarm is identified, the output can be set to off, on, or a percentage of output.

g) <u>Fire Protection Mode</u>

There is also a Fire Protection mode that will turn the output On when any error condition is identified.

h) <u>Auto Cycle / Self-Test</u>

TRACER 1 contains an Auto Cycle / Self-Test feature that can be set to a time between 1 and 999 hours or Off. When this is not off, the **TRACER 1** will perform scheduled self-tests during any non-operating period. For more information, see the Auto Cycle section.

i) <u>Output Control and Load Switching</u>

The **TRACER 1** can be configured to switch or break both sides or only the hot side of the line during operation. When both sides of the line are switched, a proprietary feature makes or breaks relays using proprietary algorithms to extend the life of the relays.

8. Real Time Clock Calendar (RTCC) Battery

The **TRACER 1** battery is used for providing power to the Real Time Clock Calendar (RTCC) in the event of a power outage. Parametric **TRACER 1** configuration data is stored in nonvolatile memory that does not require the battery, so loss of power will not require system parameter re-configuration.

The battery should be replaced by a certified Electrician before every season or on an annual basis, whichever is shortest. Battery specification:

      Manufacturer: Panasonic – BSG
      Manufacturer Part Number: CR2032
      Description: BATTERY LITHIUM 3V COIN 20MM

Please take time to read the operating manual and familiarize yourself with all operating features as much more detail on the features described in this section are available.

9. Programming Mode Operation

⚠️**WARNING** This mode is designed for trained technician or factory personnel specifically for the use of diagnostics.
Ce mode est conçu pour un technicien qualifié ou du personnel d'usine spécialement pour l'utilisation des diagnostics.

To Enter Programming Mode:

Action	Display	Notes
Apply power to the controller.		Controller is operating normally.
Press and hold <PROGRAM> switch		All 0's will be displayed. Aborts after 30 seconds of inactivity.
Use <UP> and <DOWN> switches to enter password 15		Pass code displayed. Aborts after 30 seconds of inactivity.
With 15 displayed, press <ENTER> switch		Controller is in PROGRAMMING MODE. Aborts after 120 seconds of inactivity.

Once in PROGRAMMING MODE, follow the following steps to modify parameters:

Action	Display	Notes
<MENU> key toggles between Parameter Number and Parameter Value		Press <MENU> key to display first parameter.
<UP> and <DOWN> keys increase or decrease the displayed value (Parameter Number or Parameter Value)		Use <UP> and <DOWN> keys to change parameter. When complete press <MENU> to display Parameter Value.
To accept the displayed parameter value, use the <ENTER> key		Use <UP> and <DOWN> keys to change Parameter Value. Press <ENTER> key to accept displayed value and display Parameter Number.
To save all values, press and hold, the <PROGRAM> key.		Use <PROGRAM> key to save all current parameters.
CAUTION:		RTCC Data is stored immediately when the <ENTER> key is pressed. All other data is saved using <PROGRAM> key as noted above.
To exit without saving, press and hold the <MENU> key		Use the <MENU> key to abort or exit with no save.
Auto Exit		If at any time, a key is not pressed for 120 seconds, controller will return to normal operation with no save.

10. Parameters And Default Values

Parameter No.	Item	Default	Range	S1-3	USB
P01	Set Point	40F	-80F to 999F (-62C to 537C)		
P02	Dead band	2	2-100		
P03	Probe Temp	3	0=Low, 1=High,2= Average, 3=Probe 1, 4=Probe 2, 5=Ambient		
P04	UOM	F	°F, °C		
P05	Auto Cycle / Self-Test	OFF	OFF, 1-999 hours		
P06	Load Power Switching	0	0 = 120VAC, break Hot Side of line (K4) when off 1 = 240VAC, break both sides of line (K4 & K5) when off		
P07	Sensor Alarm Output	100	Programmable 0-100%		
P08	GFEP Alarm Latch	OFF	ON=Latch, OFF=Auto		
P09	GFEP Alarm Trip	1	0=Normal Operation, 1=Trip		
P10	Fire Protection Mode	OFF	ON, OFF		
P11	Key Click	OFF	ON or OFF		
P12	Lo Temp Alarm	35F	OFF, -80F to 999F (-62C to 537C)		
P13	High Temp Alarm	180F	-80F to 999F (-62C to 537C), OFF		
P14	Low Current Alarm	OFF	OFF, 0.1 TO 40.0A		
P15	High Current Alarm	OFF	OFF, 0.1 TO 40.0A		
P16	GFEP Warning Alarm	20	OFF, 20 to 300mA		
P17	GFEP Alarm	30	OFF, 30 to 300mA		
P18	RTCC Lo Battery Alarm	OFF	ON, OFF		
P19	Alarm Relay 1 (K1) Action	1	0 = Normally Energized, 1 = Normally Deenergized Note: If set to 0, alarm relay may be used to indicate loss of power.		
P20	Alarm Relay 2 (K3) Action	1	0 = Normally Energized, 1 = Normally Deenergized Note: If set to 0, alarm relay may be used to indicate loss of power.		
P21	Low Temperature Alarm Relay Mapping	1	0=None, 1=Alarm Relay 1, 2= Alarm Relay 2, 3=Both Note: Alarm condition will transition relay(s) to opposite of "Normal" condition" see P19 and P20 for "Normal condition"		
P22	High Temperature Alarm Relay Mapping	1	0=None, 1=Alarm Relay 1, 2= Alarm Relay 2, 3=Both Note: Alarm condition will transition relay(s) to opposite of "Normal" condition" see P19 and P20 for "Normal condition"		
P23	Low Current Alarm Relay Mapping	1	0=None, 1=Alarm Relay 1, 2= Alarm Relay 2, 3=Both Note: Alarm condition will transition relay(s) to opposite of "Normal" condition" see P19 and P20 for "Normal condition"		
P24	High Current Alarm Relay Mapping	1	0=None, 1=Alarm Relay 1, 2= Alarm Relay 2, 3=Both Note: Alarm condition will transition relay(s) to opposite of "Normal" condition" see P19 and P20 for "Normal condition"		
P25	GFEP Current Alarm Relay Mapping	1	0=None, 1=Alarm Relay 1, 2= Alarm Relay 2, 3=Both Note: Alarm condition will transition relay(s) to opposite of "Normal" condition" see P19 and P20 for "Normal condition"		
P26	GFEP Warning Alarm Relay Mapping	1	0=None, 1=Alarm Relay 1, 2= Alarm Relay 2, 3=Both Note: Alarm condition will transition relay(s) to opposite of "Normal" condition" see P19 and P20 for "Normal condition"		
P27	RTCC Lo Battery Alarm Relay Mapping	0	0=None, 1=Alarm Relay 1, 2= Alarm Relay 2, 3=Both Note: Alarm condition will transition relay(s) to opposite of "Normal" condition" see P19 and P20 for "Normal condition"		
P28	Modbus Speed	1	0 = 2400, 1 = 4800, 2 = 9600, 3= 19200, 4 = 38400, 5 = 56000		
P29	Modbus Parity	0	0 = None, 1 = Even, 2 = Odd		
P30	Weekday Timer	OFF	OFF, 1-9, C1, C2 (SEE TABLE) SEE TIMER SECTION. If "OFF", controller runs in normal mode.	Not displayed if S1 switch 3 is ON.	Not exported or imported via USB Drive.
P31	Weekend Timer	OFF	OFF, 1-9, C1, C2 (SEE TABLE) SEE TIMER SECTION. If "OFF", controller runs in normal mode.		
P32	Normal Temperature	131F	-80 to 999F (-62C to 537C)		
P33	Economy Temperature	122F	-80 to 999F (-62C to 537C)		
P34	RTCC – Year	See RTCC section of manual for further details	2019 thru 2099		
P35	RTCC – Month		1 thru 12 = January thru December		
P36	RTCC – Date		1 thru 31		
P37	RTCC – Day Of Week		0 thru 6, 0 = Sunday, 6 = Saturday		
P38	RTCC – Hour		12A thru 11A & 12P thru 11P		
P39	RTCC – Minute		0 thru 59		
P40	Modbus ID	1	1 to 255		
P41	Export to USB	0	0 = cancel, no action taken. 1 = Parameters. 2 = Custom Program 1 and Custom Program 2.		
P42	Import via USB	0	0 = cancel, no action taken. 1 = Parameters. 2 = Custom Program 1 and Custom Program 2.		
P43	RESET ALL TO DEFAULT	0	0 = cancel, no action taken. 1 = Reset all parameters. 2 = Boot load new firmware. 3 = Reset all EEPROM (including custom profiles).		

For P34 through P39: These parameters are set immediately when ENTER key is depressed and do not require a PROGRAM key press and hold to save. This allows for accurate entry of current date and time.

11.   Parameter Descriptions and Operation

Item	OPERATION
Set Point	Set Point defines the target process temperature. When process temperature is greater than set point temperature, the output will be Off. When process temperature is less than the set point minus dead band, the output will be On.
Dead band	The number of units during which the controller output will be off between set point and setpoint minus dead band.
Probe Temp	If 0/Low, the lower value of Probe 1 and Probe 2 will be used as the Process Temperature. If 1/High, the higher value of Probe 1 and Probe 2 will be used as the Process Temperature. If 2/Average, the average value of Probe 1 and Probe 2 will be used as the Process Temperature. If 3/Probe 1, Probe 1 will be used as the Process Temperature. If 4/Probe 2, Probe 2 will be used as the Process Temperature. If 5/Ambient, Probe 1 will be used for Process Temperature and Probe 2 will be used for Alarm Temperature (See Ambient Probe Operation)
UOM	F=°Fahrenheit C=°Centigrade
Auto Cycle / Self-Test	The auto cycle ensures that the Current Limit and GFEP tests are run at least at the interval specified by the user. The AUTO CYCLE can be set to 0 hours (OFF), or from 1 to 999 hours. This feature will automatically be disabled if a latched GFEP error condition is detected.
Load Power Switching	This setting determines how load power relays operate. If set to 0, only the hot side of the line (K4) will break when power is turned off. This allows the neutral side of the line to remain connected. If set to 1, both sides of the line will break.
Sensor Alarm Output	If a probe alarm occurs, the output will proportion with a 3600 second period at a rate defined by the Sensor Alarm Output percentage
GFEP Alarm Latch	If set to 0/Auto, any GFEP alarm will reset upon the removal of the error. If set to 1/Latch, any GFEP alarm will be latched until manually cleared by an operator. To manually clear an alarm, press and hold <MENU> key Note: a latched GFEP alarm will disable Auto Cycle / Self-test feature.
GFEP Alarm Trip	If set to 0/normal, output will operate normally when error is present. If set to 1/trip, output will open when error is present.
Fire Protection Mode	If set to 0, no action will be taken. If set to 1, the output will be ON if any alarm is present.
Key Click	When On, the controller will issue an audible beep or "click" when a button is depressed. When Off, no audible click will be issued on key press.
Lo Temp Alarm	A Low Temperature alarm will occur if the process temperature is less than this value. If set to OFF, a Low Temperature Alarm will never occur.
High Temp Alarm	A High Temperature alarm will occur if the process temperature exceeds this value. If set to OFF, a High Temperature Alarm will never occur.
Low Current Alarm	A Low Current alarm will occur if measured output current is less than Low Current Alarm value. If set to OFF, a Low Current alarm will never occur.
High Current Alarm	A High Current alarm will occur if measured output current is greater than High Current Alarm value. If set to OFF, a High Current alarm will never occur.
GFEP Warning Alarm	A GFEP Current Warning alarm will occur if measured GFEP current is greater than GFEP Warning Alarm value. If set to OFF, a GFEP Warning alarm will never occur. This alarm does not have trip, or latch options and is designed to be a pre-alarm or health check of the system.
GFEP Alarm	A GFEP Current alarm will occur if measured GFEP current is greater than GFEP Current Alarm value. If set to OFF, a GFEP Current alarm will never occur.
	continued next page

| Item (Continued)	OPERATION (Continued)
RTCC Lo Battery Alarm	This alarm may be set to either ON or OFF. If ON, a low battery level will cause an alarm. If OFF, the low battery alarm will be disabled. Only available in revision B hardware and higher.
Alarm Relay 1 (K1) Action	Alarm Relay 1 (K2) may be set to either 0 = Normally Energized, 1 = Normally Deenergized. If the parameter is set to 0, the relay will be normally energized when system is on and there are no errors mapped to the relay. This may be used to indicate loss of power. If any mapped error is present, the relay will change to the opposite state. Additionally, the form C relay provides both normally open and normally closed contacts. Errors can be mapped to each relay to allow for maximum programming flexibility.
Alarm Relay 2 (K3) Action	Please refer to Alarm Relay 1 for details.
Low Temperature Alarm Relay Mapping	This setting determines which alarm relay(s) will be active when the alarm is present. Alarms can be mapped to either, both, or no relay.
High Temperature Alarm Relay Mapping	This setting determines which alarm relay(s) will be active when the alarm is present. Alarms can be mapped to either, both, or no relay.
Low Current Alarm Relay Mapping	This setting determines which alarm relay(s) will be active when the alarm is present. Alarms can be mapped to either, both, or no relay.
High Current Alarm Relay Mapping	This setting determines which alarm relay(s) will be active when the alarm is present. Alarms can be mapped to either, both, or no relay.
GFEP Warning Alarm Relay Mapping	This setting determines which alarm relay(s) will be active when the alarm is present. Alarms can be mapped to either, both, or no relay.
GFEP Current Alarm Relay Mapping	This setting determines which alarm relay(s) will be active when the alarm is present. Alarms can be mapped to either, both, or no relay.
RTCC Lo Battery Alarm Relay Mapping	This setting determines which alarm relay(s) will be active when the alarm is present. Alarms can be mapped to either, both, or no relay.
Modbus Speed	Modbus communication speed
Modbus Parity	Modbus communication parity
Weekday Timer	If Off, then the controller will use P1 Set Temperature to regulate the process. If set to any one of the 11 programs as described in the "Timer Feature" section of the manual, then the selected timer program will be followed.
Weekend Timer	If Off, then the controller will use P1 Set Temperature to regulate the process. If set to any one of the 11 programs as described in the "Timer Feature" section of the manual, then the selected timer program will be followed.
Normal Temperature	Set point temperature when timer is set to "nor" or Normal
Economy Temperature	Set point temperature when timer is set to "ECO" or Economy
RTCC – Year	The current year
RTCC – Month	The current month
RTCC – Day	The current day of month
RTCC – Day Of Week	The current day of week
RTCC – Hour	The current hour in 24 hour time
RTCC – Minute	The current minute
Modbus ID	Modbus controller ID
Export to USB	0 = cancel, no action taken. 1 = Parameters. 2 = Custom Program 1 AND Custom Program 2.
Import via USB	0 = cancel, no action taken. 1 = Parameters. 2 = Custom Program 1 and Custom Program 2.
RESET TO DEFAULT, BOOT LOADER, AND IMPORT / EXPORT	0 = cancel, no action taken. 1 = Reset all parameters. 2 = Boot load new firmware. 3 = Reset all EEPROM (including custom profiles).

12.   RTCC – Real Time Clock Calendar

When unit is initially powered on with dead or no battery, RTCC values will require a reset. Default values will be populated with current RTCC values and these values will change based on power applied, battery condition and last parameter setting. Once RTCC is set and a good battery is installed the RTCC will contain current date and time.

When entering RTCC values in programming mode, the values for the RTCC are transferred to the RTCC immediately after pressing the <ENTER key.

Please note that the RTCC does not automatically adjust for Daylight Savings Time and must be manually reset should a time change occur.

13.   DIP Switch Operation

The S1 dip switch controls multiple features as follows:
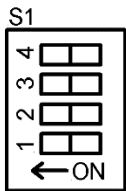
If S1 SWITCH 1 = OFF, display toggles between Process Value and Set Temperature.
If S1 SWITCH 1 = ON, display Process Value only.

If S1 SWITCH 2 = OFF, normal operation.
If S1 SWITCH 2 = ON, disable PROGRAM key.

If S1 SWITCH 3 = OFF, normal operation.
If S1 SWITCH 3 = ON, do not show Weekday timer, weekend timer, Nor Temp, ECO Temp or RTCC values when in Programming Mode Operation.

14.   Auto Cycle Feature

The auto cycle ensures that the Current Limit and GFEP tests are run at least at the interval specified by the user. The AUTO CYCLE can be set to OFF, or from 1 to 999 hours.

The GFEP test is always active and will run whenever it is enabled and the output is ON, either by heat demand or AUTO CYCLE test.

The Current Limit test is run every time the current is applied to the load.

Every time the Current Limit test is run, the Auto Cycle timer is reset. This means that it is possible that the Auto Cycle will never activate if in the normal operation:

Current is applied to the load for a long enough period for the Current Limit test to run.

The Auto cycle test will only take a few seconds.

NOTE: if a latched GFEP Alarm is detected, Auto Cycle Self-Test will be disabled until manually reset by operator.

15.   Ambient Probe Operation

In Ambient Probe Operation, Probe 1 is used for Process / Actual Temperature calculations and Probe 2 is used for all temperature alarms calculations.

16.   Fire Protection Mode

Fire protection mode overrides many operations defined in the manual relative to error detection and prognostics. Please note that when fire protection mode is set to on, any error will cause the output to be on. So, all tables will reference this section as an overriding condition.

17.   Custom Timer Programming Mode

a) Enter Custom Timer Programming Mode

The *Tracer 1* contains 9 Preset Timer Programs and two custom programs. The custom programs can be modified using the following programming mode. To Enter Timer Programming Mode:

Action	Display	Notes
Apply power to the controller.		Controller is operating normally.
Press and hold <PROGRAM> switch		All 0's will be displayed. Aborts after 30 seconds of inactivity.
Use <UP> and <DOWN> switches to enter password -13		If at any time, a key is not pressed for 30 seconds, controller will return to normal operation.
With -13 displayed, press <ENTER> switch		Controller is in CUSTOM TIMER MODE. Aborts after 120 seconds of inactivity.

b) Modifying and Saving Custom Timer Programs

Once in CUSTOM TIMER PROGRAMMING MODE, follow these steps to modify parameters. The <MENU> key will toggle between Hour # and Hour value. The <UP> and <DOWN> keys adjust the displayed value. Press and Hold of <PROGRAM> key will save all information. Press and hold <MENU> key will exit without saving any values.

Action	Display	Notes
Press <MENU> to advance to program select.		
-		Display will show Custom Program 1.
Use <UP> and <DOWN> keys to toggle between Custom Timer 1 and Custom Timer 2. Press <ENTER> key to select desired program.	or	
<UP> and <DOWN> keys increase or decrease the hour. Press <ENTER> to display current timer value for the display hour.		In this display "1" indicates Custom 1. "H" indicates Hour "00" indicates hour 0
<UP> and <DOWN> key will roll through timer options. Press <ENTER> to accept displayed timer value.		"nor" = Normal Temperature "On" = always on "OFF" = always off "ECO"= Economy Temperature
Continue programming until completed.		
To save all values, press and hold, the <PROGRAM> key.		Use <PROGRAM> key to save all current parameters.
To exit without saving, press and hold the <MENU> key		Use the <MENU> key to abort or exit with no save.
Auto Exit		If at any time, a key is not pressed for 120 seconds, controller will return to normal operation with no save.

c) Timer Default Values

Name	APARTMENT	HOSPITAL	HOTEL	NURSING HOME	OFFICE - WEEKDAY	OFFICE - WEEKEND	PRISON	SPORTS CENTER	CONSTANT	Custom 1	Custom 2
Number	1	2	3	4	5	6	7	8	9	C1	C2
Hour 0	ECO	ECO	ECO	ECO	ECO	ECO	ECO	ECO	On	nor	nor
Hour 1	ECO	ECO	ECO	ECO	ECO	ECO	ECO	ECO	On	nor	nor
Hour 2	ECO	ECO	ECO	ECO	ECO	ECO	ECO	ECO	On	nor	nor
Hour 3	ECO	ECO	ECO	ECO	ECO	ECO	nor	ECO	On	nor	nor
Hour 4	ECO	ECO	ECO	ECO	ECO	ECO	nor	ECO	On	nor	nor
Hour 5	nor	nor	nor	nor	ECO	ECO	nor	ECO	On	nor	nor
Hour 6	nor	nor	Off	nor	nor	ECO	Off	nor	On	nor	nor
Hour 7	Off	Off	nor	Off	ECO	ECO	Off	nor	On	nor	nor
Hour 8	nor	nor	Off	nor	nor	ECO	nor	Off	On	nor	nor
Hour 9	Off	Off	nor	Off	nor	ECO	nor	nor	On	nor	nor
Hour 10	nor	nor	nor	nor	nor	ECO	nor	Off	On	nor	nor
Hour 11	Off	Off	Off	Off	nor	ECO	Off	nor	On	nor	nor
Hour 12	nor	nor	nor	nor	nor	ECO	nor	Off	On	nor	nor
Hour 13	nor	nor	nor	nor	nor	ECO	nor	nor	On	nor	nor
Hour 14	nor	nor	nor	nor	nor	ECO	nor	Off	On	nor	nor
Hour 15	nor	nor	nor	nor	nor	ECO	nor	nor	On	nor	nor
Hour 16	Off	nor	nor	nor	nor	ECO	Off	Off	On	nor	nor
Hour 17	nor	Off	Off	Off	nor	ECO	nor	nor	On	nor	nor
Hour 18	Off	nor	nor	nor	nor	ECO	Off	Off	On	nor	nor
Hour 19	nor	nor	nor	nor	nor	ECO	nor	nor	On	nor	nor
Hour 20	nor	Off	Off	Off	ECO	ECO	Off	Off	On	nor	nor
Hour 21	Off	ECO	ECO	ECO	ECO	ECO	nor	nor	On	nor	nor
Hour 22	ECO	ECO	ECO	ECO	ECO	ECO	ECO	ECO	On	nor	nor
Hour 23	ECO	ECO	ECO	ECO	ECO	ECO	ECO	ECO	On	nor	nor

18.   Temperature Alarms

Please reference Fire Protection Mode section of this manual. Fire protection mode overrides normal operations as shown below.

These alarms run continuously whenever controller is ON and the alarm is not turned OFF:

Alarm Condition	Setting Variable	Output	Alarm Out	Alarm LED	Panel Display flips between Actual Temp and this display.	Notes
Low Temp. Alarm	Low Temp	Normal Operation Continues	Follows mapping parameter	On	LoAt	Alarm cleared automatically when process temperature is within normal limits.
High Temp. Alarm	High Temp	Normal Operation Continues	Follows mapping parameter	On	biAt	Alarm cleared automatically when process temperature is within normal limits.

19.   Current Alarms

Please reference Fire Protection Mode section of this manual. Fire protection mode overrides normal operations as shown below.

Output current is tested whenever the output is ON, and once every AUTO CYCLE TIME whenever the alarms are not set to OFF.

Alarm Condition	Setting Variable	Output	Alarm Out	Alarm LED	Panel Display flips between Actual Temp and this display.	Notes
Low Current Alarm	Low Current	Normal Operation Continues	Follows mapping parameter	On	LoC	Alarm cleared automatically when current falls within limits or if <MENU> key is pressed and held.
High Current Alarm	High Current	Normal Operation Continues	Follows mapping parameter	On	hiC	Alarm cleared automatically when current falls within limits or if <MENU> key is pressed and held.

20.   GFEP Alarms

Please reference Fire Protection Mode section of this manual. Fire protection mode overrides normal operations as shown below.

When a GFEP error is detected, the following table describes the controller operation:

GFEP Trip	GFEP Latch	Output	Auto Cycle Self Test	Alarm Relay and LED On Error	Display	How To Clear Alarm
0/Normal	0/Auto	Regulates Temp	Enabled	Follows mapping parameter	`8888` / Actual Temp.	Automatically clears when error is no longer present or clears upon successful self-test-auto cycle (if enabled) or if menu key is held (see Clear a Latched Alarm).
0/Normal	1/Latch	Regulates Temp	Disabled	Follows mapping parameter	`8888` / Actual Temp.	Must be cleared by operator intervention when menu key is held (see Clear a Latched Alarm)
1/Trip	0/Auto	Off	Enabled	Follows mapping parameter	`8888` / Actual Temp.	Clears upon successful self-test-auto cycle (if enabled) or if menu key is held (see Clear a Latched Alarm)
1/Trip	1/Latch	Off	Disabled	Follows mapping parameter	`8888`	Must be cleared by operator intervention when menu key is held (see Clear a Latched Alarm)

21.   GFEP Warning Alarm

Output	Auto Cycle Self Test	Alarm Relay and LED On Error	Display	How To Clear Alarm
Regulates Temp	Enabled	Follows mapping parameter	/ Actual Temp.	Automatically clears when error is no longer present or clears upon successful self-test-auto cycle (if enabled) or if menu key is held (see Clear a Latched Alarm).

22.   Clear a Latched Alarm

If any alarm is latched it must be manually cleared by an operator. To manually clear an alarm, press and hold <MENU> key while an alarm is being display. The alarm will clear if the error condition is cleared. Error will not clear if the alarm condition is still present.

23.   Probe Errors and Alarms

Please reference Fire Protection Mode section of this manual. Fire protection mode overrides normal operations as shown below.

Probes are tested continuously whenever controller is ON. The following table describes the controller operation:

Parameter	Setting	Condition	Alarm LED	Panel Display flips between Actual Temp (if available) and this display.	Output	Alarm Outputs	Notes
Sensing Method	3/Probe 1	Probe 1 Error	Lit	*Prb1*	Set output to value in parameter: Probe Error Output %	Open or Closed depending on parameter	Error resets when probe returns to normal operation.
	4/Probe 2	Probe 2 Error	Lit	*Prb2*	Set output to value in parameter: Probe Error Output %		
	2/Average or 0/Low Probe or 1/High Probe	Probe 1 error	Lit	*Prb1*	Normal operation using valid probe.		
		Probe 2 error	Lit	*Prb2*	Normal operation using valid probe.		
		Both probe errors	Lit	*Prb*	Set output to value in parameter: Probe Error Output %		
	5/Ambient	Probe 1 error	Lit	*Prb1*	Set output to value in parameter: Probe Error Output %		
		Probe 2 error	Lit	*Prb2*	Set output to value in parameter: Probe Error Output %		
		Both probe errors	Lit	*Prb*	Set output to value in parameter: Probe Error Output %		

24. Reset Parameters to Factory Settings

To reset factory parameter setting or to reset all EEPROM settings including custom timer profiles), follow these steps:

1) Follow instructions in Programming Mode Operation to enter programming mode.
2) Navigate to the Parameter "RESET TO DEFAULTS" setting.
3) To reset all parameters, select option 1
4) To Reset all EEPROM (including custom profiles), select option 3.
5) Once selection has been made, press and hold the <PROGRAM> key.

25. Bootloader

The TRACER 1 operating firmware may be updated through the USB port. Please note that only approved USB flash drives will be guaranteed to operate properly. Failure to use an approved device could result in a failure of the TRACER 1 operation. Please see Accessory Section of this manual for ordering information. To complete an update, following these steps:

1) Install the new bootloader file named "T1IMAGE.BL2" in the root of an approved USB flash drive.
2) Insert the drive into the Tracer 1 USB connector.
3) Navigate to the Parameter "RESET TO DEFAULTS" setting and select option 2.
4) Press enter **and wait approximately 15 seconds** for the system to reboot. The firmware should now be updated.
5) If option 2 is selected and there is not a USB flash drive installed, the system will reboot after about 8 seconds with the previous version of firmware.

26.   Import and Export Program Parameters and Custom Programs

When saving parametric data or when cloning multiple TRACER 1 controllers, it is possible to import and export data from the USB port onto an approved USB drive. Please refer to accessories for approved USB drive part number.

To import or export data:

1) Follow instructions in Programming Mode Operation to enter programming mode.
2) Navigate to the Parameter "Export to USB" or "Import via USB" setting depending on desired operation.
3) To Export to Approved USB Drive and overwrite any existing file on drive:
    a. Select option 1 for Parameters. Creates file named "T1PARAMS.TXT"
    b. Select option 2 for Custom Program 1 and Custom Program 2. Creates file named "T1TIMERS.TXT"
4) To Import from Approved USB Drive
    a. Select option 1 for Parameters. Imports file named "T1PARAMS.TXT"
    b. Select option 2 for Custom Program 1 and Custom Program 2. Imports file named "T1TIMERS.TXT"
5) Once selection has been made, press the <ENTER> key.

27.   Low Voltage Programming

The TRACER 1 may be powered through a micro-USB cable. When using low voltage, the USB port will be operable for all boot loading, importing, and exporting functions. However, the relays, buzzer, and other devices will not be functional. To apply power to the device using low voltage, perform the following:

1) Place USB_PWR jumpers in positions 3-5 and 4-6.
2) Apply power to USB_PWR micro USB connector
3) Program device following the instructions in the manual.
4) **When complete ensure USB_PWR jumpers are returned to positions 1-3 and 2-4. Failure to do so will cause TRACER 1 do be non-functional when powered with line voltage.**

28.   Mechanical Dimensions

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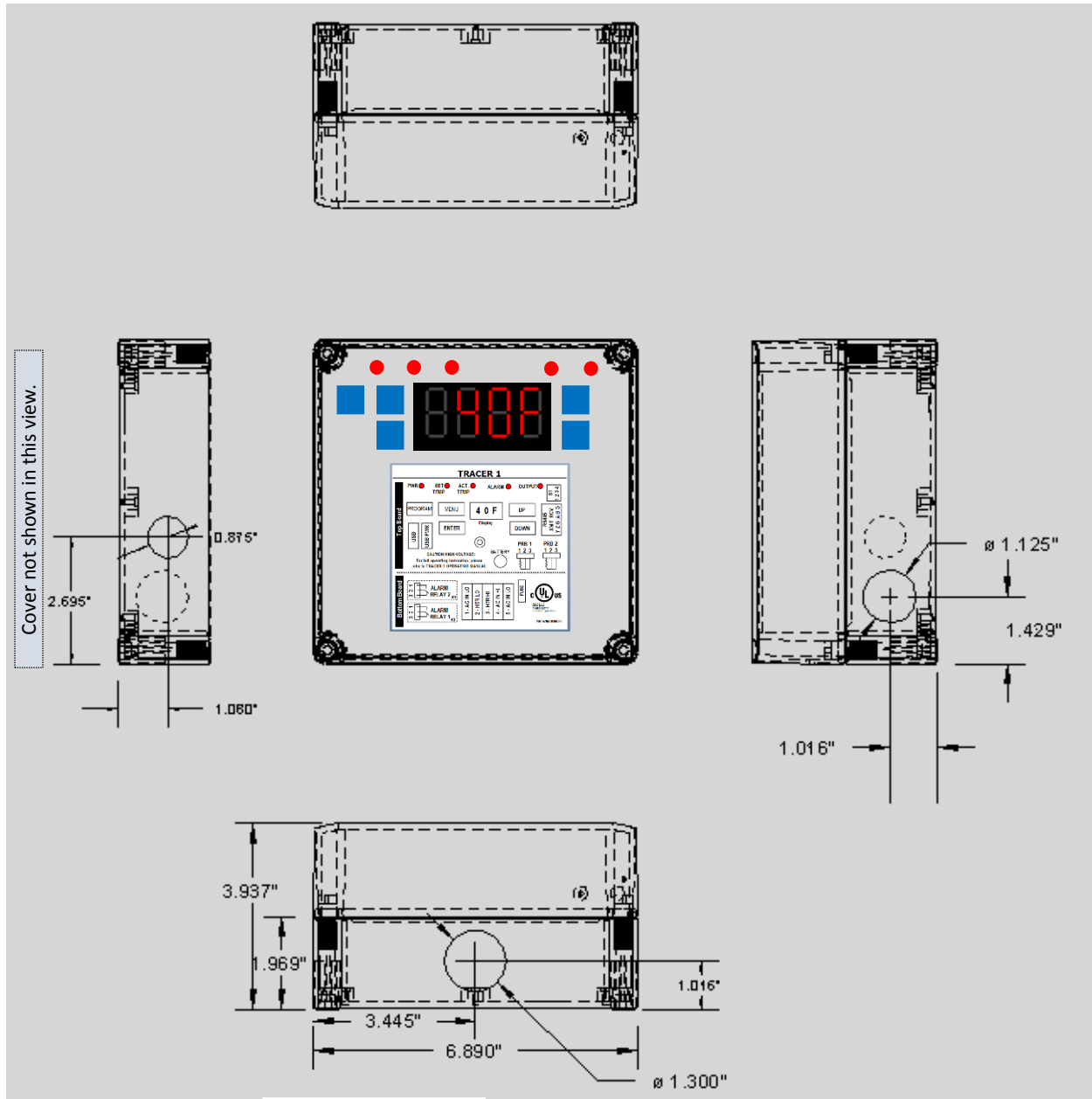
29.   Modbus

The **TRACER 1** supports Modbus communications via RS485 interface 2 or 4 wire communications. For detailed explanations of Modbus, please refer to:

http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf

The data in this manual is particular to the **TRACER 1** product.

Physical Layer

The Base address, bit rate and character format are configured via the factory service menu.

Physical layer configuration settings possible are:

Data rate: 2400, 4800, 9600 (default), 19200, 38400, 56000 bps
Parity: None (default), Even, Odd
Addresses: 0 to 255 (default = 8)
Character format: Always 8 bits per character.

a) RS485 Wiring Schematic

	To terminate circuit with 120 ohms, place jumpers in the 120 Ohm position. If termination is not required, place jumpers in the Storage position
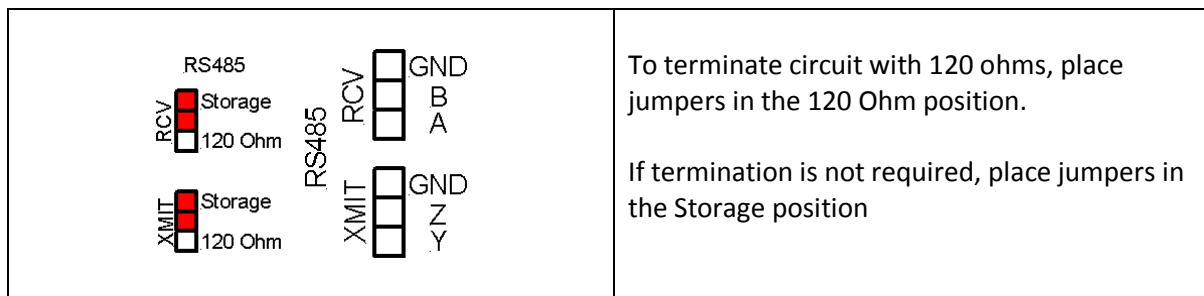
b) RS485 Wiring Table

Connection	2 wire	4 wire
RS485_RCV-A	RS485 RX-	RS485 RX-
RS485_RCV-B	RS485 RX +	RS485 RX +
RS485_XMIT-Y	JUMPER TO RS485 RX-	RS485 XMIT -
RS485_XMIT-Z	JUMPER TO RS485 RX+	RS485 XMIT +

c) Supported Modbus Function Codes

01 (0x01) Read Coils

This function code is used to read from 1 to 2000 contiguous status of coils in a remote device. The Request PDU specifies the starting address, i.e. the address of the first coil specified, and the number of coils. In the PDU Coils are addressed starting at zero. Therefore, coils numbered 1-16 are addressed as 0-15. The coils in the response message are packed as one coil per bit of the data field. Status is indicated as 1= ON and 0= OFF. The LSB of the first data byte contains the output addressed in the query. The other coils follow toward the high order end of this byte, and from low order to high order in subsequent bytes.

Request

Slave Address	1 Byte	0 - 255
Function code	1 Byte	1
Starting Address	2 Bytes	0 - 65535
Quantity of Coils	2 Bytes	1 to 2000
CRC	2 Bytes	0 - 65535

Response

Slave Address	1 Byte	0 - 255
Function code	1 Byte	1
Byte count	1 Byte	N*
Coil Status	n Byte	n = N or N + 1
CRC	2 Bytes	0 - 65535

*N = Quantity of Input

01 (0x01) Read Coils Address Map & Description

Data Address	Hex Address	Description
0	0x0000	Alarm Relay (0 = OFF, 1 = ON)
1	0x0001	Reserved
2	0x0002	Reserved
3	0x0003	Reserved
4	0x0004	Heater Output (0 = OFF, 1 = ON)
5- 65535	0x006 – 0xFFFF	Reserved

02 (0x02) Read Discrete Inputs

This function code is used to read from 1 to 2000 contiguous status of discrete inputs in a remote device. The Request PDU specifies the starting address, i.e. the address of the first input specified, and the number of inputs. In the PDU Discrete Inputs are addressed starting at zero. Therefore, Discrete inputs numbered 1-16 are addressed as 0-15. The discrete inputs in the response message are packed as one input per bit of the data field. Status is indicated as 1= ON; 0= OFF. The LSB of the first data byte contains the input addressed in the query. The other inputs follow toward the high order end of this byte, and from low order to high order in subsequent bytes. If the returned input quantity is not a multiple of eight, the remaining bits in the final data byte will be padded with zeros (toward the high order end of the byte). The Byte Count field specifies the quantity of complete bytes of data.

Request

Slave Address	1 Byte	0 - 255
Function code	1 Byte	2
Starting Address	2 Bytes	0 - 65535
Quantity of Inputs	2 Bytes	1 to 2000 (0x07D0)
CRC	2 Bytes	0 - 65535

Response

Slave Address	1 Byte	0 - 255
Function code	1 Byte	2
Byte count	1 Byte	N*
Input Status	N* x 1 Byte	
CRC	2 Bytes	0 - 65535

*N = Quantity of Inputs / 8 if the remainder is different of 0 $\Rightarrow$ N = N+1

02 (0x02) Read Discrete Inputs Address Map & Description

Data Address	Hex Address	Description
0	0x0000	Probe 1 Error (0 = NO ERROR, 1 = ERROR)
1	0x0001	Probe 2 Error (0 = NO ERROR, 1 = ERROR)
2	0x0002	Reserved
3	0x0003	Reserved
4	0x0004	Temperature Alarm (0 = NO ALARM, 1 = ALARM)
5	0x0005	Reserved
6	0x0006	Load Current Alarm (0 = NO ALARM, 1 = ALARM)
7	0x0007	Reserved
8	0x0008	GFEP Current Alarm (0 = NO ALARM, 1 = ALARM)
9- 65535	0x010 – 0xFFFF	Reserved

04 (0x04) Read Input Registers

This function code is used to read from 1 to 125 contiguous input registers in a remote device. The Request PDU specifies the starting register address and the number of registers. In the PDU Registers are addressed starting at zero. Therefore, input registers numbered 1-16 are addressed as 0-15. The register data in the response message are packed as two bytes per register, with the binary contents right justified within each byte. For each register, the first byte contains the high order bits and the second contains the low order bits.

Request

Slave Address	1 Byte	0 - 255
Function code	1 Byte	4
Starting Address	2 Bytes	0 - 65535
Quantity of Input Registers	2 Bytes	1 to 125 (0x007D)
CRC	2 Bytes	0 - 65535

Response

Slave Address	1 Byte	0 - 255
Function code	1 Byte	4
Byte count	1 Byte	2 x N*
Input Registers	N* x 2 Bytes	
CRC	2 Bytes	0 - 65535

*N = Quantity of Input

04 (0x04) Read Input Registers Address Map & Description

Data Address	Hex Address	Description
0	0x0000	Actual Temperature– Integer Degrees F
1	0x0001	Set Temperature– Integer Degrees F
2	0x0002	Load Current – Fixed in Tenths of Amps (ex. 101 = 10.1A)
3	0x0003	Reserved
4	0x0004	GFEP Current – Integer mA (ex. 100 = 100mA)
10- 65535	0x0005 – 0xFFFF	Reserved

06 (0x06) Write Single Register

This function code is used to write a single holding register in a remote device. The Request PDU specifies the address of the register to be written. Registers are addressed starting at zero. Therefore, register numbered 1 is addressed as 0. The normal response is an echo of the request, returned after the register contents have been written. All control via MODBUS is volatile except where indicated and should be re-initialized by the MODBUS master when power is cycled.

NOTE: if register value is out of limits, the register will be set to the value closest to the limit. For example, if a value of -90 is sent to the Set Temperature register (Address 0x0000) while the system is set to degrees F, the Set Temperature will be set to -80 degrees F.

Request

Slave Address	1 Byte	0 - 255
Function code	1 Byte	6
Register Address	2 Bytes	0 - 65535
Register Value	2 Bytes	0 - 65535
CRC	2 Bytes	0 - 65535

Response

Slave Address	1 Byte	0 - 255
Function code	1 Byte	6
Register Address	2 Bytes	0 - 65535
Register Value	2 Bytes	0 - 65535
CRC	2 Bytes	0 - 65535

06 (0x06) Write Single Register Address Map & Description

Data Address	Hex Address	Item	Values
0	0x0000	Set Temperature	-80F to 999F (-62C to 537C) integer
1	0x0001	Low Temp. Alarm	-80F to 999F (-62C to 537C) integer[1]
2	0x0002	High Temp. Alarm	-80F to 999F (-62C to 537C) integer[2]
3	0x0003	Low Current Alarm	0 to 40A integer 0 = Off
4	0x0004	High Current Alarm	0 to 40A integer 0 = Off
5	0x0005	GFEP Setpoint	30.0ma to 150.0ma in tenths fixed width (ex 150.0mA = 1500)
6	0x0006	GFEP Trip	0 = Normal - Alarm Only No Circuit Trip
			1 = Trip - Alarm and Trip Circuit
7	0x0007	GFEP Latch	0 = Auto - reset error and trip when error is resolved
			1 = Latch - hold error until error is cleared
8	0x0008	Reserved	Reserved
9	0x0009	Dead band	2F to 100F integer
10	0x000A	Reserved	Reserved
11	0x000B	Reserved	Reserved
12	0x000C	Reserved	Reserved
13	0x000D	Reserved	Reserved
14	0x000E	Sensing Method	0=Low, 1=High,2=Average,3=Probe 1, 4=Probe2, 5=Ambient
15	0x000F	Output On Failed Sensor	0% to 100% integer
16	0x0010	Alarm Output On Fault	0 = OPEN ON FAULT, 1 = CLOSE ON FAULT
Continued next page			

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[1] The Low Temperature Alarm must be enabled and disabled via the front panel.
[2] The High Temperature Alarm must be enabled and disabled via the front panel.

Continued from previous page			
Data Address	Hex Address	Item	Values
17	0x0011	Key Click	0 = Off, 1 = On
18	0x0012	Baud Rate	0 = 2400 1 = 4800 2= 9600 3 = 19200 4 = 38400 5 = 56000 ** CAUTION*** Changes to Baud Rate take effect immediately and corresponding changes to the MODBUS master will be required before communication can resume. ALL PENDING CHANGES will be saved to EEPROM immediately.
19	0x0013	Parity	0 = None 1 = Even 2= Odd ** CAUTION*** Changes to Parity take effect immediately and corresponding changes to the MODBUS master will be required before communication can resume. ALL PENDING CHANGES will be saved to EEPROM immediately.
20	0x0014	ID	0 to 255 ** CAUTION*** Changes to port ID (MODBUS address) take effect immediately and corresponding changes to the MODBUS master will be required before communication can resume. ALL PENDING CHANGES will be saved to EEPROM immediately.
21	0x0015	Save Settings To EEPROM	0 = NO, 1 = YES

30.   BacNet

Not implemented in software. Hardware contains RS485 interface 2 or 4 wire. Upon request, a BacNet converter can be supplied for the TRACER 1. Please contact your distributor.

31.   Service Information

TRACER 1 products are warranted against defective material and workmanship for a period of one year from date of shipment. This warranty is limited to the repair or replacement of products at the factory. Under no circumstances does any responsibility extend to apparatus other than its own manufacture. All products are factory-calibrated and adjusted, unauthorized tampering other than field wiring voids the warranty. This warranty applies only to products purchased directly from an authorized distributor.

32.   Factory Service Mode UART

Factory Service mode is conducted through a debug UART. The Factory Service mode is used as a factory test and debugger. Should this feature be required in the field for any reason, please consult the factory. The UART reveals select embedded data that can be used for hardware and software verification.

33.   Accessories

Part Number	Item
6000-00003-00	Tracer 1 USB Stick With Proprietary Format
3400-00002-02	Hardware Kit – Plastic Cover Screws for lost or damaged screws
3400-00002-03	Hardware Kit – Wall Mount
3400-00003-01	90 Degree Elbow Cord Grip Plastic, for 0.19"-0.25" Cord OD, for 1/2 Knockout
3400-00004-00	Submersible Hole Plug for 1/2 Trade Size Knockout

34.   Contact Information

For Sales, Service and Warranty information, please contact:

Advent Industrial Technologies
PO Box 2000
Clifton, NJ 07015

(844)923-8368
sales@advent-industrial.com
www.advent-industrial.com

35.   Revision Control

This manual details the full feature set including software revision 0.18 used with revision A1 hardware (pre-production) as well as revision 1.00 used with revision B hardware (production).

Below is a list of features detailed in the manual which is not available in pre-production units:

a. Battery level monitor and alarm
b. Terminal block is not centered over pipe stand cutout
c. Not UL approved
d. UP and DOWN switches will be swapped, but board and cover silkscreen will be updated with labels. Rev B hardware will have silkscreen corrected

36.   Revision Record

Rev	Date	Description
0.01	11/24/2019	Initial Draft
0.02	3/23/20	Revised for clarity, accuracy, and completeness.
0.03	3/25/20	Updated to show software enhancements
0.04	-	Regression test release
0.05	-	Regression test release
0.06	-	Regression test release
0.07	4/12/20	Numerous updates and clarifications in software and manual
0.12	5/8/20	Released for regression
0.17	6/27/20	Regression test passed. Released for customer review.
0.18	8/1/20	ECO1304
1.00	8/7/20	SOFTWARE AND REV B HARDWARE PENDING