3101 Chromalox®

High/Low Limit Controller

FM APPROVED

UL

c UL

Issue Date
November 2007

Operator's Manual
0037-75253

Table of Contents

Sections

Illustrations

Illustrations

Section 1
Getting Started

The Chromalox 3101 is a compact 1/4 DIN programmable high/low limit controller with two independent alarms. While designed to be low-cost, the 3101 has many features of high-end limit controllers:

- Universal Sensor Input
- Switching Power Supply allows universal AC voltage input (100 to 230 Vac)
- U. L. and U. L. (Canadian) Listed as an Overtemperature Controller
- FM High/Low Limit Controller
- High Impact Plastic Bezel and Housing
- One high/low limit output and two independent alarm outputs
- Time over/under setpoint display
- Max/Min process variable display
- One programmable Digital Input
- Isolated Serial Communications (optional)
- Analog Process Output (optional)
- Security protection
- 32°F to 149°F Operating Temperature
- ±0.2% Accuracy Specification
- VIEW DATA key on front panel for a quick access to Display Page
- Power Down Recovery feature retains limit and alarm status when power is restored

Model Identification

Before installation, please identify your controller model number. The model number is written on the tag on the side of the housing.

Figure 1.1 Model Identification

Model Temperature Controller

3101 Microprocessor-based 1/4 DIN Programmable High/Low Limit Controller. Universal Sensor Input accepts Thermocouple, RTD, Current or Voltage Inputs. One Digital Input and One Alarm Output.

Code	Limit Output #1
1	Relay—Form C Contact, 5A @ 120 or 230 Vac

Code	Alarm #1 Output
1	Relay—Form C Contact, 5A @ 120 or 230 Vac

Code	Analog Process Output Option
0	None
1	Field selectable 4-20mA or 1-5 Vdc

Code	Digital Comm. and Alarm #2 Options
0	None
1	RS422/485 Digital Communications and Alarm #2 Relay—Form C contact, 5A @ 120 or 230 Vac
2	RS232 Digital Communications and Alarm #2 Relay—Form C Contact, 5A @ 120 or 230 Vac

Code	Power Supply
0	100 - 230 Vac

3101 -	**1**	**1**	**1**	**2**	**0**	**Typical Model Number**

Section 2
Installation

Inspection and Unpacking

On receipt of your 3101 controller, immediately make note of any visible damage to the shipment packaging and record this damage on the shipping documents. Unpack the controller and carefully inspect it for obvious damage due to shipment. If any damage has occurred, YOU must file a claim with the transporter, as they will not accept a claim from the shipper.

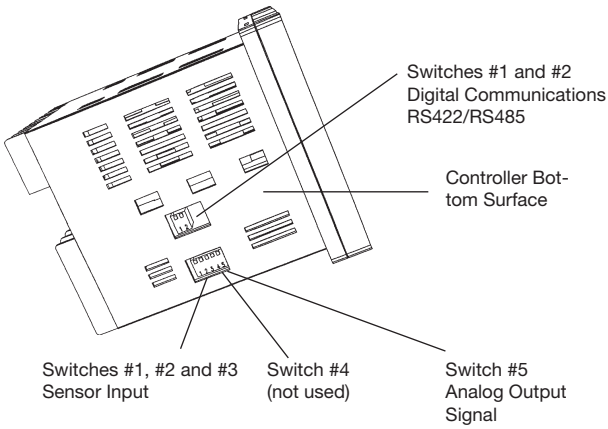
If the controller will not be immediately installed and placed into operation, it should be stored in a cool, dry environment in its original protective packaging until time for installation and operation. Temperature extremes and excessive moisture can damage the instrument.

Switch Settings

The 3101 has up to seven (7) hardware switches located on the bottom of the controller. The switches are accessible through cutouts in the controller housing and do not require that you remove the controller from its housing to access the switches.

Figure 2.1 identifies the switches. Instructions for switch settings are given in the corresponding sections of the manual.

Figure 2.1
Sensor Selection
Dip Switch
Settings



Sensor Selection Switches

Sensor selection requires that you:

1. Set the sensor switches for the correct sensor type.
2. Program the input sensor type in sensor selection setup on the INPT Page (see page 36).

It is much easier to set the sensor input switches before you mount and wire the controller.

To set the sensor switches:

1. Locate the sensor switches — #1, #2 and #3 — on the bottom of the controller, as shown in Figure 2.1 on the previous page.
2. Place the switches in the appropriate Up or Down position for your input type:

	Switch #		
Input Type	**1**	**2**	**3**
T/C	Up	Up	Up
RTD	Down	Up	Up
4-20mA	Up	Down	Down
1-5 Vdc	Up	Up	Down

Mounting

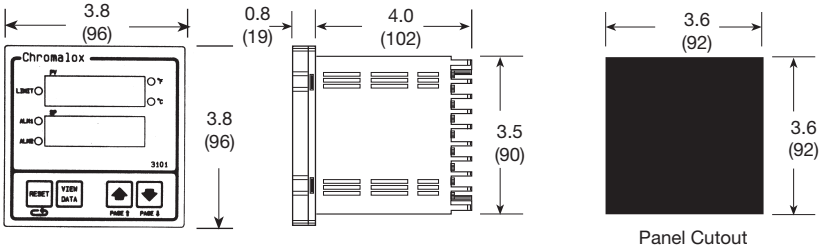
Figure 2.2, on the following page, shows the mounting dimensions for the controller:

1. Cut out the square “panel cutout” mounting hole and install the unit as shown in Figure 2.3.

2. Place the controller through the square panel cutout and replace the mounting clip.

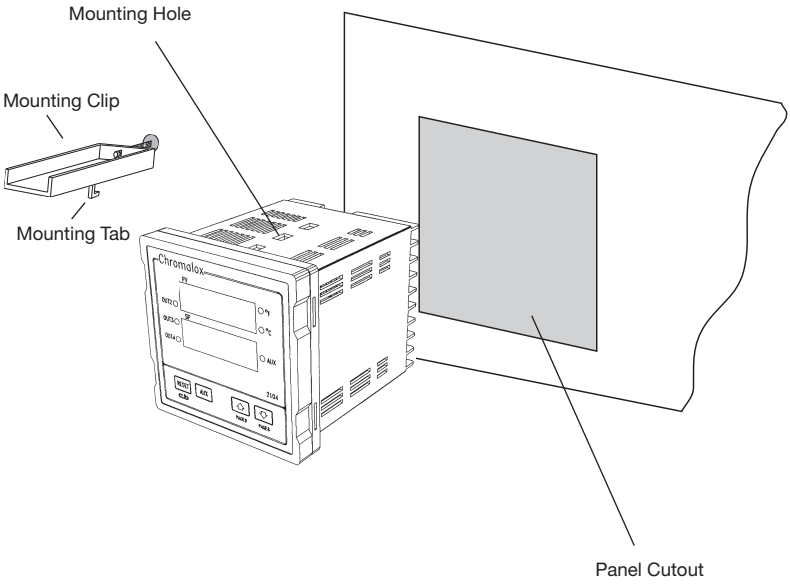
3. Tighten the mounting clip screw (do not overtighten) to secure the controller firmly against the mounting surface.

Figure 2.2 Mounting Dimensions



Measurements are shown in inches. Millimeters are shown in parentheses.

Figure 2.3 Mounting Diagram



Wiring Instructions

Good Wiring Practices

1. When planning the system wiring, separate wiring into functionally similar bundles - i.e. power leads, sensor leads, output signal lines, etc. If the power leads and sensor leads must cross, they should cross at a 90° angle to each other (perpendicular).

2. Locate all sources of electrical noise in your system, and separate these sources from the control systems—motors, contacts, solenoids, etc. Electrical noise can affect the function of any control system. When driving a contactor coil or other inductive load, an appropriately rated AC snubber circuit is recommended (Chromalox Part. No. 0149-01305), as described on page 11, “Relay Output Wiring.”

3. For sensor wiring practices, see Sensor Wiring Notes, next page.

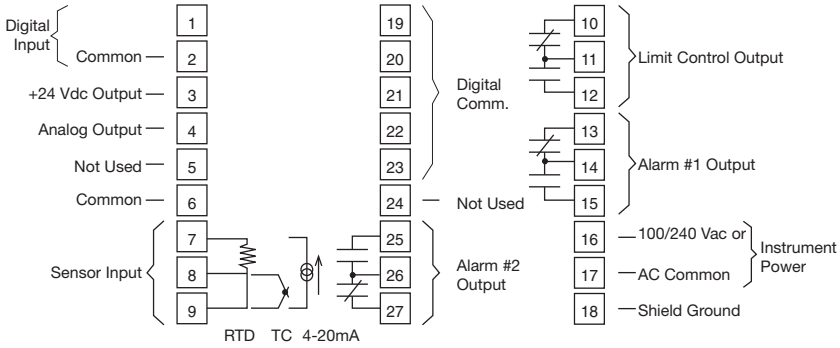
4. Additional information on good wiring practices is available from IEEE, 345 East 47th St., NY, NY 10017. Request IEEE Standard No. 518-1982.

Make all electrical wiring connections to the back of the controller before power is applied to the unit.

All wiring must comply with local codes, regulations and ordinances. This instrument is intended for panel mounting and the terminals must be enclosed within a panel. Use National Electric Code (NEC) Class 1 wiring for all terminals except the sensor terminals.

Check the wiring decal on the side of the unit to verify the model number. The wiring decal shows the wiring terminations. All wires will be connected to the terminals on the back of the instrument case. Specific wiring instructions for different input and output types are given in this section.

Figure 2.4 Wiring Terminal Identification



Sensor Input Wiring

Sensor Input Wiring Notes:

- Sensor leads (thermocouple and RTD) should not be run together in the same conduit as power wiring.
- Twisted pair, shielded wire is recommended for sensor connections.
- False process readings can occur if the sensor wire is exposed to electrical noise.
- Ungrounded thermocouples are recommended.
- If thermocouple extension wire is required, it must be the same type as the thermocouple (i.e. if a Type K thermocouple is used, then Type K extension wire must be used).
- Thermocouple wires should connect directly to the controller terminals. Do not use copper crimp terminals or solder terminals to make connections.
- If shielded thermocouple wire is used, the shield must be grounded at one end only, preferably at the shield ground terminal on the controller, as shown in Figure 2.5.
- Three wire RTDs are recommended for greatest accuracy.
- Standard shielded copper wire is recommended for RTD extensions.

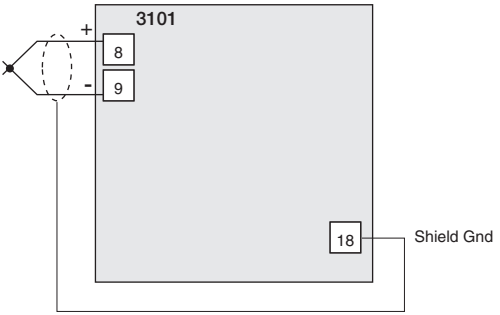
Thermocouple Inputs

It is important to observe polarity (+, -) when connecting thermocouple leadwires. The table below shows ANSI color coding for the thermocouples used with this instrument.

T/C Type	Material	Polarity (+)	Polarity (-)
B	Plat, 30% Rhodium/ Plat, 6% Rhodium	Gray	Red
J	Iron/Constantan	White	Red
K	Chromel/Alumel	Yellow	Red
E	Chromel/Constantan	Purple	Red
T	Copper/Constantan	Blue	Red
R	Plat, 13% Rhodium/Plat	Black	Red
S	Plat, 10% Rhodium/Plat	Black	Red

Make the thermocouple wiring connections to terminals as shown in Figure 2.5.

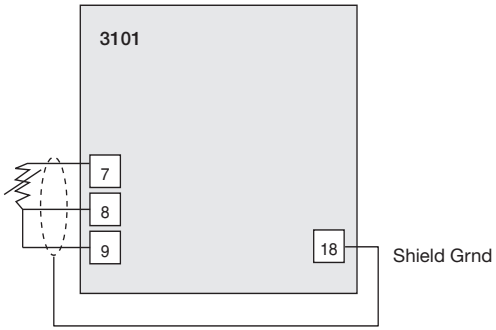
Figure 2.5
Thermocouple
Connections



3-Wire RTD Inputs

When making the 3-wire RTD input connection, it is important to make the resistance of all three extension leadwires equal by using the same gauge and same length of wire for optimum leadwire compensation. Chromalox recommends 3-wire RTDs for greatest accuracy, and standard shielded copper wire for RTD extensions. Make 3-wire RTD connections to terminals 7, 8 and 9 as shown in Figure 2.6 on the following page.

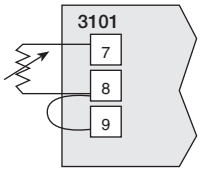
Figure 2.6
3-Wire RTD
Connections



2-Wire RTD Inputs

If using a 2-wire RTD input, use heavier gauge leadwires to reduce leadwire resistance. Any leadwire resistance adds directly to sensor resistance, thus adding error to the process temperature measurement. It is also necessary to jumper terminals 8 and 9 on the instrument to complete a 2-wire hookup.

Figure 2.7
2-Wire
Connections



Current/Voltage Inputs

Figure 2.8
Current
Input Wiring
(Self-powered)

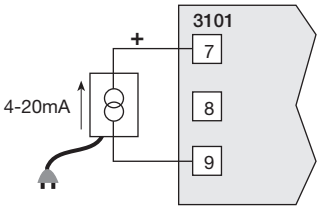
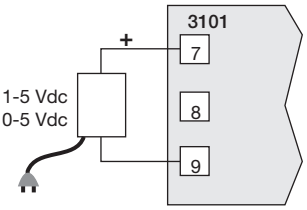
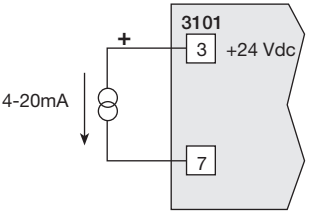


Figure 2.9
Voltage
Input Wiring
(Self-powered)



The 3101 has a +24 Vdc power supply which can be used to power a 4-20mA transmitter.

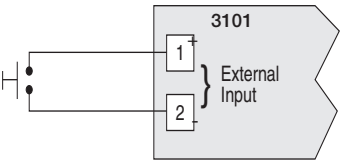
Figure 2.10
Current
Input Wiring
(Loop-powered
by controller)



Digital Input Connections

The digital input can be used to reset the latching alarms—Limit Output, Alarm #1 and Alarm #2. Setup for the digital input is shown on the Setup page (SET PAGE). An external, normally open, momentary contact can be connected to this input (100 msec., minimum closure). Use isolated switches only. Do not tie the Digital Input terminals to ground.

Figure 2.11
Momentary
Contact
Pushbutton



Output Wiring

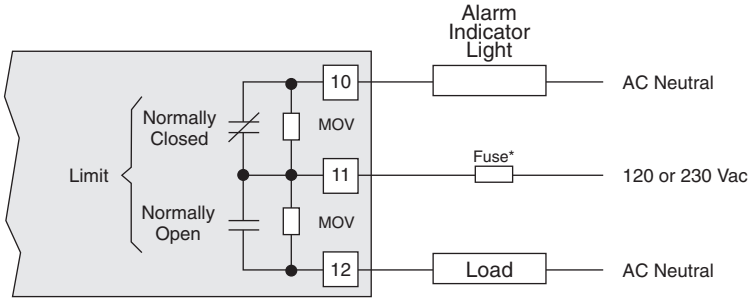
The 3101 is supplied with:
- 1 Relay Output for Limit Output Control
- 1 Relay Output for Alarm #1

As an option, it may also include:
- 1 Relay Output for Alarm #2

☛ **Warning**
Incorrect output wiring may cause system/process damage.

Limit Control Output Wiring

Figure 2.12
Relay Output Connections

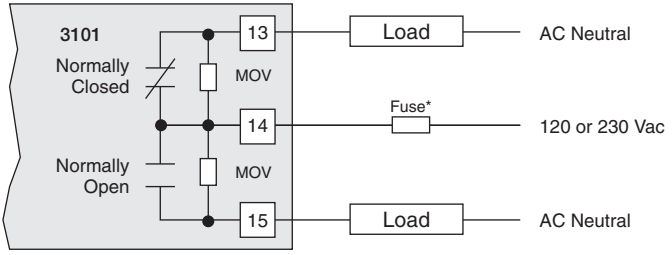


*Fuse should be sized for the current of the Limit Output.

Note: Relay is shown in De-energized (fail safe) state (Power off or alarm condition). Relay would be energized in normal operation (Power on and no alarm condition).

Alarm #1 Output The independent Alarm #1 relay output is connected as shown in Figure 2.13.

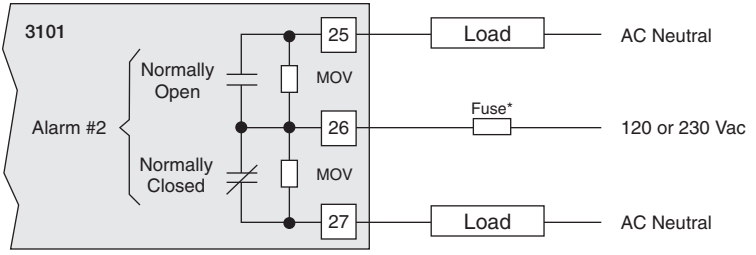
Figure 2.13
Alarm #1 Relay Output



* Fuse should be sized for the current Alarm #1 Output.

Alarm #2 Output The Form C Relay Output is connected as shown in Figure 2.14.

Figure 2.14
Alarm #2
Output

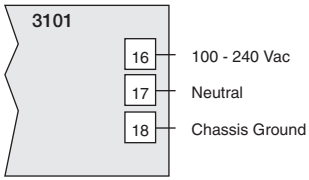


* Fuse should be sized for the current of Alarm #2 Output.

Instrument Power Wiring

Make 120/230 Vac instrument power connections to terminals 16-18 as shown in Figure 2.15.

Figure 2.15
100-240 Vac
Instrument Power
Connections
(3101-11**0)



Section 3
Operation

Section Contents

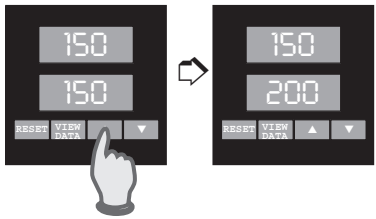
Pushbuttons and Indications

Control programming is easily accomplished with the front panel pushbuttons. The displays provide a constant overview of the process. Figure 3.1, on the next page, summarizes the functions of the pushbuttons and displays.

Normal Display Mode

At powerup, and when the controller is not being programmed, the upper display shows the Process Value and the lower display shows the limit setpoint.

The setpoint can be changed in the Normal Display Mode using the ⇧ and ⇩ pushbuttons, if the Security Level allows setpoint changes (see page 20 for Security Levels).



Use ▲ and ▼ to change setpoint in Normal Display Mode.

Disable Lower Display

The lower display may be disabled for applications where it is desirable to have only the Process Variable displayed in the upper display. See SETPAGE, menu LOSP, page 24.

Figure 3.1
Front Panel
Identification

- Process Variable Display in Normal Display Mode
- Alphanumeric Menu display in Setup Mode

LED indicates Limit Control Output ON

LEDs indicate °F or °C selected for Process Variable

LEDs indicate Alarms #1 or #2 Output ON

Limit Setpoint Display
- May be disabled on SET PAGE

RESET

Pushbutton
- Reset Latching Alarms
- Resets Limit Alarm
- Hold for more than 3 seconds to enter or exit Setup Mode
- Scrolls through MENUs in Setup Mode

VIEW DATA

Pushbutton
- To access Display Page
- To scroll through Display Page Menus

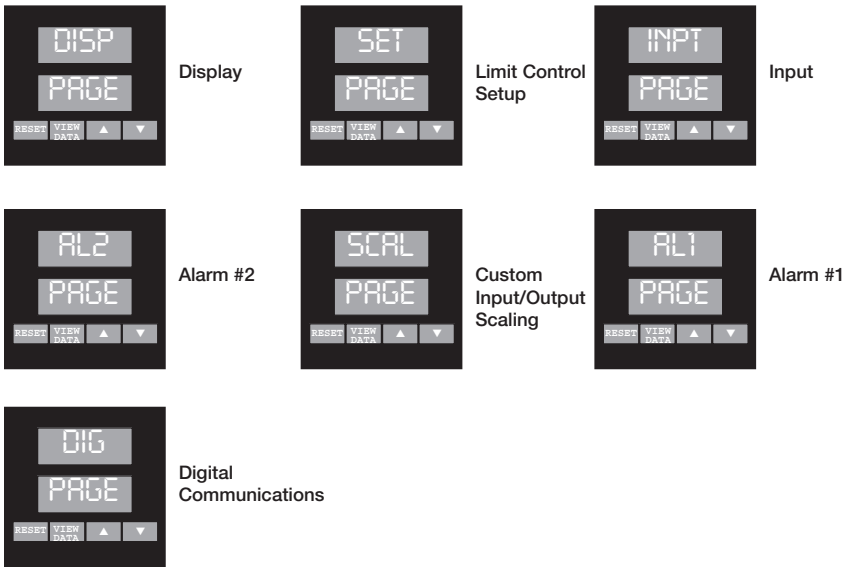
- In Normal Display Mode, pushbuttons adjust Setpoint.
- In Setup Mode, pushbuttons increase/decrease MENU values.

PAGE/MENU Setup

All control parameters, selections and calibration procedures for the 3101 are accomplished through simple MENU selections. These MENU selections are organized into PAGES. On each PAGE you will find a specific set of related functions.

This organization allows you to go directly to the parameter to be adjusted, without stepping through a long series of unrelated entries. Figure 3.2 illustrates the 3101 PAGE/MENU setup structure. Only pages that apply to your unit will be displayed (i.e. if you do not have Digital Communications or Alarm #2 options, these pages will not appear).

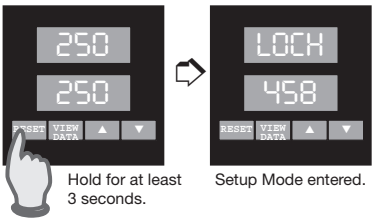
Figure 3.2
PAGE/MENU Setup Structure



Accessing a MENU is accomplished by entering the Setup Mode, then selecting a PAGE and MENU.

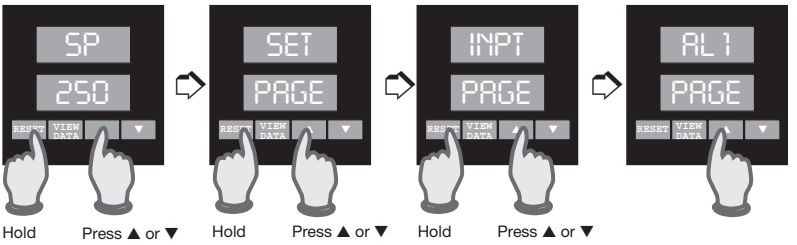
To enter Setup Mode:

Hold down the RESET pushbutton for longer than 3 seconds.



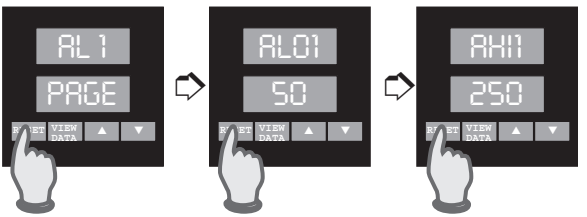
To select a PAGE:

Press and hold the Reset pushbutton, while pressing the ▲ or ▼ Pushbutton. The upper display will increment (or decrement) through the PAGEs, and PAGE will be displayed in the lower display.



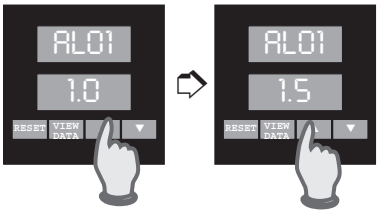
To select a MENU:

After reaching the correct PAGE, press RESET to move through the MENUs. The alpha cue for the MENU will appear on the upper display, and the current value will appear in the lower display.



To change a MENU value:

After the MENU is selected and displayed, use the  and  pushbuttons to change the value. For large adjustments (for example, 50 to 100), hold the pushbutton pressed and the display will change more quickly.



To return to Operating Mode:

Press and hold RESET for more than 3 seconds. The controller will automatically return to operating mode after 10 minutes of no pushbutton activity.

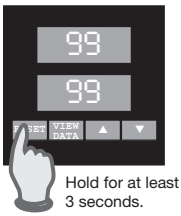


Figure 3.3
Sample of
PAGE/MENU
Table

SEt Page

MENU	Description	Available Settings	Security
LocK	Security Lock	0 to 9999	A
L SP	Limit Setpoint	Instrument Sensor Span	C
db	Limit Dead Band	0 to 100 C	
Ent1	Event Input Function	NonE = Disabled Rir = Alarm Reset	D
AOut	Analog Output Enable	NonE = Disabled Proc = Process Variable	
Cont	Controller Type	Hi Lo	

Security Levels

Every parameter or selection in the 3101 controller's setup PAGEs has an identifying MENU. Each MENU is assigned one of four Security Levels, A-D. In each level you may *view* certain MENUs, and *adjust* certain MENUs. This allows you to set the Security level that is appropriate for your operating environment, prohibiting unauthorized access to or accidental changing of control parameters.

Figure 3.4
Security Levels and PAGE/MENU Contents

Level	Code	Description
A	---	Display Page and Security Lock
B	123	Display Page and Security Lock
C	458	Settings for: Limit Control Alarms Input Digital Communications
D	736	Calibration Digital Input, Analog Process Output

Entering the Security Code

The Security Code is entered on the **Setup** PAGE SET, at the MENU LOCK. This code determines which MENUs may be viewed and adjusted.

The controller is set at Security Level C, when you receive it from Chromalox.

To access and enter the Security Code:

1. Press and hold RESET for more than 3 seconds to enter Setup Mode. Security Lock is the first menu that will appear.

Security Codes

Figure 3.5 lists the Security Codes for each of the four Security Levels, along with the levels that may be viewed and adjusted.

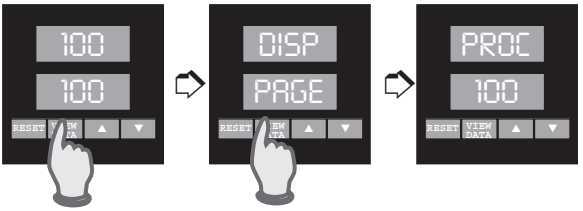
Figure 3.5
Security Codes & View/Adjust Levels

Security Level	Security Code	View/Adjust Level
A	- - -	A
B	**123**	A, B
C	458	A, B, C
D	**736**	A, B, C, D

If a number other than one of the three codes listed above is entered at LOCH on the SET PAGE, adjustment of all parameters is locked out. An additional security number can be added using the menu for User Selectable Security Code (SET PAGE, menu CODE).

To access the Display Page:

1. Press the VIEW DATA pushbutton to directly access the Display Page.



2. Press VIEW DATA to scroll through the menus/ displays.
3. To reset the menus Time Over Setpoint timer (TOSP) and Peak Temperature Displays (PEAK), press RESET while the menus are displayed.
4. To exit the Display Page, press and hold RESET for 3 seconds.

Section 4
Controller Setup PAGEs

Section Contents

This section contains detailed information for the following controller setup pages:

- DISP: Display
- SET: Limit Control Setup
- INPT: Input
- SCAL: Custom Scaling
- AL 1: Alarm #1
- AL 2: Alarm #2

Setup PAGEs specific to certain functions are located in the section of this manual that addresses that function specifically.

Section	Page	Topic	Setup PAGE
6	35	Alarms	INPT, AL 1, AL 2
8	43	Analog Output Option	SET, INPT, SCAL
9	45	Digital Communications	DIG

More Info

Throughout the following Setup PAGEs you will find these symbols 40. This indicates a section of this User's Manual where more specific information on a parameter/application/feature can be found.

The Display Page is for status only. None of the settings can be changed.

Display Page

MENU	Description	Displays	Security
PROC	Process Variable	Sensor Span	A
L SP	Limit Setpoint	Sensor Span	
LOUT	Limit Output	ON/OFF	
TOSP	Time Over Setpoint	0 TO 999.9 MIN	
PEAK	Peak Temperature	Instrument Sensor Span	
ALR	Alarm Output Status	NONE = No alarms AL 1 = Alarm #1 AL 2 = Alarm #2 AL12 = Alarm #1 and #2	

SET **Page**

MENU	Description		Available Settings	Security
LOCK	Security Lock	20	0 to 9999	A
L SP	Limit Setpoint		Instrument Sensor Span	C
DB	Limit Dead Band		0 to 100	C
ENTI	Event Input Function		NONE = Disabled ALR = Alarm Reset	D
AOUT	Analog Output Enable		NONE = Disabled PROC = Process Variable	
CONT	Controller Type	29	HI LO	
CODE	User Security Code		0 to 999 0-122 = Security level A 123-457 = Security level B 458-735 = Security level C 736-999 = Security level D	
A LO	Ambient Temperature Low		-3 to 153	
A HI	Ambient Temperature High		-3 to 153	
LOSP	Lower Display Disable		ON = Enabled OFF = Disabled	

Input Page

MENU	Description	Available Settings	Security
SENS	Sensor Type (4)	Sensor Type selected here must agree with dip switch settings. J = J Thermocouple K = K Thermocouple T = T Thermocouple E = E Thermocouple R = R Thermocouple S = S Thermocouple B = B Thermocouple RTD = 100 Pt RTD (α = .00385) 4-20 = 4 to 20mA 0-5 = 0 to 5 Vdc 1-5 = 1 to 5 Vdc	C
UNIT	Display Units	NONE = none (analog inputs) °F = Degrees Fahrenheit °C = Degrees Celsius	
COFF	Calibration Offset (56)	0 to ±100°F (±6.25% of span for analog inputs)	
SPLL	Setpoint Low Limit	Instrument Sensor Span	
SPUL	Setpoint Upper Limit	Instrument Sensor Span	
CALS	Sensor Calibration	INLO = Input low INHI = Input high DONE = Calibration finished	D
AD 0	Analog Output Zero Calibration	0 to 4095	
AD 5	Analog Output Span	0 to 4095	
RECC	Factory Calibration Recovery	RDY = Ready ---- = Wait DONE = Finished	

This PAGE appears only when Analog Input is selected, Remote SP is enabled, or Analog Output is enabled on SET PAGE.

Custom Scaling Page

MENU	Description		Available Settings	Security
DP	Analog Input Decimal Pts.	9	0 = none 1 = 123.4 2 = 12.34 3 = 1.234	C
RINL	Analog Process Input Low	9	-500 to 5000	
RINH	Analog Process Input High	9	-500 to 5000	
ROTL	Analog Process Output Low	44	Instrument Sensor Span	
ROTH	Analog Process Output High	44	Instrument Sensor Span	

Alarm #1 Page

MENU	Description		Available Settings	Security
EN1	Alarm 1 Enable		OFF = Disabled ON = Enabled	C
TYP1	Alarm 1 Type		NONE = Disabled (off) HI = High Alarm LO = Low Alarm HILO = High-Low Alarm PDE = Plus Deviation Alarm -DE = Minus Deviation Alm DE = Plus/Minus Dev Alm	
RLY1	Alarm 1 Relay	12	NDE = normally de-energized non-latching NE = normally energized non-latching NDEL = normally de-energized latching NEL = normally energized latching	
RLO1	Alarm 1 Low Setpoint		Instrument Sensor Span	
RHI1	Alarm 1 High Setpoint		Instrument Sensor Span	
DB1	Output 1 Dead Band (Alarm Hysteresis)		0 to 100°F (.00 to 6.25% of span for analog inputs)	
INH1	Alarm 1 Inhibit	36	OFF ON	

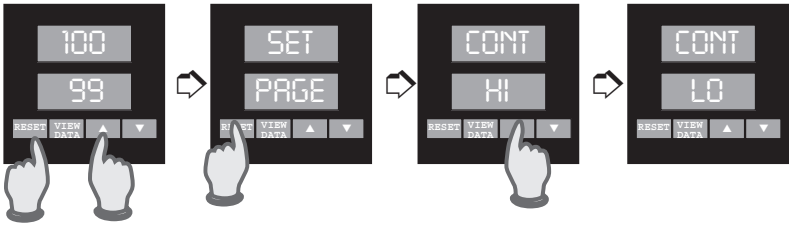
Alarm #2 Page

MENU	Description		Available Settings			Security
EN2	Alarm 2 Enable		OFF ON	= =	Disabled Enabled	C
TYP2	Alarm 2 Type		NONE HI LO HILO POE -DE DE	= = = = = = =	Disabled (off) High Alarm Low Alarm High-Low Alarm Plus Deviation Alarm Minus Deviation Alm Plus/Minus Dev Alm	
RLY2	Alarm 2 Relay	12	NDE NE NDEL NEL	= = = =	normally de-energized non-latching normally energized non-latching normally de-energized latching normally energized latching	
AL02	Alarm 2 Low Setpoint		Instrument Sensor Span			
AHI2	Alarm 2 High Setpoint		Instrument Sensor Span			
DB2	Output 2 Dead Band (Alarm Hysteresis)		0 to 100°F (.00 to 6.25% of span for analog inputs)			
INH2	Alarm 2 Inhibit	36	OFF ON			

Section 5
Limit Control Operation

Limit Control Operation

The 3101 High/Low Limit Controller provides control output and visual indication when the process variable exceeds the limit setpoint. The controller can be setup to operate as a high or low limit controller at the “controller type” menu:



On Powerup:
The controller status on powerup depends on the process variable. If the process value (PV) is within the setpoint range (i.e. below setpoint for high limit, above setpoint for low limit), the controller will begin normal operation. If the PV is out of the setpoint range (above setpoint for high limit, below setpoint for low limit), the controller will be in the limit alarm condition and cannot be reset until the PV is within the setpoint range or the setpoint is adjusted (above or below the PV).

To reset the limit output for normal operation, press RESET. This will put the output relay in the energized, normal operating condition. If the process variable is above (or below) setpoint, the controller will remain in the alarm condition and the limit output cannot be reset.

Limit Control Operation
(continued)

Normal Operating Condition (no Limit Alarm):

Limit Output Relay:	Energized
LIMIT LED:	Off

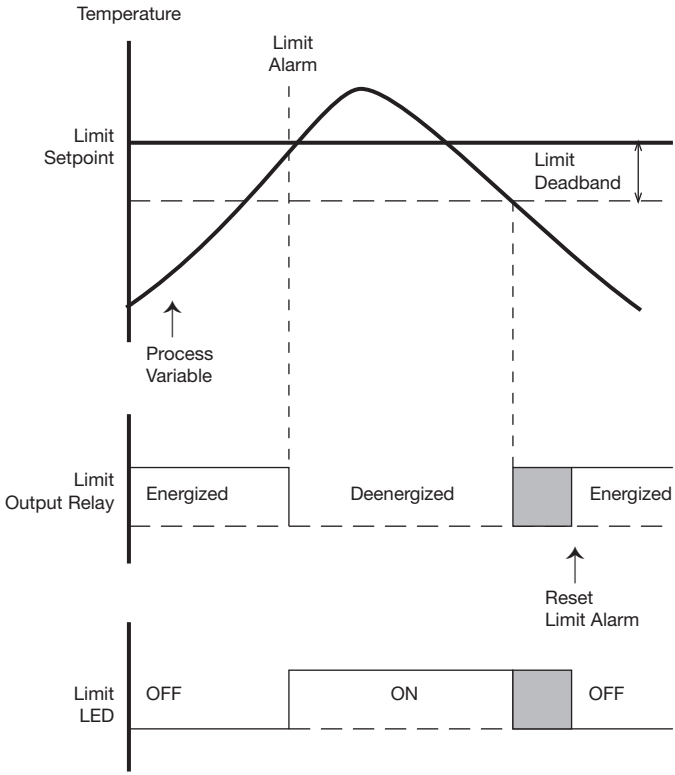
Limit Alarm Condition:

Limit Output Relay:	De-Energized
LIMIT LED:	ON

If the controller type is set as a high limit controller, the output is activated when the process variable exceeds the setpoint. If set as a low limit controller, the output is activated when the process variable drops below the setpoint (see Figure 5.1 on the following page).

Power Down Recovery:
In the event of a power failure, the 3101 will retain the current status of the Limit Alarm, record the Time Over Setpoint (TOSP) and Peak Temperature value (PEAK). The controller will return to this status when power is restored. If a limit alarm occurred and power was interrupted, the controller will restart in the Limit Alarm condition when power is reapplied.

Figure 5.1
Process Variable Profile—High Limit Control



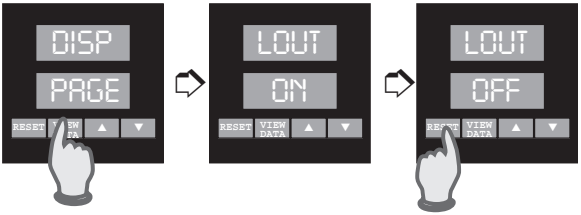
When the process variable exceeds the limit setpoint, the relay output is de-energized and the Limit LED comes ON. The Limit Alarm cannot be reset until the process variable falls below the Limit Setpoint Deadband.

Limit Control Output Reset

To acknowledge the Limit Output and reset the Output/LED, the process variable must be outside of the limit deadband setting. If the limit condition still exists, the limit output cannot be reset (as shown in Figure 5.1).

Reset the Limit Output/LED in one of two ways:

1. Press RESET.



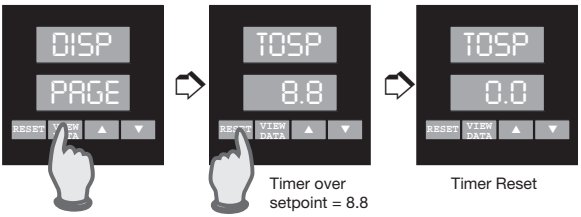
2. Press the Remote Alarm Acknowledge Switch.

41 An external switching device can be connected to the digital event terminals and used as a Remote Alarm Acknowledge Switch. The digital input function is setup on the SET PAGE, menu ENTI. See page 41 for details.

Over Setpoint Timer

The 3101 is equipped with a timer to register the total process time over setpoint. This internal timer begins recording the total time of the process over (or under) the limit setpoint. The time may be reviewed on the Display page, menu TOSP.

Press VIEW DATA to access the TOSP menu:

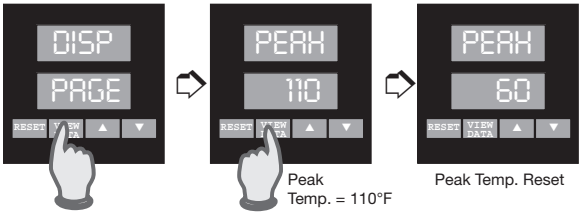


To reset the Time Over Setpoint Timer the PV must be within the normal setpoint limit. Press RESET to set the TOSP setting to “0.0”. Press and hold RESET for 3 seconds to exit the Display Page.

Peak Temperature Display

The 3101 also records and displays the peak (minimum or maximum) temperature when the process variable exceeds the setpoint.

To see the PEAK temperature, press VIEW DATA to access the PEAK menu:

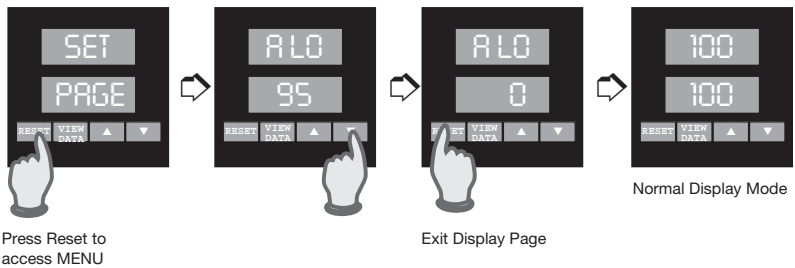


To reset the Peak Temperature, the PV must be within the normal setpoint limit. Press RESET to set the PEAK display to the current PV. Press and hold RESET for 3 seconds to exit the Display Page.

Peak Ambient Temperature Display

The 3101 records and displays the peak (minimum and maximum) ambient temperatures that the controller has sensed (internal sensor, no separate sensor or probe).

To view the peak ambient temperatures, select A LO and A HI on the SET PAGE. The ▲ and ▼ pushbuttons may be used to preset these values. The current ambient temperature, as sensed by the controller's internal sensor, will be recorded as soon as the PAGE/MENU is exited, if it exceeds the preset value.



The 3101 controller has one alarm output (Alarm #1) and an optional Alarm #2 output. The optional Alarm #2 output is indicated by the following model numbers:

Optional Outputs	Model Number
Alarm #2	3101 - 11*1* 11*2*

Each alarm is individually setup with a high and low setpoint on its own Page:

- ALR1 PAGE
- ALR2 PAGE

Alarm Types

Each of the alarms can be set up for the following alarm types:

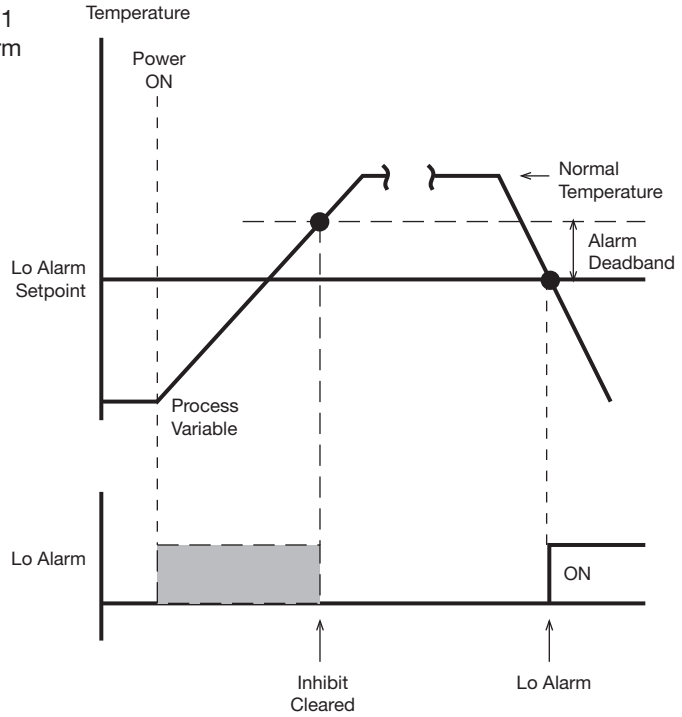
HI	High Alarm—Absolute Temperature Alarm
LO	Low Alarm—Absolute Temperature Alarm
HILO	High/Low Alarm—Absolute Temperature Alarm
PDE	+Deviation Alarm—Setpoint Tracking Alarm
-DE	-Deviation Alarm—Setpoint Tracking Alarm
DE	±Deviation Alarm—Setpoint Tracking Alarm

The Absolute Temperature Alarms are set to a specific value; i.e. if the High Alarm is set for 100°F, the alarm will turn on at 100°F. The Deviation Alarms, or Setpoint Tracking Alarms, track the process setpoint. If the Alarm = 5°F and the setpoint is 70°F, the + Deviation Alarm will energize at 75°F.

Alarm Inhibit

When enabled, the Alarm Inhibit feature prevents false alarms during initial powerup. For example, the low alarm will not be set until after the process temperature has initially reached the alarm setpoint. Alarm Inhibit is selectable (ON/OFF) for each alarm output.

Figure 6.1
Low Alarm Inhibit



Alarm Wiring

Wiring instructions for Alarms #1, and #2 are given on pages 12-13.

Alarm Relay Action

The Alarm Relays can be set to be normally energized or de-energized, latching or non-latching. A normally de-energized relay is in its non-energized state when not in alarm. For example, the alarm relays are normally-open contacts. When setup as normally de-energized, the relays will be open when not in alarm, and closed when in alarm. A non-latching relay will not stay in alarm if the alarm condition goes away. A latching relay will not go out of alarm until the alarm condition no longer exists and RESET is pressed.

Alarm Operation

Latching alarms can be reset by pressing RESET on the controller front panel. The alarm cannot be reset until the process is out of the alarm condition. The Digital Input provides a remote alarm reset button (see page 41).

Alarm #1 Page

MENU	Description		Available Settings			Security
EN1	Alarm 1 Enable		OFF ON	= =	Disabled Enabled	C
TYP1	Alarm 1 Type		NONE HI LO HILO POE -DE DE	= = = = = = =	Disabled (off) High Alarm Low Alarm High-Low Alarm + Deviation Alarm - Deviation Alarm ± Deviation Alarm	
RLY1	Alarm 1 Relay	12	NDE NE NDEL NEL	= = = =	normally de-energized non-latching normally energized non-latching normally de-energized latching normally energized latching	
RLO1	Alarm 1 Low Setpoint		Instrument Sensor Span			
RHI1	Alarm 1 High Setpoint		Instrument Sensor Span			
DB1	Output 1 Dead Band (Alarm Hysteresis)		0 to 100°F (.00 to 6.25% of span for analog inputs)			
INH1	Alarm 1 Inhibit	36	OFF ON			

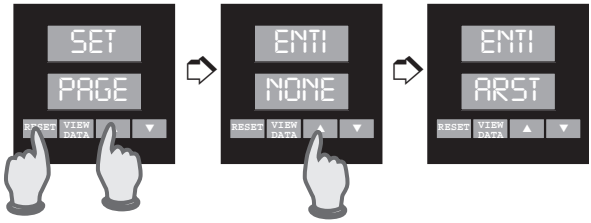
Alarm #2 Page

MENU	Description		Available Settings			Security
EN2	Alarm 2 Enable		OFF ON	= =	Disabled Enabled	C
TYP2	Alarm 2 Type		NONE HI LO HILO POE -DE DE	= = = = = = =	Disabled (off) High Alarm Low Alarm High-Low Alarm + Deviation Alarm - Deviation Alarm ± Deviation Alarm	
RLY2	Alarm 2 Relay	12	NDE NE NDEL NEL	= = = =	normally de-energized non-latching normally energized non-latching normally de-energized latching normally energized latching	
AL02	Alarm 2 Low Setpoint		Instrument Sensor Span			
AHI2	Alarm 2 High Setpoint		Instrument Sensor Span			
DB2	Output 2 Dead Band (Alarm Hysteresis)		0 to 100°F (.00 to 6.25% of span for analog inputs)			
INH2	Alarm 2 Inhibit	36	OFF ON			

Section 7
Digital Event Input

The 3101 controller Digital Event Input allows you to use a pushbutton contact to function as a remote Alarm Reset.

The external switching device is connected to the controller Digital Input at terminals 1 and 2 (see page 10 for wiring instructions). The Digital Input function is selected in the SET PAGE programming, menu ENTI.



SET Page

MENU	Description	Available Settings	Security
ENTI	Event Input Function	NONE = Disabled ARST = Alarm Reset	D

Section 8
Analog Output Option

Analog Output Option

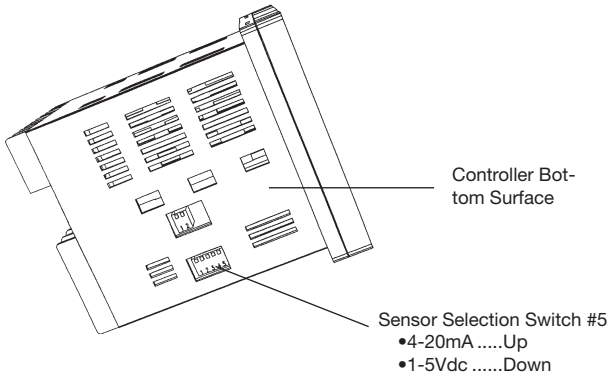
The Analog Output Option is provided on controllers with model number

- **3101 - 111****

This option can be used to transmit process variable to a remote recorder, computer or other device via a
4-20mA or 1-5Vdc signal, selectable by a switch on the bottom of the controller.

To Select the Analog Process Output Signal
Locate switch #5 on the bottom of the controller, as shown in Figure 8.1. Place the switch in the desired position.

Figure 8.1
Analog Output Signal



To Enable the Analog Output Option:
The Analog Output function is selected on the SET PAGE, MENU AOUT. Available MENU settings are:

- PROC = ON (Enabled)
- NONE = OFF (Disabled)

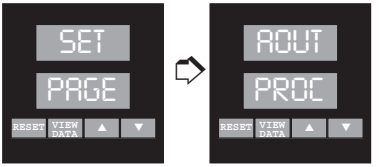
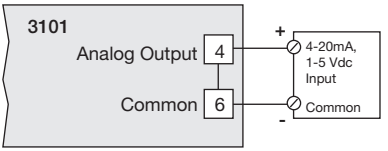


Figure 8.2
Process
Output Wiring



To Scale the Output Signal
When the Process Variable or Active Setpoint is selected for transmission, the output signal is scaled using the Analog Output scaling MENUs. Go to the SCAL PAGE, MENUs AOTL (analog output low) and AOTH (analog output high). Enter the output signal range to be sent to your recorder or computer (i.e., 100°F = 4mA and 500°F = 20mA).

Custom Scaling Page			
MENU	Description	Available Settings	Security
AOTL	**Analog Process Output - Low**	**Instrument Sensor Span**	**C**
AOTH	Analog Process Output - High	Instrument Sensor Span	C

Section 9
Digital Communications

The Digital Communications option is provided on the following controllers:

Model	Communications
3101 - 11* **1***	RS232
3101 - 11* **2***	RS485/422

The Digital Communications option gives the 3101 the ability to interface with computers using either Chromalox's Computer Interface mode or ASCII Line mode. These modes implement communications that can address up to 255 Chromalox controllers on an RS422A/RS485 multidrop line. The protocols for these two modes are described in the Digital Communications User's Manual that is supplied with controllers containing the Digital Communication option.

ChromaSoft™

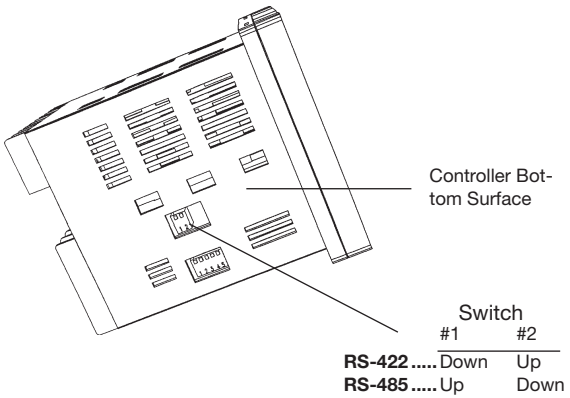
If a prepackaged software program is preferred for multidrop digital communication with up to 255 Chromalox controllers, Chromalox offers ***ChromaSoft*** remote operator interface software. ***ChromaSoft*** is DOS-based and communicates with the controllers via a serial interface port. Instructions for using ***ChromaSoft*** are given in the User's Manual provided with the software.

Hardware Setup

RS232 can be used to connect a computer or modem to a single 3101 controller. RS232 lines can be run over distances up to 50 feet.
RS422 and RS485 provide multidrop network communications where up to 255 controllers can communicate with a single computer at a distance of up to 4000 feet.

Hardware Setup (continued)
When shipped from the factory, the multidrop communications interface is set for RS422. If you are using RS485, two switches in the controller hardware must be positioned for the communications interface. Locate the switches on the bottom of the controller and position them as shown in Figure 9.1.

Figure 9.1
RS422/RS485
Communications
Switches

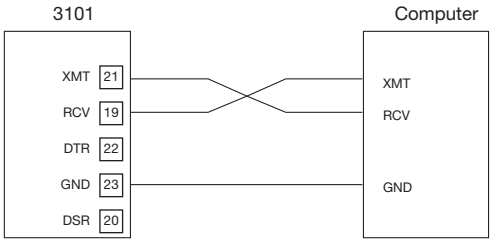


Digital Communications Wiring

Wiring connections for the digital communications interface are made on terminals 9-13 using shielded serial interface cable.

RS232 Communications

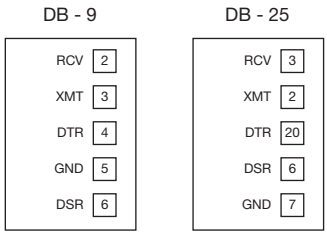
Figure 9.2
RS232 Wiring
Connections



Note: The DTR output is always enabled when the 3101 power is on.

Following are typical connector pin designations for comm-based data acquisition. Reference the manufacturer's specifications for computer interconnections.

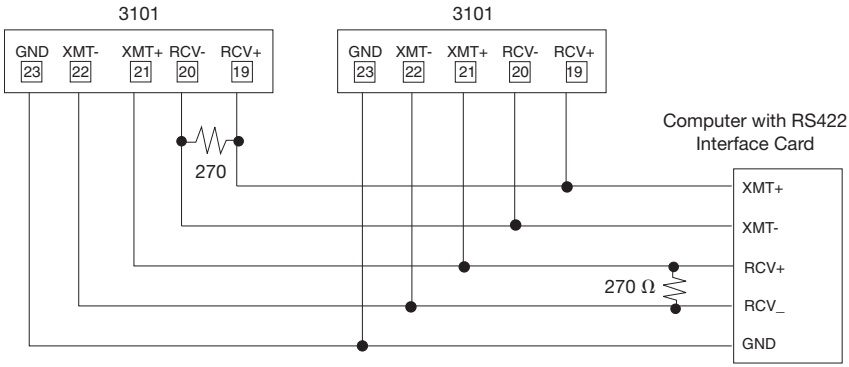
Figure 9.3
RS232 Connector Pin Designations (Typical)



RS422A Communications

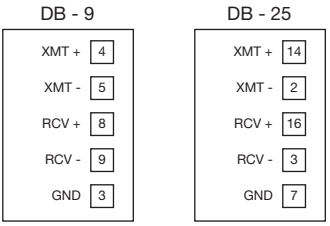
RS422 defines a balanced interface with no accompanying physical connector. Reference manufacturer's specifications for computer interconnections.

Figure 9.4
RS422A Wiring Connections (4-wire)



Note: 270 Ω resistors recommended across receive line on computer and last controller.

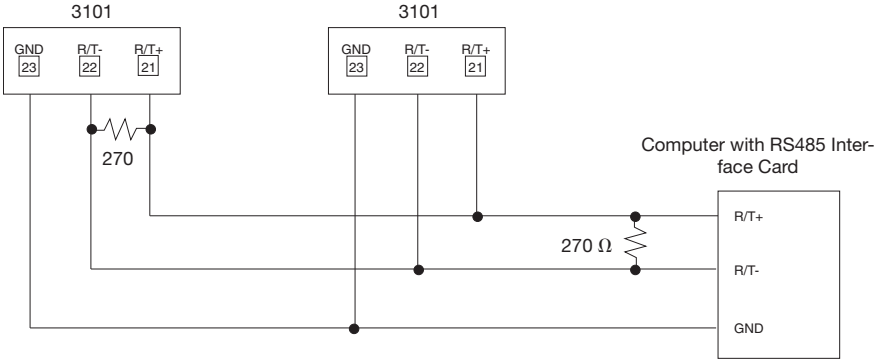
Figure 9.5
RS422A
Connector
Pin
Designations
(Typical)



RS485 Communications

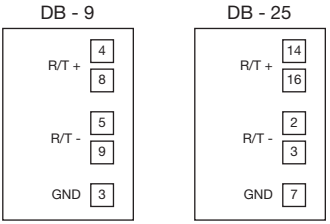
RS485 defines a tri-state interface with no accompanying physical connector. Reference manufacturer's specifications for computer interconnections.

Figure 9.6
RS485 Wiring Connections (2-wire)



Note: 270 Ω resistors recommended across receive line on computer and last controller.

Figure 9.7
RS485
Connector
Pin
Designations
(Typical)



Digital Communications Programming and Setup

All programmed selections are made on the DIG PAGE of the controller.

This setup PAGE appears only if the controller is equipped the digital Communications option.

Digital Communications Page: DIG PAGE

MENU	Description	Available Settings	Security
DIGT	Mode Selection	OFF = Disabled CPIF = Computer Interface LINE = ASCII Line*	C
BAUD	Baud Rate	1200 2400 4800 9600 19.2K	
ADDR	Address	1 to 255	

*For ASCII Line Mode Communications, see page 65 for PAGE # / MENU #.

Section 10
Calibration

In this section you will find calibration instructions for calibrating:

- Sensor Input
- Analog Output

Instructions are also given for:

- Factory Calibration Recovery
- Calibration Offset

When is Calibration Required?

The 3101 controller is factory calibrated before shipment to you, therefore, it is not necessary to calibrate the controller when you receive and install it. Periodic calibration checks or adjustments of the unit should not be required under normal operating conditions. Chromalox recommends that you recalibrate the controller in the following instances:

- all instruments in your facility are periodically calibrated to one device (metrology)

Important Calibration Notes

1. **Disconnect load power when calibrating.**
2. RTD inputs should be calibrated using copper (Cu) wire, and thermocouple inputs should be calibrated using thermocouple extension wire of the same type as the thermocouple you are calibrating.
3. Substitute a precision sensor simulator (thermocouple simulator or resistance decade box) for the sensor inputs. The controller should be allowed to warm-up with the appropriate sensor simulator connected for at least one hour prior to calibration.
4. To access the calibration, you will need to be at LEVEL D security. Enter Security Code "736" at menu LOCK on the SET PAGE.

Sensor Input Calibration

The sensor input of the 3101 can be calibrated using an appropriate sensor simulator and the Sensor Calibration menu on the Input Page.

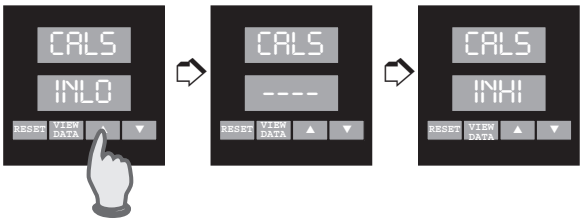
1. Connect the sensor simulator to the sensor input terminals.
2. Go to menu CALS. The lower display will show INLO, indicating that you should first calibrate the sensor low end.

Sensor Input Calibration (continued)

3. Adjust the simulator to output the low end of the selected sensor range. Sensor minimum ranges are:

Sensor	°F	°C
J T/C	-100	-73
K T/C	-300	-184
T	-350	-212
E	-100	-73
R	0	-18
S	0	-18
B	50	10
RTD	48.46Ω	
4-20mA	4mA	
0-5 Vdc	0 Vdc	
1-5 Vdc	1 Vdc	

4. Wait 30 seconds for the electronics to fully stabilize. Press  . Dashes will appear in the lower display while the controller calibrates the low end of span.



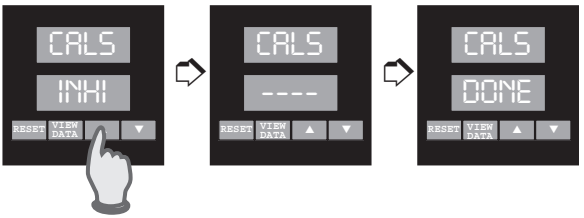
5. When the controller prompts INHI in the lower display, adjust the sensor simulator to output the high end of the currently selected sensor span.

Sensor maximum ranges are:

Sensor	°F	°C
J T/C	1400	760
K T/C	2400	1316
T	750	399
E	1100	593
R	3200	1760
S	3200	1760
B	3300	1816
RTD	293.49Ω	
4-20mA	20mA	
0-5 Vdc	5 Vdc	
1-5 Vdc	5 Vdc	

Sensor Input Calibration (continued)

6. Wait 30 seconds for the electronics to stabilize. Press ⬆. Dashes will appear in the lower display while the controller calibrates the high end of span. When finished, the controller will display DONE.

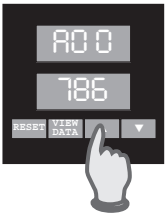


7. Press and hold RESET for 3 seconds to exit calibration mode.

Analog Output Option Calibration

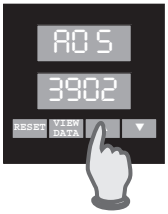
The Analog Output signal is calibrated using an appropriate current or voltage meter. Calibration is performed in the two analog output calibration menus (Ro 0 and Ro 5) on the Input Page.

1. Connect the meter to the analog process output terminals. To calibrate the analog output, the output must be set to the low end of span.
2. Go to menu RO 0. Adjust the value in the lower display—using ⬆ and ⬇—until the meter reads 4mA or 1.000 Vdc.



Analog Output Option Calibration (continued)

3. Adjust the setpoint to the high end of span.
4. Go to menu AO S. Adjust the value in the lower display until the meter reads 20mA or 5.000 Vdc.



5. Press and hold RESET for 3 seconds to exit calibration mode.

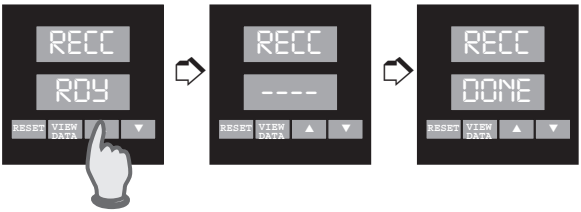
Factory Calibration Recovery

This option allows you to return the controller to its factory calibration settings in the event that it is severely out of calibration due to poor technique or unauthorized calibration. Although the factory calibration settings are recovered, this does not guarantee original calibration accuracy. The Factory Calibration Recovery should be used as a "starting point" for recalibration, should the unit become severely out of calibration.
Factory Calibration Recovery is performed on the INPT PAGE, menu RECC.

Factory Calibration Recovery (continued)

To reestablish the factory calibration constants:

1. Disconnect load power.
2. Go to menu RECC and press ⬆. The controller will automatically recalibrate.



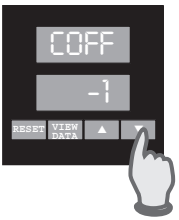
3. The lower display cycles from "----" to "DONE". Press RESET to exit the calibration mode.

Display Calibration Offset

If an offset on the temperature reading is desired, the Display/Calibration Offset menu may be used. In some applications, this offset may be desired to match another instrument or an inferred temperature in another part of the system.
To establish the calibration offset:

1. Go to menu COFF on the Input Page.

2. Use ⬆ and ⬇ to set the calibration offset, adjustable from -100 to 100°F.



Section 11
Specifications

Limit Control Mode	
Automatic	Normally-energized latching relay; relay de-energizes at and above limit setpoint to generate Alarm Condition. Output Type Relay, Form C contacts, 5 Amps at 120/230 Vac
Limit Control Adjustments	
High/Low Limit Setpoint	Sensor Range
Setpoint Limits	Sensor Range
Deadband	0 to 100°F
Display Offset	-100 to 100°F
Alarm Adjustments	
Setpoints	High and Low Settings for each Alarm Output
Alarm Types	Absolute: High, Low and High/Low Tracking: + Deviation, - Deviation and +/- Deviation
Relay Action	Latching or Non-Latching, Energized or De-Energized
Alarm Deadband	Adjustable, 0 to 100°F
Alarm Inhibit	On Power-Up, Enabled or Disabled
Alarm Outputs	
Relay	Form C contacts, 5.0 Amps at 120/230 Vac (resistive)
Sensor Input	Field selectable Thermocouple, RTD, Current or Voltage
Input Update Rate	2 Samples per Second
Readout Stability	
J, K, E Thermocouple	±1°F/10°F change in ambient temperature
T Thermocouple	±2°F/10°F change in ambient temperature for sensor temperature > -80°C ±5°F/10°F change in ambient temperature for sensor temperature < -80°C
R, S, B Thermocouple	±2°F/10°F change in ambient temperature
RTD	±0.5°F/10°F change in ambient temperature
4-20mA, 1-5Vdc	±0.05% of span / 10°F change in ambient temperature
Digital Input	Accepts dry-contact closure, momentary pushbutton (100 ms/min.)
Analog Output (Optional)	
Retransmit Function	Process Variable
Output Signal	4-20mA into 0-800 load 1-5 Vdc into 100K or greater load Selectable via DIP switch
Range	Programmable over selected sensor span for retransmission of Process Variable
Accuracy	±0.2% of programmed span, ±1 LSD

Input Specifications	Range °F	Range °C	Accuracy @ 77°F ambient
J T/C	-100 to 1400	-73 to 760	± 0.2% of sensor span
K T/C	-300 to 2400	-184 to 1316	± 0.2% of sensor span
T T/C	-350 to 750	-212 to 399	± 0.2% of sensor span for PV > -112°F (-80°C) ± 0.4% of sensor span for PV < -112°F (-80°C)
E T/C	-100 to 1100	-73 to 593	± 0.2% of sensor span
R T/C	0 to 3200	-18 to 1760	± 0.4% of sensor span
S T/C	0 to 3200	-18 to 1760	± 0.4% of sensor span
B T/C	50 to 3300	10 to 1816	± 0.4% of sensor span for PV > 1000°F
100 Pt RTD (α = .00385)	-200 to 1000	-128 to 538	± 0.2% of sensor span
4-20mA	-500 to 5000 (programmable)		±0.2% of sensor span
0-5 Vdc	-500 to 5000 (programmable)		± 0.2% of sensor span
1-5 Vdc	-500 to 5000 (programmable)		± 0.2% of sensor span

Transmitter Power	
+24 Vdc Output	+24 Vdc ±20% at 50mA maximum

Digital Communications (Optional)	
RS-232	Single-drop, isolated
RS-422/485	Multi-drop, isolated, field selectable by switch
Baud rates	1200, 2400, 4800, 9600, 19.2K
Protocols	ASCII Line, Computer Interface
Instrument Power	100 to 240 Vac, +10%, -15%; 15VI
Operating Environment	32 to 150°F (0 to 65°C) ambient temperature, relative humidity less than 95%, non-condensing
Dimensions	
Overall	4.00 x 4.00 x 4.75 inches (102 x 102 x 121mm)
Depth Behind Projection	4.00 inches (102 mm)
Front Panel Projection	0.75 inches (19 mm)
Panel Cutout	3.6 x 3.6 inches (92 mm x 92 mm)
Case Material	High Impact, Black ABS Plastic
Front Panel	NEMA 4X Construction

Influence of Line Voltage Variation	±0.1% of Sensor Span/10% change in nominal line voltage
Noise Rejection	
Common Mode Noise	140dB at 60 Hz
Series Mode Noise	±0.1% of Sensor Span with 300mV peak to peak, 50 or 60Hz series mode noise
RFI	Typically less than 0.5% of Sensor Span at a distance of 1 meter (3.1 feet) from transmitter (4W, 464Mhz)
Sensor Leadwire Effect	
J Thermocouple	+1°F for 1000 Ft. of 18 AWG extension wire
K Thermocouple	+5°F for 1000 Ft. of 18 AWG extension wire
E Thermocouple	+4°F for 1000 Ft. of 18 AWG extension wire
R Thermocouple	+3°F for 1000 Ft. of 18 AWG extension wire
S Thermocouple	+3°F for 1000 Ft. of 18 AWG extension wire
B Thermocouple	+6°F for 1000 Ft. of 18 AWG extension wire
T Thermocouple	+1°F temperatures > -112°F (-80°C) +2°F temperatures < -112°F (-80°C)
RTD, 4-20mA, 1-5 Vdc	±0.1% of Sensor Span/20 bbalanced leadwire resistance

Section 12
Troubleshooting

The following Troubleshooting Guide gives simple solutions to common problems, and explains the 3101's Error Messages. Should you have a problem with your controller, it is a good idea to check this Guide for possible corrections before contacting the factory. The corrections are listed in the order in which they should be performed.

Troubleshooting Guide

Symptom	Probable Cause	Correction
Power applied, display does not light and controller does not function	1. No power applied	1. Check power wiring and fusing 2. Power down and repower up
Display reads OPEN SENS	1. Open sensor 2. Out of calibration	1. Check sensor wiring (page 7-10) 2. Check sensor type selected at INPT PAGE, SENS 3. Recover Factory Calibration (page 55) 4. Attach sensor simulator and verify calibration (page 52)
Erratic operation	1. Intermittent sensor connections 2. Controller failure (internal electronics)	1. Check sensor wiring or substitute sensor simulator 2. Power down and repower up 3. Contact factory
Instrument continually goes through power-up reset	1. Internal electronic failure 2. Drastic power line anomalies	1. Contact factory
ERR3 displayed with PAGE in lower display	1. EEPROM failed redundancy check	1. Power down and back up to retest EEPROM 2. Go to PAGE shown. Use RESET pushbutton to scroll through all menus. Readjust any settings that appear incorrect. After scrolling through all menus, error will clear.
ERR4 displayed	1. A to D electronics failure	1. Power down and up to reset 2. Consult factory

Section 13
Warranty & Return

Warranty

Chromalox warrants only that the Products and parts manufactured by Chromalox, when shipped, and the work performed by Chromalox when performed, will meet all applicable specification and other specific product and work requirements (including those of performance), if any, and will be free from defects in material and workmanship under normal conditions of use. All claims for defective or nonconforming (both hereinafter called defective) Products, parts or work under this warranty must be made in writing immediately upon discovery, and in any event, within three (3) years from delivery, provided, however all claims for defective Products and parts must be made in writing no later than thirty-six (36) months after shipment by Chromalox. Defective and nonconforming items must be held by Chromalox's inspections and returned to the original f.o.b. point upon request. THE FOREGOING IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES WHATSOEVER, EXPRESSED, IMPLIED AND STATUTORY, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Limitations

Notwithstanding the provisions of this WARRANTY AND LIMITATIONS Clause, it is specifically understood that Products and parts not manufactured and work not performed by Chromalox are warranted only to the extent and in the manner that the same are warranted to Chromalox by Chromalox's vendors, and then only to the extent that Chromalox is reasonably able to enforce such a warranty, it being understood Chromalox shall have no obligation to initiate litigation unless buyer undertakes to pay all cost and expenses therefore including but not limited to attorney's fees, and indemnifies Chromalox against any liability to Chromalox's vendors arising out of such litigation.

Upon buyer's submission of a claim as provided above and in its substantiation, Chromalox shall at its option either (i) repair or replace its Products, parts or work at the original f.o.b. point of delivery or (ii) refund an equitable portion of the purchase price.
The foregoing is Chromalox's only obligation and buyer's exclusive remedy for breach of warranty, and is buyer's exclusive remedy against Chromalox for all claims arising hereunder or relating hereto whether such claims are based on breach of contract, tort (including negligence and strict liability) or other theories, buyer's failure to submit a claim as provided above shall specifically waive all claims for damages or other relief, including but not limited to claims based on latent defects. In no event shall buyer be entitled to incidental or consequential damages and buyer should hold Chromalox harmless therefrom. Any action by buyer arising hereunder or relating hereto, whether based on breach of contract, tort (including negligence and strict liability) or other theories, must be commenced within one (1) year after the date of shipment or it shall be barred.

Returns

Items returned to Chromalox Instruments and Controls must be accompanied by a Return Authorization Number. This number may be obtained from Chromalox Instruments and Controls, Customer Service Department, Telephone Number (615) 793-3900. It should appear on the exterior of the shipping carton and on the shipping documents. Defective items will be repaired or replaced at our option, at no charge. Return the defective part or product, freight prepaid, to:

Chromalox Instruments and Controls
1382 Heil-Quaker Blvd.
LaVergne, TN 37086-3536

Appendix 1
PAGE/MENU Tables

Setup Page	PAGE Name	PAGE Contents	PAGE#/MENU#*
DISP	Display	Process Variable	P0/M1
		Limit Setpoint	P0/M2
		Limit Output	P0/M3
		Time Over Setpoint	P0/M4
		Peak Temperature	P0/M5
		Alarm Output Status	P0/M6
SET	Set	Security Lock	P1/M1
		Limit Setpoint	P1/M2
		Limit Deadband	P1/M3
		Event Input Function	P1/M4
		Analog Output Enable	P1/M5
		Controller Type	P1/M6
		User Security Code	P1/M7
		Ambient Temperature Low	P1/M8
		Ambient Temperature High	P1/M9
		Lower Display Disable	P1/M10
INPT	Input	Sensor Type	P2/M1
		Display Units	P2/M2
		Calibration Offset	P2/M3
		Setpoint Low Limit	P2/M4
		Setpoint Upper Limit	P2/M5
		Sensor Calibration	P2/M6
		Analog Output Zero Calibration	P2/M7
		Analog Output Span Calibration	P2/M8
		Factory Calibration Recovery	P2/M9
SCAL	Scaling	Analog Input Decimal Points	P3/M1
		Analog Input Low	P3/M2
		Analog Input High	P3/M3
		Analog Process Output Low	P3/M4
		Analog Process Output High	P3/M5
AL1	Alarm #1	Alarm #1 Enable	P4/M1
		Alarm #1 Type	P4/M2
		Alarm #1 Relay	P4/M3
		Alarm #1 Low Setpoint	P4/M4
		Alarm #1 High Setpoint	P4/M5
		Output #1 Deadband (Alarm Hysteresis)	P4/M6
		Alarm #1 Inhibit	P4/M7
ALR2	Alarm #2	Alarm #2 Enable	P5/M1
		Alarm #2 Type	P5/M2
		Alarm #2 Relay	P5/M3
		Alarm #2 Low Setpoint	P5/M4
		Alarm #2 High Setpoint	P5/M5
		Output #2 Deadband (Alarm Hysteresis)	P5/M6
		Alarm #2 Inhibit	P5/M7
DIG	Digital Comm.	Mode Selection	P6/M1
		Baud Rate	P6/M2
		Address	P6/M3

* For digital communications using the Ascii Line Mode, you will use PAGE#/MENU# instead of the alphanumeric cues. For example, Alarm 1 Low Setpoint would be P4/M4.

Security Levels

See pages 20-21 for details.

Security Levels and PAGE/MENU Contents

Level	Code	Description
A	---	Display Page and Security Lock
B	123	Display Page and Security Lock
C	458	Settings for: Limit Control Alarms Input Digital Communications
D	736	Calibration Digital Input Analog Process Output

Security Codes

Security Codes

Security Level	Security Code	Adjust Level
A	**- - -**	A
B	**123**	A, B
C	**458**	A, B, C
D	**736**	A, B, C, D

Display Page

See page 24 for details.

Display Page

MENU	Description	Displays	Security
PROC	Process Variable	Sensor Span	A
L SP	Limit Setpoint	Sensor Span	
LOUT	Limit Output	0.0 TO 100.0%	
TOSP	Time Over Setpoint	0 TO 999.9 MIN	
PEAK	Peak Temperature	Instrument Sensor Span	
ALR	Alarm Output Status	NONE = No alarms AL 1 = Alarm #1 AL 2 = Alarm #2 AL12 = Alarm #1 and #2	

Setup Page

See page 24 for details.

SET **Page**

MENU	Description	Displays	Factory Setting	Security
LOCK	Security Lock	0 to 9999	458	A
L SP	Limit Setpoint	Instrument Sensor Span	Span High	C
DB	Limit Dead Band	0 to 100	1°F	
ENTI	Event Input Function	NONE = Disabled ARST = Alarm Reset	ARST	D
AOUT	Analog Output Enable	NONE = Disabled PROC = Process Variable	NONE	
CONT	Controller Type	HI LO	HI	
CODE	User Security Code	0 to 999 0-122 = Security level A 123-457 = Security level B 458-735 = Security level C 736-999 = Security level D	0	
ALO	Ambient Temp Low	-3 to 153	65	
AHI	Ambient Temp High	-3 to 153	85	
LDSP	Lower Display Enable	ON = Enabled OFF = Disabled	ON	

Input Page

See page 25 for details.

Input Page

MENU	Description	Available Settings	Factory Setting	Security
SENS	Sensor Type	Sensor Type selected here must agree with dip switch settings. J = J Thermocouple K = K Thermocouple T = T Thermocouple E = E Thermocouple R = R Thermocouple S = S Thermocouple B = B Thermocouple RTD = 100 Pt RTD (α = .00385) 4-20 = 4 to 20mA 0-5 = 0 to 5 Vdc 1-5 = 1 to 5 Vdc	J	C
UNIT	Display Units	NONE = none (analog inputs) °F = Degrees Fahrenheit °C = Degrees Celsius	°F	
COFF	Calibration Offset	0 to ±100°F (±6.25% of span for analog inputs)	0	
SPLL	Setpoint Low Limit	Instrument Sensor Span	Span Low	
SPUL	Setpoint Upper Limit	Instrument Sensor Span	Span High	
CALS	Sensor Calibration	INLO = Input low INHI = Input high DONE = Calibration finished	INLO	D
AO0	Analog Output Zero Calibration	0 to 4095	781	
AO5	Analog Output Span	0 to 4095	3902	
RECC	Factory Calibration Recovery	RDY = Ready ---- = Wait DONE = Finished	RDY	

Custom Scaling Page

See page 26 for details.

Custom Scaling Page

MENU	Description	Available Settings	Factory Setting	Security
DP	Analog Input Decimal Pts.	0 = none 1 = 123.4 2 = 12.34 3 = 1.234	1	C
AINL	Analog Process Input Low	-500 to 5000	0.0	
AINH	Analog Process Input High	-500 to 5000	100.0	
AOTL	Analog Process Output Low	Instrument Sensor Span	Span Low	
AOTH	Analog Process Output High	Instrument Sensor Span	Span High	

Alarm #1 Page

See page 26 for details.

Alarm #1 Page

MENU	Description	Available Settings	Factory Setting	Security
EN1	Alarm 1 Enable	OFF = Disabled ON = Enabled	OFF	C
TYP1	Alarm 1 Type	NONE = Disabled (off) HI = High Alarm LO = Low Alarm HILO = High-Low Alarm POE = Plus Deviation Alarm -DE = Minus Deviation Alm DE = Plus/Minus Dev Alm	NONE	
RLY1	Alarm 1 Relay	NDE = normally de-energized non-latching NE = normally energized non-latching NDEL = normally de-energized latching NEL = normally energized latching	NDE	
AL01	Alarm 1 Low Setpoint	Instrument Sensor Span	Span Low	
AH01	Alarm 1 High Setpoint	Instrument Sensor Span	Span High	
DB1	Output 1 Dead Band (Alarm Hysteresis)	0 to 100°F (.00 to 6.25% of span for analog inputs)	1°F	
INH1	Alarm 1 Inhibit	OFF ON	OFF	

Alarm #2 Page

See page 27 for details.

Alarm #2 Page

MENU	Description	Available Settings	Factory Settings	Security
EN2	Alarm 2 Enable	OFF = Disabled ON = Enabled	OFF	C
TYP2	Alarm 2 Type	NONE = Disabled (off) HI = High Alm LO = Low Alm HILO = High-Low Alm POE = Plus Deviation Alm -DE = Minus Deviation Alm DE = Plus/Minus Dev Alm	NONE	
RLY2	Alarm 2 Relay	NDE = normally de-energized non-latching NE = normally energized non-latching NDEL = normally de-energized latching NEL = normally energized latching	NDE	
AL02	Alarm 2 Low Setpoint	Instrument Sensor Span	Span Low	
AHI2	2 High Setpoint	Instrument Sensor Span	Span High	
DB2	Output 2 Dead Band (Alarm Hysteresis)	0 to 100°F (.00 to 6.25% of span for analog inputs)	1°F	
INH2	Alarm 2 Inhibit	OFF ON	OFF	

Digital Communications Page

See page 49 for details.

Digital Communications Page: DIG PAGE

MENU	Description	Available Settings	Factory Settings	Security
DIGT	Mode Selection	OFF = Disabled CPIF = Computer Interface LINE = ASCII Line	CPIF	C
BAUD	Baud Rate	1200 2400 4800 9600 19.2K	19.2K	
ADDR	Address	1 to 255	1	

Index

Chromalox®

PRECISION HEAT AND CONTROL

1382 HEIL QUAKER BLVD., LAVERGNE, TN 37086
Phone: (615) 793-3900 www.chromalox.com