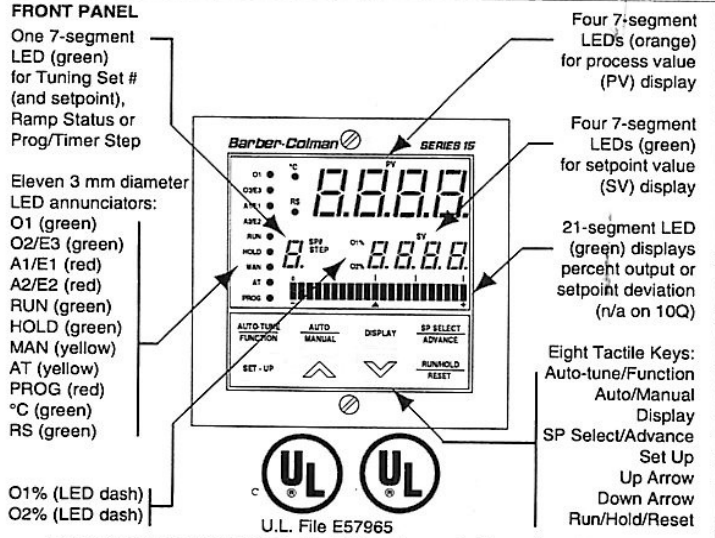
Series 100/150 Instruction Manual

1261-IN-003-0-00

September 1995

Price: $ 5.00

FRONT PANEL



U.L. File E57965

(some Items are not available in the 10Q and are noted throughout this manual.)

STATUS ANNUNCIATORS

O1	● (green) is lit when Output 1 is ON
O2/E3	● (green) is lit when Output 2 (or Event 3) is ON
A1/E1	● (red) flashes (lit steadily if acked) when Alarm 1 (or Event 1) is ON
A2/E2	● (red) flashes (lit steadily if acked) when Alarm 2 (or Event 2) is ON
RUN	● (green) is lit when the Programmer/Timer is running (flashes if by Contact In)
HOLD	● (green) is lit when the Programmer/Timer is in hold (flashes if by Contact In)
MAN	● (yellow) is lit (flashes if by Contact In) in manual (% Out) control
AT	● (yellow) is lit while autotuning; flashes if tuning fails
PROG	● (red) is lit when the Setpoint Source is Programmer
°C	● (green) is lit when temperature is displayed in Celsius
RS	● (green) is lit when remote setpoint is in use
O1%	▬ (green dash) is lit when SV display is showing Output 1 percent
O2%	▬ (green dash) is lit when SV display is showing Output 2 percent

SPECIFICATIONS

Control Modes
ON/OFF; Proportional; Proportional/Integral; Proportional/Integral/Derivative (all with Load Line); Proportional/Derivative with Manual Reset; Position Proportional Control with Slidewire Feedback; None (for Indicator).

Proportional Band
0.1% to 999.9% for 15Q; 0.1% to 200.0% for 10Q (of Input Scale [Input Low to High]).

Integral (Reset)
0 to 3600 seconds in 1 second steps (0 indicates off).

Derivative (Rate)
0 to 600 seconds in 1 second steps (0 indicates off).

Load Line
0% to 100% (of Demand) in 1% steps.

Cycle Time
1 to 120 seconds in 1 second steps.

Powerup Modes
Automatic; Manual; or Previous (can be Automatic or Manual depending on the mode when powered down). Manual powers up with a preset manual percent out.

Response Time
200 milliseconds for 15Q; 300 milliseconds for 10Q.

Input Impedance
Millivolt, Volt, Thermocouple: 10 Megohm minimum. *Current:* 250 ohms nominal.

RTD
3-wire Platinum, 100Ω (0.00385Ω/Ω/°C), per IEC 751 and DIN 43760.

Input Lead Resistance
200Ω maximum (any control input).

Contact Closure Inputs
2 contacts, 1.5 mA max. current ; 200Ω max. resistance (leads and contacts).

Input Protection
Common Mode Rejection (Thermocouple & RTD only): Common mode voltages from 0 to 240 Vac will not shift the control operating point more than 0.1% of span. *Common Mode Rejection (Analog Inputs):* Common mode voltages from -1 to 10 Vdc will not shift the control operating point more than 0.5% of span. *Series Mode Rejection:* 60 db at 50 or 60 Hz for all input signals from 0 to 250 mVac rms.

Input Isolation to Ground
500 Vdc.

Accuracy
±0.2% of span typical (±1 digit) for 15Q; ±0.3% of span typical (±1 digit) for 10Q.

Input Resolution
Thermocouples: 0.1 °C or °F (under 999 counts); 1 °C or °F (over 999 counts). *RTDs*: 0.1 °C or °F. *Analog*: 0.02% of full scale span.

Heater Burnout Input
0 to 50 mA ac rms (field scaleable) for 0 to 100 Amp (field scaleable) input, shipped 0 to 20 Amps or 0 to 100 Amps; 100Ω maximum load resistance.

Electric Actuator Input
1.0 Vdc excitation voltage provided for 100Ω to 2500Ω slidewire, short circuit protected. *Deadband:* 1.0 to 10.0% of PB. *Resolution:* 0.1% of PB.

Digital Communications (15Q only)
Type: RS-485 multi-drop, per ANSIx3.28-1976, 32 unit loads maximum (each controller equals 1 unit load). *Baud Rates:* 300, 600, 1200, 2400, 4800, 9600 and 19,200. *Isolation:* Meets UL 1092 between communication link and all other inputs and outputs. *Distance:* 4000 feet maximum. *Protocol:* SPI Dev ID 27.

Outputs
Output 1 Relay: Form C, SPDT. NO, NC and Common contacts. 120/240 Vac, 2 Amp, resistive load; 50 VA inductive load. *Output 2 Relay*: Form A, SPST. NO and Common contacts. 120/240 Vac, 2 Amp, resistive load; 50 VA inductive load. *Triac Output*: 1.0 Amp continuous, 24 to 240 Vac, resistive, 8 Amp inrush. Minimum load 50 mA. *Non-Contact Voltage*: On: 12 Vdc; Off: 0.1 Vdc or less, into 1K Ohm minimum load. *Current*: 0 to 20 mA (shipped 4 to 20 mA), isolated, short circuit protected both leads to ground. Maximum load 750 Ohms, 14 bit resolution for 0 to 20 mA., 0.2% accuracy at full scale at rated conditions. *Voltage* : 0 to 10 Vdc, isolated, short circuit protected at 30 mA both leads to ground. Minimum load 1K Ohm, 14 bit resolution for 0 to 10 Vdc., 0.2% accuracy at full scale at rated conditions. *Alarm Outputs:* Up to 2 alarm relays (see model number). Form A, SPST. NO and Common contacts are brought out to the rear terminals as standard. NC operation is jumper selectable. 120/240 Vac, 2 Amp, resistive load; 50 VA inductive load.

Low Resolution Analog Outputs (10Q only)
Current: 0 to 20 mA (shipped 4 to 20 mA), isolated, short circuit protected both leads to ground. Maximum load 750 Ohms, 11 bit resolution for 0 to 20 mA., 2.0% accuracy at full scale at rated conditions. *Voltage* : 0 to 10 Vdc, isolated, short circuit protected at 30 mA both leads to ground. Minimum load 1K Ohm, 11 bit resolution for 0 to 10 Vdc., 2.0% accuracy at full scale at rated conditions.

Transmitter Power Supply (15Q only)
24 Vdc, +/- 7%, 35 mA maximum; 30 Vdc, +/- 7%, 35 mA maximum.

Time Scales
Hours (to 9999 hours); hours/minutes (to 99 hours/59 minutes); minutes/seconds (to 99 minutes/59 seconds).

Displays
Process Value: 4 digit, 14.2mm (0.56 in.), 7 segment orange LEDs, from -1999 to 9999. *Set Value*: 4 digit, 9.1mm (0.36 in.), 7 segment green LEDs, from -1999 to 9999. *SET#/PROG (Setpoint Number/Program)*: 1 digit, 9.1mm (0.36 in.), 7 segment green LED, from 0 to 9. Indicates setpoint (and tuning set) number, ramping setpoint or programmer step. *Bar Graph:* Twenty-one segment green LED bar graph, field programmable to deviation from setpoint or percent output (n/a 10Q).

Environmental
Operating Conditions
Temperature: 0°C to 55°C (32°F to 131°F). *Humidity:* 10% to 95% RH (non-condensing). *Storage Temperature:* -40°C to 85°C (-40°F to 185°F). *Temperature Stability:* ±0.02% of reading per °C or 1 µvolt per °C.

Front Panel: Designed to be dust and water resistant per IEC IP65. *Electrostatic Discharge:* Designed to meet IEC 801-2. *RF Protection:* Designed to meet IEC 801-3. *Transient/Burst (Noise immunity)*: Designed to meet IEC 801-4. *Operating Voltage:* 85 to 250 Vac, 50/60 Hz (standard). *Power Consumption:* 30 VA maximum.

Physical
Height: 96mm (3.78 in.). *Width:* 96mm (3.78 in.). *Depth:* 106.7mm (4.20 in.). *Weight:* 1 lb. (.45 Kg).

Housing Materials
Front Lens: Polycarbonate. *Keypad:* Silicone Rubber. *Front Bezel and Case:* Polyarylene Ether Engineering Plastic.

Security
Programmable 4 digit pass code.
Pass Code Levels (note that the password function is available at all levels)

Level 1 Operating mode screens can be reached, but data cannot be changed (default level).

Level 2 Same as Level 1, except setpoints (or percent out in manual mode) can be changed.

Level 3 Same as Level 2, except setpoint select, autotune and auto/manual can be used.

Level 4 Same as Level 3, except Setup can be changed.

Level 5 Same as Level 4, except Configuration data can be changed.

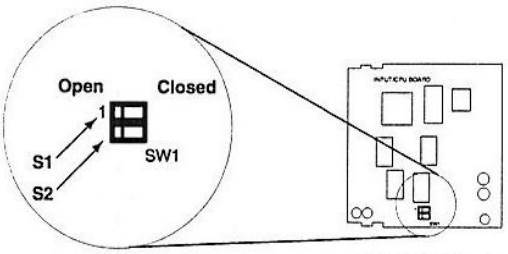
S2	S1	Action
Open	Open	Software Lock Only (as shipped)
Open	Closed	Partial Hardware Lock (arrow keys function)
Closed	Open	Total Hardware Lock (keypad totally disabled)
Closed	Closed	Software & Hardware Lock both OFF (no security)

Hardware Security Switch Positions

Hardware Lock
Internal switch: "Total" locks entire keyboard; "Partial" allows setpoint changes only.

(Note that Security displays will NOT appear if Switch is set to "Closed/Closed)

Use a non-metallic object to change switch positions!



Hardware Security Switch Location

Key Functions			
KEYS	***Operating Mode***	***Setup Mode***	***Configuration Mode***
AUTO-TUNE / FUNCTION	For Startup autotuning, cancels "startup" tuning constants. (press again to re-initiate tuning). For Bump autotuning, initiates autotuning (press again to cancel tuning; press again to re-initiate tuning).	Steps the display through a particular setup function. Once in Setup, press the Setup key repeatedly to reach the proper setup function (e.g., "tun1"). Use this key to step through the function.	Steps the display through a particular configuration function. Once in Config, press the Setup key repeatedly to reach the proper config function (e.g., "SEc"). Use this key to step through the function.
AUTO / MANUAL	Toggles the controller between Automatic and Manual (% Out) control.	Not Used.	In Calibration, initiates calibration of input signal.
DISPLAY	Steps through a loop of displays: Active Setpoint, Amps (with HBO) or Actuator Position or Timer, % Out (heating and/or cooling), 2nd Setpoint, Setpoint Ramp and Deviation from Setpoint.	Returns the controller to the operating mode.	Returns the controller to the operating mode.
SP SELECT / ADVANCE	Toggles the controller between Setpoint and Tuning Set 1 (a "1" is displayed on the single 7-segment display) and Setpoint and Tuning Set 2 (a "2" is displayed on the single 7-segment display). Can be configured to toggle between local and remote setpoint or local setpoint and Programmer. If Programmer is in run or hold, press (and hold 4 seconds) to advance to next step (current step shown in single 7-segment display).	Steps the display backward through a particular setup function (like the function key in reverse).	Steps the display backward through a particular configuration function (like the function key in reverse).
SET - UP	Steps the controller through two different modes. Press (and release), controller goes to Setup ("SEtU") mode. Press (and hold 4 seconds), controller goes to Configuration ("conF") mode. Outputs are ON in Setup, OFF in Configuration.	Steps the controller forward one Setup functional group.	Steps the controller forward one Configuration functional group.
⌃ ⌄	During Automatic control, pressing an arrow key increases or decreases the control setpoint. During Manual control, pressing an arrow key increases or decreases the percent output. With a numeric display, the longer an arrow key is pressed, the faster the rate of change.	Increases/decreases the Setup parameter on display or selects a mode of operation for a Setup parameter. With a numeric display, the longer an arrow key is pressed, the faster the rate of change.	Increases/decreases the Configuration parameter on display or selects a mode of operation for a Configuration parameter. With a numeric display, the longer an arrow key is pressed, the faster the rate of change.
RUN/HOLD / RESET	If Programmer or Timer selected, toggles between run and hold. Press (and hold 4 seconds) to reset. Press again to run.	Steps the controller backward one Setup functional group (like the Setup key in reverse).	Steps the controller backward one Configuration functional group (like the Setup key in reverse).

① bAr 9 **Bargraph Type (n/a 10Q)**

Pout	PdEU	FdEU
Demand (% Out) Bargraphs	**Pivot Deviation Bargraphs**	**Fill Deviation Bargraphs**
0% Demand (at setpoint)	Pivot Deviation (at setpoint)	Fill Deviation (at setpoint)
20% Demand Out 2 (above setpoint)	Pivot Deviation (above setpoint)	Fill Deviation (above setpoint)
25% Demand Out 1 (below setpoint)	Pivot Deviation (below setpoint)	Fill Deviation (below setpoint)
First segment represents 0% Out. Each succeeding segment is 5%. For dual outputs, if Output 1 demand is greater than zero, Output 1 demand will be displayed. If Output 1 demand is zero and Output 2 demand is greater than zero, Output 2 demand will be displayed.	Middle segment represents zero deviation. The scaling factor and decimal location determine how many Engineering Units are represented by each LED. If above setpoint, segments will light from center to the right. If below setpoint, segments will light from center to the left.	Left side represents zero deviation. The scaling factor and decimal location determine how many Engineering Units are represented by each LED. If above setpoint, all of left side plus segments to the right of center will be lit. If below setpoint, segments will turn off from the center to the left.

② PrUP Using Powerup Autotuning

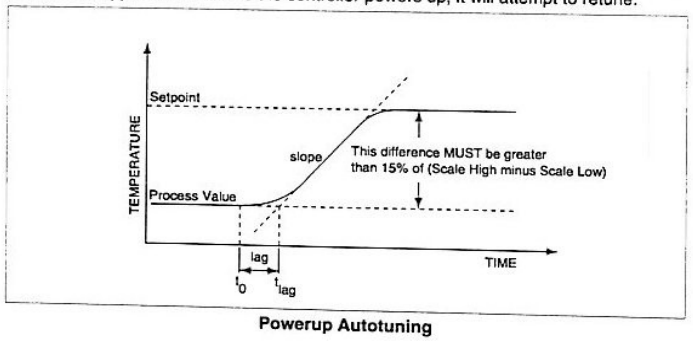
The following conditions must be met before powerup autotuning can be used:

1. The controller must be in the automatic control mode (the "MAN" LED will be unlit).
2. Algorithm 1 must be set to PID (see Control Configuration).
3. Action 1 must be reverse (heat) (see Control Configuration).
4. The autotune type must be powerup (see AT Setup).
5. There must be a 15% of scale difference between process value and setpoint (see diagram).

Once the controller meets these conditions, go to the Operating mode and use the Setpoint Select key to bring up the Tuning Set in which the autotuned constants are to be stored (observe the SP# display). Check Loop Setup if the Setpoint Select key does not function (it may be disabled). Remember that any tuning constants presently stored in the chosen Tuning Set will be overwritten once autotuning is complete. Make certain the proper control setpoint has been entered (in the Operating mode it will appear in the lower display).

Press the Autotune key or cycle power to the controller. The AT light will be steadily lit, indicating that tuning is occurring. The AT light will turn off once the autotune sequence is successful. A blinking AT light indicates that the process value did not fall below the AT Setpoint and autotuning has failed. Check the control setpoint and input scale (see Input Configuration) to see if it is physically possible for the process value to reach the AT Setpoint. If possible, allow the process to cool and try again. Autotuning can be stopped by pressing the Autotune key (the AT LED will turn off). It can be started either on power up or by pressing the AT key.

Once the autotune sequence is successful, the newly calculated tuning constants will overwrite the Tuning Set currently on display (SP#). If there is a cooling output (with a PID algorithm), the same reset and rate terms calculated for heating will be used, but the proportional band for the cooling output will be dependent on the PID Type chosen for the cooling output. Once tuning is complete, the autotune type should be changed to "none" (see AT Setup) or the next time the controller powers up, it will attempt to retune.



Powerup Autotuning

② bnnP Using TouchTune™ (Bump) Autotuning

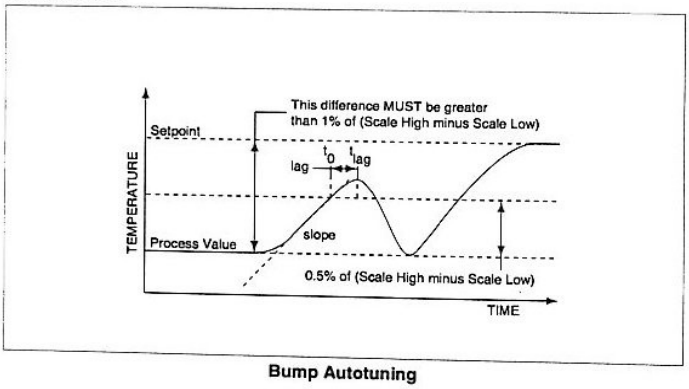
The following conditions must be met before bump autotuning can be used:

1. The controller must be in the automatic control mode (the "MAN" LED will be unlit).
2. Algorithm 1 must be set to PID (see Control Configuration).
3. Action 1 must be reverse (heat) (see Control Configuration).
4. The autotune type must be bump (see AT Setup).
5. The process value must be capable of dropping at least 1% of scale below setpoint (see diagram).

Once the controller meets these conditions, go to the Operating mode and use the Setpoint Select key to bring up the Tuning Set in which the autotuned constants are to be stored (observe the SP# display). Check Loop Setup if the Setpoint Select key does not function (it may be disabled). Remember that any tuning constants presently stored in the chosen Tuning Set will be overwritten once autotuning is complete. Make certain the proper control setpoint has been entered (in the Operating mode it will appear in the lower display).

Press the Autotune key to initiate tuning. The AT light will be steadily lit, indicating that tuning is occurring. The AT light will turn off once the autotune sequence is successful. A blinking AT light indicates that the process value did not fall below the AT Setpoint and autotuning has failed. Check the control setpoint and input scale (see Input Configuration) to see if it is physically possible for the process value to reach the AT Setpoint. Autotuning can be stopped by pressing the Autotune key (the AT LED will turn off). It can be started again by pressing the AT key.

Once the autotune sequence is successful, the newly calculated tuning constants will overwrite the Tuning Set currently on display (SP#). If there is a cooling output (with a PID algorithm), the same reset and rate terms calculated for heating will be used, but the proportional band for the cooling output will be dependent on the PID Type chosen for the cooling output.



Bump Autotuning

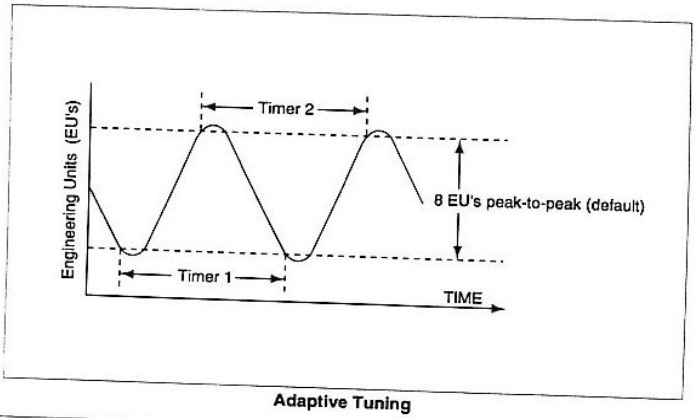
③ AdAP Using Adaptive Tuning

The following conditions must be met before adaptive tuning can be used:

1. The controller must be in the automatic control mode (the "MAN" LED will be unlit).
2. Algorithm 1 must be set to PID (see Control Configuration).
3. Action 1 must be reverse (heat) (see Control Configuration).
4. Adaptive Tune Enable must be set to "yes" (see AT Setup).

As long as these conditions are met and the controller remains in the Operating mode, adaptive tuning will function. Nothing on the display will indicate that adaptive tuning is executing.

Once the adaptive tuning routine is complete, the new tuning constants overwrite those in the currently used Tuning Set. Adaptive tuning can be stopped by setting Adaptive Tune Enable to "no" (see AT Setup). Note that Adaptive Tune Enable will reset itself to "no" after three tuning attempts.



Adaptive Tuning

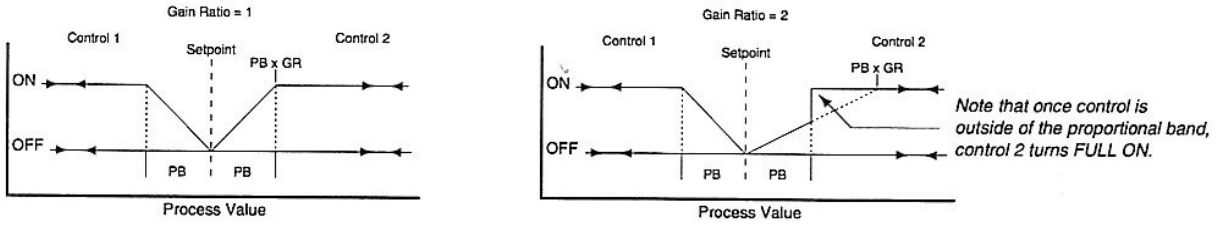
④ bSSc Bargraph Scaling Factor (n/a 10Q)

Determines the number of eng. units represented by each LED in a deviation bargraph (won't appear unless Bargraph Type is set to "Pdev" or "Fdev"), by this formula:

$$\text{E.U.s} = \frac{\text{Bargraph Scaling Factor}}{\text{Decimal Representation}}$$

Where "Bargraph Scaling Factor" is a unitless number from 1 to 100 (1 is the default) and "Decimal Representation" is determined by the number of decimal places (see Input Setup) in the display (0 = 1; 0.0 = 10; 0.00 = 100; 0.000 = 1000). For example, a Bargraph Scaling Factor of 100 with the process displayed to one decimal place would mean that each LED of the bargraph was worth 10 engineering units.

Gain Ratio The Gain Ratio setting in Heat/Cool control is used to determine the slope of output 2 within the proportional band. The Cooling PB will be set equal to the Heating PB x the Gain Ratio setting. The default gain ratio setting depends on the PID Type of the direct acting control (oil = 2; Fan = 4; H2o = 16). The range is 0.1 to 32.0.



Note that once control is outside of the proportional band, control 2 turns FULL ON.

Heat/Cool Control

The screens that appear within the tuning set are dependent both on the hardware assignments (see Output Configuration) and the algorithm, control action and PID type (see Control Configuration).

If Heat/Cool control is being used, the menus will appear as shown under "Heat/Cool." In all other cases, the menus will appear as shown under "Single or Dual."

Heat/Cool control is called for if the following conditions are true:

1. Both control algorithms are set to PID.

2. Control 1 is reverse acting (Control 2 will be direct acting).

3. The PID Type for Control 2 is either water, fan, or oil (NOT linear).

AL91	PID	
Act 1	Reverse	
tYP 1		
AL92	None	PID
		Direct
tYP2		(16:1) H2o (4:1) Fan (2:1) Oil

Heat/Cool Control

AL91	PID			
Act 1	Reverse			
tYP 1				
AL92	None	PID	PD-r	ON/OFF
		Direct		
tYP2		Linear		

Dual Control

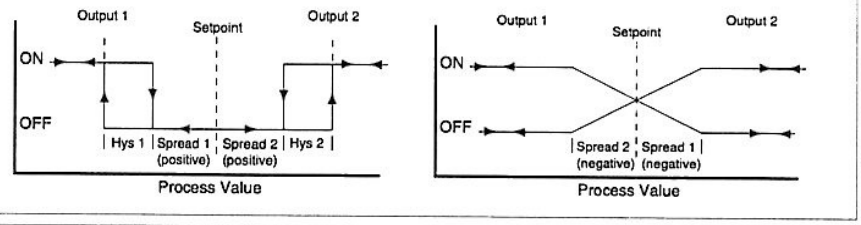
5 **Spread** The Spread settings determine the amount of offset from setpoint of control action. Zero (engineering units) is the default setting The range is ±10% of the input scale (Input Scale High - Input Scale Low).

SPr 1 For Spread 1, if the setting is positive, it is subtracted from setpoint. If the setting is negative, it is added to setpoint (setpoint is overlapped).

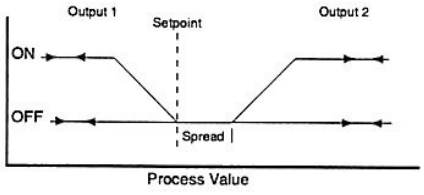
SPr2 For Spread 2, if the setting is positive, it is added to setpoint. If the setting is negative, it is subtracted from setpoint (setpoint is overlapped).

SPr Spread appears without a number for Heat/Cool control. The setting is always positive and it is added to setpoint.

Spread 1 or Spread 2 (for Dual Control)



Spread (for Heat/Cool Control)

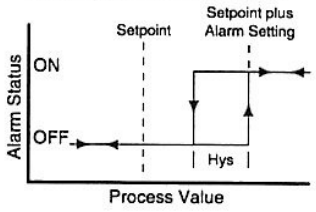


6 tYP 1 tYP2 **Alarm Type**

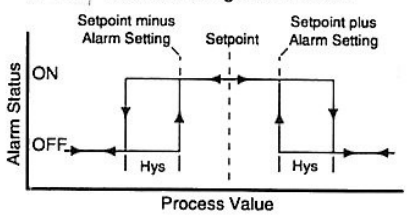
LPbr **Loop Break Alarm**

Demand is at maximum ("On" for On/Off control) and no progress is made towards setpoint in the time entered in the Loop Break Setting (see Alarm Setup).

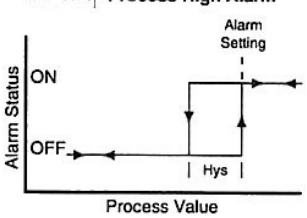
dUH 1 **Deviation High Alarm**



drbd **Deviation Range Band Alarm**



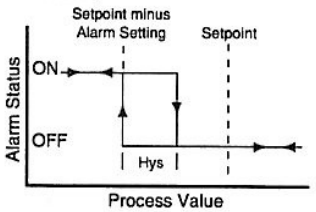
PrH 1 **Process High Alarm**



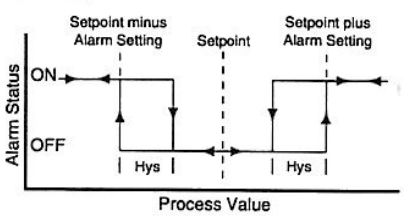
Hbo **Heater Burnout Alarm**

The current passing through the current transformer falls below the current entered in the Heater Burnout Setting (see Alarm Setup).

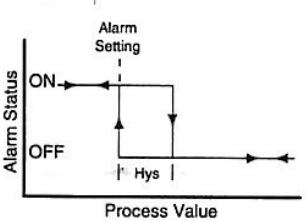
dUL o **Deviation Low Alarm**



dUbd **Deviation Band Alarm**



PrL o **Process Low Alarm**



INTRODUCTION

This manual contains all essential information needed to operate the controller. A reference manual (1261-IN-006-0-XX) which includes detailed setup and operating procedures is also available from the factory.

The controller is preconfigured by model number. Inputs, outputs and alarm types are preset. Final setup and configuration are done from the keypad. The controller has three basic modes: the operating mode, the setup mode and the configuration mode.

The operating mode is used for "normal" day-to-day operation of the controller. The screens appearing in this mode depend on whether the controller is configured to operate as an automatic controller, a manual controller, or an indicator.

The setup mode is, in general, used to set or change settings associated with control, such as ramp rate, tuning constants, alarm settings, etc. Control outputs remain active in the setup mode.

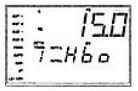
The configuration mode is, in general, used to set or change settings more closely associated with hardware, such as input type, output type, alarm type, etc. Control outputs turn OFF in the configuration mode.

THE OPERATING MODE

Automatic Operation

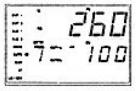
Process Value & Setpoint

DISPLAY



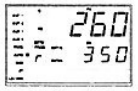
HBO Current or EA Position

DISPLAY



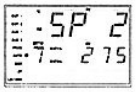
Process Value & % Out 1 (& 2)

DISPLAY



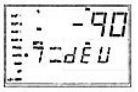
Process Value & Stpt Ramp

DISPLAY



The "Other" Setpoint

DISPLAY



Deviation from Setpoint

The control setpoint value can be changed (if the security setting allows) using the Arrow keys.

SP SELECT / ADVANCE

The setpoint (and tuning set) can be toggled between "1" and "2" or "local" and "remote" or "local" and "programmer" (if security allows and if Setup and Config. allow) using the Setpoint Select key.

AUTO / MANUAL

Manual control can be selected (if security allows and if Setup and Config. allow) using the Auto/Manual key. The present Pid (or Pd-r) output is converted to a percent out for a "bumpless" transfer.

AUTO-TUNE / FUNCTION

Powerup autotuning can be cancelled using the Auto-Tune key. Powerup Tuning can also be re-iniated (if security allows and if Setup and Configuration allow) using the Auto-Tune key. Bump autotuning can be initiated (if security allows and if Setup and Configuration allow) using the Auto-Tune key. Bump autotuning can also be cancelled and re-initiated using the Auto-Tune key (see the explanation of autotuning).

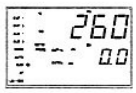
SET - UP

The Setup mode can be accessed (if security allows) by pressing (and releasing) the Setup key. Note that in order to allow changes to the software security level, Security Setup is *always* accessible if it is enabled (see Security Setup).

SET - UP

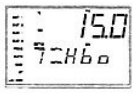
The Configuration mode can be accessed (if security allows) by pressing (and holding for 4 seconds) the Setup key.

Manual Operation



Percent Out (Output 1 & 2)

DISPLAY



HBO Current or EA Position

The percent output can be changed (if the security setting allows) using the Arrow keys. Note that if manual control has been initiated by means of the optional contact input function, it will NOT be possible to change the percent output using the Arrow keys.

AUTO / MANUAL

Automatic control can be selected (if security allows and if Setup and Configuration allow) using the Auto/Manual key. Note that if manual control has been initiated by means of the optional contact input function, it will NOT be possible to switch to automatic control using the Auto/Manual key.

SET - UP

The Setup mode can be accessed (if security allows) by pressing (and releasing) the Setup key. Note that in order to allow changes to the software security level, Security Setup is *always* accessible if it is enabled (see Security Setup).

SET - UP

The Configuration mode can be accessed (if security allows) by pressing (and holding for 4 seconds) the Setup key.

Indicator Operation

Indicator Only

SET - UP

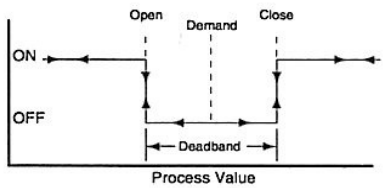
The Setup mode can be accessed (if security allows) by pressing (and releasing) the Setup key. Note that in order to allow changes to the software security level, Security Setup is *always* accessible if it is enabled (see Security Setup).

SET - UP

The Configuration mode can be accessed (if security allows) by pressing (and holding for 4 seconds) the Setup key.

Electric Actuator Positioning

The electric actuator positioning control uses a slidewire feedback to position a reversible motor in proportion to the control algorithm output. The slidewire input accepts a 100Ω minimum to 2500Ω maximum slidewire.



If any of the three leads (EX+, EX- or Wiper) should open, the CLOSE output will turn ON and drive the actuator to the closed position (and "high-bars" will be displayed on the EA position screen).

SETUP MODE

for Programmer, see 1261-IN-013-0-XX; for Timer, see 1261-IN-012-0-XX

SET - UP → SEtu ← SET - UP ← RUN/HOLD RESET

Security	System	Loop	Control	AutoTune	Tuning Set 1or 2 (Single or Dual)	Tuning Set 1 or 2 (Heat/Cool)	Input	Alarm
SEc 1	SYS	LP	cEL	AE	tun 1	tun 1	in	ALr
AUTO-TUNE FUNCTION	UEr5 Firmware (VV.RR)	SPSr Stpt. Source see (7)	SPLo Stpt. Low Limit (see Input Config)	Autotune Type see (2)	SP 1 Setpoint 1 or 2 (Stpt Low to Hi)	SP 1 Setpoint 1 or 2 (Stpt Low to Hi)	SLt5 Slot 5 Hardware (universal)	Ack 1 Acknowledge 1 (yes or no)
SP SELECT ADVANCE	Digital Communications see 1261-IN-014-0-XX	SPSL Stpt. Sel. Key see (8)	SPH 1 Stpt. High Limit (see Input Config)	rESP AT Response (0.5 to 1.5)	Pb 1 Prop. Band 1 (% of Scale)	Pb Prop. Band (% of Scale)	tYP5 Sensor Type see (11)	tYP 1 Alarm 1 Type see (6)
PASS Password (0000-9999)		LSEt Local Stpt Select (tun1 or tun2)	HYS 1 Out 1 Hysteresis (eng. units)	AdAP Adaptive Tune (yes or no) (3)	LL 1 Load Line 1 (percent)	LL Load Line (percent)	AS95 Slot 5 Assignment (Process In)	SEt 1 Alarm Setting 1 (eng. units)
		A-Mn Auto/Man Key (yes or no)	Pr1 1 Out 1 Min. Power (percent)	oScL Oscillation Limit (eng. units)	rES 1 Reset 1 (seconds)	rES Reset (seconds)	En95 Eng. Units (°C, °F, none)	HYS 1 Hysteresis 1 (eng. units)
		PrUP Powerup Type (Auto, Man, Prev)	PrH 1 Out 1 Max. Power (percent)		rAt 1 Rate 1 (seconds)	rAt Rate (seconds)	cor5 Correction (eng. units)	Ack2 Acknowledge 2 (yes or no)
		SPrP Stpt. Ramp (yes or no)	SLF 1 Out 1 Slew Filter (percent)		cYc 1 Cycle Time 1 (seconds)	cYc 1 Cycle Time 1 (seconds)	FiL5 Input Filter (seconds)	tYP2 Alarm 2 Type see (6)
		rPUP Ramp Up (units/minute)	HYS2 Out 2 Hysteresis (eng. units)		SPr 1 Spread 1 (eng. units)	SPr Spread (eng. units)	dEc5 Decimal Place (0 to 3) see (9)	SEt2 Alarm Setting 2 (eng. units)
		rPdn Ramp Down (units/minute)	PrL2 Out 2 Min. Power (percent)		Pb 2 Prop. Band 2 (% of Scale)	gr Gain Ratio (PB2/PB1)	SLt6 Slot 6 Hardware see (23)	HYS2 Hysteresis 2 (eng. units)
		bAr9 Bargraph Type see (1)	PrH2 Out 2 Max. Power (percent)		LL 2 Load Line 2 (percent)	cYc2 Cycle Time 2 (seconds)	AS96 Slot 6 Assignment see (22)	LPbr Loop Break (minutes)
		b9Sc Bargraph Scaling see (4)	SLF2 Out 2 Slew Filter (percent)		rES2 Reset 2 (seconds)		En96 Eng. Units (°C, °F, none)	Hbo Heater Burnout (Amps)
			nnPr Manual % Preset (percent)		rAt2 Rate 2 (seconds)		cor6 Correction (eng. units)	
			EAdb EA Deadband (percent of PB)		cYc2 Cycle Time 2 (seconds)		FiL6 Input Filter (seconds)	
					SPr2 Spread 2 (eng. units)		dEc6 Decimal Place (0 to 3)	

(7) SPSr Setpoint Source

Loc	Local
rEmn	Remote
Prog	Programmer

(8) SPSL Setpoint Select Key

L-L	Local - Local
L-r	Local - Remote
L-P	Local - Programmer

(9) dEc5 Slot 5 Decimal Setting

The range is determined by the Input Scale Limits (see Input Configuration) as follows:

Input Scale Limits	Decimal Range
from -1.999 to 9.999	0 to 3
from -19.99 to 99.99	0 to 2
from -199.9 to 999.9	0 to 1
from -1999 to 9999	0

(10) Acknowledging Alarms

Ack 1
Ack2

Alarm Occurs
LED flashing
Relay Energized

Latching	Alarm still exists	Acked	LED lit steady Relay energized
		Not Acked	LED flashing Relay energized
	Alarm clears	Acked	LED off Relay deenergized
		Not Acked	LED flashing Relay energized
Non Latching	Alarm still exists	Acked	LED lit steady Relay deenergized
		Not Acked	LED flashing Relay energized
	Alarm clears		LED off Relay deenergized

See Page Number: (1) Page 2 (2)(3)(4) Page 3 (5)(6) Page 4 (7)(8)(9)(10)(11) Page 6 (12)(13)(14)(15)(16)(17) Page 7 (18)(19)(20)(21)(22)(23) Page 8

(11) tYP5 Slot 5 Sensor Type

Accuracy is not guaranteed for Type B below 200°C or for Types R and S below 100°C.

tc K	Type K,	-100 °F to 2400 °F -75 °C to 1320 °C	tc nn	Ni/Ni Mo,	32 °F to 2500 °F 0 °C to 1371 °C	tc n	Type N,	-100 °F to 2400 °F -75 °C to 1320 °C
tc J	Type J,	-100 °F to 1600 °F -75 °C to 875 °C	tc t	Type T,	-350 °F to 700 °F -215 °C to 375 °C	Lnnu	mVdc,	-1999 to 9999 (unitless)
tc P	PL-II,	0 °F to 2500 °F -20 °C to 1375 °C	tc S	Type S,	0 °F to 3100 °F -20 °C to 1705 °C	LnnA	mAdc,	-1999 to 9999 (unitless)
tc E	Type E,	-100 °F to 1600 °F -75 °C to 875 °C	tc r	Type R,	0 °F to 3100 °F -20 °C to 1705 °C	Ludc	Vdc,	-1999 to 9999 (unitless)
tc C	Type C,	0 °F to 4200 °F -20 °C to 2320 °C	tc b	Type B,	100 °F to 3100 °F 37 °C to 1817 °C	PLtB	RTD	-199.9 °F to 999.9 °F -199.9 °C to 850.0 °C

Analog Input Signals (by Model No.):

C1 = 4 to 20 mAdc
V1 = 0 to 5 Vdc
V2 = 1 to 5 Vdc
V3 = 0 to 10 Vdc
V4 = 0 to 100 mVdc
V5 = -10 to 10 mVdc
V6 = 0 to 10 mVdc

CONFIGURATION MODE

for Programmer, see 1261-IN-013-0-XX; for Timer, see 1261-IN-012-0-XX

SET-UP → conF ← SET-UP ← RUN/HOLD RESET

(4 seconds) Note that all annunciator LEDs turn off; alarm outputs turn off; and control outputs go to 0% demand (analog outputs can still have a signal present at the terminals).

Security	Loop	Control	Input	Output	Alarm	Calibration	Diagnostics
SEc	LP	cEL	in	oUt	ALr	cAL	diAG
AUTO-TUNE FUNCTION	SEt Tuning Set Limit (1 or 1-2)	AL1 1 Algorithm 1 see (15)	SLt5 Slot 5 Hardware (universal)	SLt1 Slot 1 Hardware see (21)	tyP1 Alarm 1 Type see (6)	S5L5 Slot 5 Calibration Signal Low	dEFc Default Config (yes or no)
↓	rSEt Remote Tuning Set (tun1 or tun2)	Act 1 Control Action 1 see (19)	tyP5 Slot 5 Sensor Type see (11)	AS51 Slot 1 Assignment see (20)	Sby1 Alarm 1 Standby (minutes)	S5H5 Slot 5 Calibration Signal High	dEF5 Default Setpoints (yes or no)
↑ SP SELECT ADVANCE	burn Sensor Break Mode see (12)	tyP1 PID Type 1 see (17)	AS5S Slot 5 Assignment (Process In)	S5L1 Slot 1 Signal Low see (21)	LcH1 Alrm 1 Latch Enable (yes or no)	cPL5 Slot 5 Compensation Signal Low	dESt Display Test (yes or no)
↓	AtcP Auto-Comp Type see (13)	AL2 2 Algorithm 2 see (15)	Sc L5 Slot 5 Scale Low see (11)	S5H1 Slot 1 Signal High see (21)	tyP2 Alarm 2 Type see (6)	cPH5 Slot 5 Compensation Signal High	SESt Switch Test (yes or no)
tyPE Security Type (none or password)	A-mn Auto/Man. Transfer see (14)	tyP2 PID Type 2 see (17)	Sc H5 Slot 5 Scale High see (11)	SLt2 Slot 2 Hardware see (21)	Sby2 Alarm 2 Standby (minutes)	S5L6 Slot 6 Calibration Signal Low	
cod1 Code, Level 1 (4 digits) thru:		SAFE Safety Out (percent)	S5L5 Slot 5 Signal Low see (11)	AS52 Slot 2 Assignment see (20)	LcH2 Alrm 2 Latch Enable (yes or no)	S5H6 Slot 6 Calibration Signal High	
cod5 Code, Level 5 (4 digits)			S5H5 Slot 5 Signal High see (11)	tyP2 Slot 2 Retran Type see (16)	LPbE Loop Break Enable (yes or no)		
			SLt6 Slot 6 Hardware see (23)	S5L2 Slot 2 Signal Low see (21)			
			AS56 * Slot 6 Assignment (Rem Stpt or None)	S5H2 Slot 2 Signal High see (21)			
			Sc L6 Slot 6 Scale Low see (23)	SLt3 Slot 3 Hardware see (21)			
			Sc H6 Slot 6 Scale High see (23)	AS53 Slot 3 Assignment see (20)			
			S5L6 Slot 6 Signal Low see (23)	SLt4 Slot 4 Hardware see (21)			
			S5H6 Slot 6 Signal High see (23)	AS54 Slot 4 Assignment see (20)			
			SLt7 Slot 7 Hardware see (23)				
			c 1 7 * Slot 7, Contact 1 Def. see (18)				
			c2 7 Slot 7, Contact 2 Def. see (18)				

(12) burn Sensor Break Mode (T/C, RTD & mVdc only)

- uP — Causes outputs to go to the "off" condition (0% demand for PID outputs; "Off" for On/Off outputs). Alarms assume an upscale process reading (default setting).
- dUUn — Causes outputs to go to the "off" condition (0% demand for PID outputs; "Off" for On/Off outputs). Alarms assume a downscale process reading.
- SAFu — Causes outputs to go to the Safety Out demand percent specified by the user (see Control Config.). Alarms assume an upscale process reading.
- SAFd — Causes outputs to go to the Safety Out demand percent specified by the user (see Control Config.). Alarms assume a downscale process reading.
- AEcu — Causes the controller to use the auto-compensation setting. Alarms assume an upscale process reading.
- AEcd — Causes the controller to use the auto-compensation setting. Alarms assume a downscale process reading.

(13) AtcP Auto-Compensation Type

- Proc — Causes the outputs to freeze at the present demand percent if the "steady state" conditions have been met. If "process" is chosen but the "steady state" conditions have not been met, the Manual Percent Preset Out setting will be used.
- nnPr — Causes the outputs to go to the Manual Percent Preset Out setting specified by the user (see Control Setup).

(14) A-mn Auto/Manual Transfer Type

(Requires Auto/Manual Select and Contact Input.)

- Proc — Causes the controller to use the present output demand if switched to manual by contact input.
- nnPr — Causes the controller to use the Manual Percent Preset Out setting (see Control Setup) if switched to manual by contact input.

* Depends on hardware. Refer to Model Number for all possibilities.

(15) AL1 | AL2 Algorithm 1 or 2

- Pid — Three-mode (Proportional, Integral and Derivative) control with a "load line" setting.
- Pd-r — Two-mode (Proportional and Derivative) control with manual reset (load line).
- onoF — ON/OFF control (note that Output must be a switching output – either relay or pulse voltage or triac – see Output Configuration).
- nonE — Causes control to NOT be used. "nonE" cannot be chosen for Algorithm 1 unless Algorithm 2 has been previously set to "nonE." Choosing "nonE" for both Algorithm 1 and 2 will cause the controller to act as an indicator only (the Process Value will appear in the upper display and the lower display will remain blank).

(16) tyP2 Retransmitting Output Types

cEL 1	Control Output 1	PU	Process Value
cEL2	Control Output 2	Er	Actuator Position
SP	Setpoint (scaled to Stpt High and Low Limits - see Control Setup)	nonE	No Assignment

(17) tyP1 | tyP2 PID Type

This setting determines how the results of the control algorithm are applied to a DIRECT acting control output. This screen will not appear unless the corresponding control action is "direct."

- Lin — Calculated percent demand is applied without modification.
- oiL — Calculated percent demand is applied without modification. The default gain ratio is 2:1.
- FAn — Calculated percent demand is constrained by the minimum and maximum power settings (Control Setup). "FAn" has a minimum on-time of 2 seconds. The default gain ratio is 4:1.
- H2o — Calculated percent demand is squared. The default gain ratio is 16:1.

(18) c1 6c1 7 / c2 6c2 7 Contact In Definition

The Contact Definition screen determines which of the optional contact closure functions is assigned to the Contact Inputs (Slot 6 Input 1 is Terminals 34 & 36; Slot 6 Input 2 is Terminals 35 & 36) (Slot 7 Input 1 is Terminals 31 & 33; Slot 7 Input 2 is Terminals 32 & 33).

- AAcK — Controller will acknowledge any existing LATCHING alarms as long as contacts are closed.
- L-r — Controller will use the remote setpoint input for the control setpoint as long as contacts are closed.
- SEt2 — Controller will switch the local tuning set from Tuning Set 1 to Tuning Set 2 as long as contacts are closed. The Setpoint Select key will NOT function and the Setpoint Select variable can NOT be changed (if Set has already been selected using the Setpoint Select key, the contact will NOT function).
- A-mn — Controller will switch to manual (Auto/Manual Select option must be present) as long as contacts are closed. Either the present process percent out or the "manual percent preset" out is used, based on the Auto/Manual Transfer Type (see Loop Config). ON/OFF outputs will be converted to time proportioning using the Manual Percent Out setting and Cycle Time (default cycle time is 15 seconds for relays, 10 seconds for all other switching outputs – see Tuning Set 1 & 2 Setup). As long as the contact is closed, the Auto/Manual key will NOT function. Percent out CAN be changed from the keypad (if Manual has already been selected using the Auto/Manual key, the contact will NOT function). Note that the Auto/Manual contact in will NOT function if "HALt" is in effect (the contact must be cycled after "HALt" terminates).
- FrSt — Controller will stop calculating (freeze) the reset term and use current value for control as long as contacts are closed.
- tAct — Controller will toggle the control action from whatever it was to the opposite control action as long as contacts are closed. Note that this definition is NOT available with Heat/Cool control or Dual control.
- S-Hd — Controller will use the present process value for control (sample and hold) as long as contacts are closed.
- HALt — Controller will use the Safety Percent Out setting (see Control Con-figuration) as long as contacts are closed. Note that ON/OFF outputs will be converted to time proportioning using the Safety Percent Out setting and Cycle Time (default cycle time is 15 seconds for relays, 10 seconds for all other switching outputs – see Tuning Set 1 & 2 Setup).

(19) Act 1 Control Action 1

(Does not appear if Algorithm 1 is set to "nonE")

- rEU — Control Output 1 will be reverse acting and Control Output 2 (if present) will be direct acting. Using proportional control (Pid or Pd-r) with a REVERSE acting Output 1 causes the percent demand to decrease as the process value rises towards setpoint. Using ON/OFF control with a REVERSE acting Output 1 causes the output to turn off if the process value is above setpoint.
- dir — Control Output 1 will be direct acting.Using proportional control (Pid or Pd-r) with a DIRECT acting Output 1 causes the percent demand to increase as the process value rises towards setpoint. Using ON/OFF control with a DIRECT acting Output 1 causes the output to turn on if the process value is above setpoint.

(20) Hardware Assignments Outputs

A591 A592 / A593 A594

- cEL 1 — Control Output 1
- cEL2 — Control Output 2
- AL r 1 — Alarm 1
- AL r2 — Alarm 2
- nonE — No Assignment
- trAn — Retran Output, see (16)
- EA-o — Electric Actuator, Open
- EA-c — Electric Actuator, Close

(21) SLt 1 SLt2 / SLt3 SLt4 Hardware Type

- rLyA — Form A Relay
- rLyc — Form C Relay
- USSr — Non-Contact Voltage for SSR (12Vdc)
- curr — Current (0-20mAdc max.) 4-20 mAdc (ordered for Control Out or for Retransmitting Out)
- Volt — Voltage (0-10 Vdc max.) 0-10 Vdc (ordered for Control Out; 1-5 Vdc ordered for Retransmitting Out)
- trAc — Triac (24 to 240 Vac)
- PS — Power Supply 8 = 24 Vdc, 35 mA maximum 9 = 30 Vdc, 35 mA maximum
- nonE — No hardware installed

Analog Output Signals (by Model No.):

3 or 7 = 4 to 20 mAdc
4 = 0 to 10 Vdc
6 = 1 to 5 Vdc

(22) Hardware Assignments Inputs

A595 / A596

- Prc 1 — Process Input 1
- rSP — Remote Setpoint
- nonE — No Assignment

(23) SLt5 / SLt6 SLt7 Hardware Type

- uni U — Universal (process) Input
- Hbo — CT Input for Heater Burnout (0-50 mA ac max.; 0-100 Amps)
- cin — Dual Contact Closure Input
- curr — Current (0-20 mAdc max.) 4-20 mAdc (ordered for Remote Setpoint Input)
- Volt — Voltage (0-10 Vdc max.) 1-5 Vdc (ordered for Remote Setpoint Input)
- EA — Electric Actuator Slidewire Input 100Ω to 2500Ω
- PS — Power Supply 8 = 24 Vdc, 35 mA maximum 9 = 30 Vdc, 35 mA maximum
- di — RS-485 Digital Communications
- nonE — No hardware installed

Analog Input Signals (by Model No.):

3 = 4 to 20 mAdc
4 = 1 to 5 Vdc
H = 20 Amp HBO Transformer
P = 100 Amp HBO Transformer

(Scale for Current or Voltage is -1999 to 9999)

Security		
	Security Level	None
	Password	None
System		
	Firmware Version/Revision	(as installed)
Loop		
	Setpoint Source	Local
	Setpoint Select Key Define	Local-Local
	Local Setpoint Select	tun1
	Auto/Manual Key Enable	if ordered, Yes
	Powerup Type	Automatic
	Setpoint Ramp Enable	No
	Ramp Rate Up	9999
	Ramp Rate Down	9999
	Bargraph Type	None
	Bargraph Scaling Factor	1
Control		
	Setpoint Low Limit	Input Scale Low
	Setpoint High Limit	Input Scale High
	Hysteresis Out 1	1
	Minimum Power Out 1	0
	Maximum Power Out 1	100
	Slew Rate Filter Out 1	100
	Hysteresis Out 2	1
	Minimum Power Out 2	0
	Maximum Power Out 2	100
	Slew Rate Filter Out 2	100
	Manual Percent Preset	0
	Electric Actuator Deadband	1.0
Autotune		
	Autotune Type	None
	Autotune Response	1.0
	Adaptive Tune Enable	No
	Oscillation Limit	8
Tuning Set 1		
†	Setpoint 1	0
†	Proportional Band 1	2.5
†	Load Line 1	0
†	Reset (Integral) 1	360
†	Rate (Derivative) 1	60
†	Cycle Time 1	(Relays = 15) 10
†	Spread 1	0
†	Proportional Band 2	2.5
†	Load Line 2	0
†	Reset (Integral) 2	360
†	Rate (Derivative) 2	60
†	Cycle Time 2	(Relays = 15) 10
†	Spread 2	0
Tuning Set 2		
†	Setpoint 2	0
†	Proportional Band 1	2.5
†	Load Line 1	0
†	Reset (Integral) 1	360
†	Rate (Derivative) 1	60
†	Cycle Time 1	(Relays = 15) 10
†	Spread 1	0
†	Proportional Band 2	2.5
†	Load Line 2	0
†	Reset (Integral) 2	360
†	Rate (Derivative) 2	60
†	Cycle Time 2	(Relays = 15) 10
†	Spread 2	0
Input		
	Slot 5 Hardware Type	(see Model Number)
	Slot 5 Sensor Type	(Default = None)(see Model Number)
	Slot 5 Assignment	Process Input
	Slot 5 Eng. Units	(Default = °F)(see Model Number)
	Slot 5 Sensor Correct	0
	Slot 5 Filter Window	0
	Slot 5 Decimal Location	0
	Slot 6 Hardware Type	(see Model Number)
	Slot 6 Assignment	(see Model Number)
	Slot 6 Eng. Units	(HBO only) Amps
	Slot 6 Sensor Correct	0
	Slot 6 Filter Window	(Remote Stpt. = 5) 0
	Slot 6 Decimal Location	0
Alarm		
	Alarm 1 Acknowledge	No
	Alarm 1 Type	(Default = None)(see Model Number)
†	Alarm 1 Setpoint	0
†	Alarm 1 Hysteresis	1
	Alarm 2 Acknowledge	No
	Alarm 2 Type	(Default = None)(see Model Number)
†	Alarm 2 Setpoint	0
†	Alarm 2 Hysteresis	1
†	Loop Break	1
†	Heater Burnout	0

† Default Setpoints.

Setup Defaults

Security		
	Security Type	None
	Set Code 1	1
	Set Code 2	2
	Set Code 3	3
	Set Code 4	4
	Set Code 5	5
Loop		
	Tuning Set Enable	1-2
	Remote Setpoint Tuning Set Select	tun2
	Sensor Break (Burn) Mode	Up (outputs off; alarms upscale)
	Auto Compensation Type	Process
	Auto/Manual Transfer Type	Process
Control		
	Algorithm 1	PID
	Control Action 1	Reverse
	PID Type 1	Linear
	Algorithm 2	if ordered, PID
	PID Type 2	Linear
	Safety Percent Out	0
Input		
	Slot 5 Hardware Type	Universal
	Slot 5 Sensor Type	(Default = None)(see Model Number)
	Slot 5 Assignment	Process Input 1
	Slot 5 Input Scale Low	(see Model Number)
	Slot 5 Input Scale High	(see Model Number)
	Slot 5 Input Signal Low	(see Model Number)
	Slot 5 Input Signal High	(see Model Number)
	Slot 6 Hardware Type	(see Model Number)
	Slot 6 Assignment	(see Model Number)
	Slot 6 Input Scale Low	(see Model Number)
	Slot 6 Input Scale High	(see Model Number)
	Slot 6 Input Signal Low	(see Model Number)
	Slot 6 Input Signal High	(see Model Number)
	Slot 6 Contact 1 Definition	None
	Slot 6 Contact 2 Definition	None
	Slot 7 Hardware Type	(see Model Number)
	Slot 7 Contact 1 Definition	None
	Slot 7 Contact 2 Definition	None
Output		
	Slot 1 Hardware Type	(see Model Number)
	Slot 1 Assignment	(see Model Number)
	Slot 1 Output Signal Low	(see Model Number)
	Slot 1 Output Signal High	(see Model Number)
	Slot 2 Hardware Type	(see Model Number)
	Slot 2 Assignment	(see Model Number)
	Slot Retran Type	Process Value
	Slot 2 Output Signal Low	(see Model Number)
	Slot 2 Output Signal High	(see Model Number)
	Slot 3 Hardware Type	(see Model Number)
	Slot 3 Assignment	(see Model Number)
	Slot 4 Hardware Type	(see Model Number)
	Slot 4 Assignment	(see Model Number)
Alarm		
	Alarm 1 Type	(Default = None)(see Model Number)
	Alarm 1 Standby Time	0
	Alarm 1 Latch Enable	No
	Alarm 2 Type	(Default = None)(see Model Number)
	Alarm 2 Standby Time	0
	Alarm 2 Latch Enable	No
	Loop Break Enable	No
Calibration		
	Slot 5 Signal Low	(see Calibration)
	Slot 5 Signal High	(see Calibration)
	Slot 5 Compensation Low	(see Calibration)
	Slot 5 Compensation High	(see Calibration)
	Slot 6 Signal Low	(see Calibration)
	Slot 6 Signal High	(see Calibration)
Diagnostics		
	Load Default Config.	No
	Load Default Setup	No
	Display Test	No
	Switch Test	No

Configuration Defaults

Note that the controller will be shipped "as ordered" by model number. "Default" and "As Shipped" are the same (with four exceptions), but are model number dependent as noted by items labeled "see Model Number." The four exceptions are Slot 5 Sensor Type, Slot 5 Eng. Units, and Alarm 1 & 2 Type.

MODEL	1		Q		-						-				-		-	
Field No.	1	2	3	4		5	6	7	8	9		10	11	12		13		14	15

Field 1, 2. CONTROLLER
0 - Series 10
5 - Series 15

Field 3. CONTROLLER SIZE
Q - Quarter DIN

Field 4. OUTPUT SLOT 1
Control Output 1
0 - None*
2 - Pulse Non-Contact Voltage for SSR (12 Vdc)
3 - Current (4 to 20 mAdc)
4 - Voltage (0 to 10 Vdc)
C - Low Resolution Current (4 to 20 mAdc)(Series 10 ONLY)
G - Low Resolution Voltage (0 to 10 Vdc)(Series 10 ONLY)
R - Relay (Form A)
T - Triac (24 to 240 Vac, 1 Amp)
V - Indicator (No Output)
Alarm
A - Form A Relay for Alarm 1 or Program Event 1 (shipped as Process High Alarm)**
*Use ONLY if Field 13 is "S" (Form C Relay Control Output) and no Alarm 1 is wanted.
** Order here ONLY if Field 13 is "S" (Form C Relay Control Output).

Field 5. OUTPUT SLOT 2
0 - None
Control Output 2
1 - Relay (Form A)
2 - Pulse Non-Contact Voltage for SSR (12 Vdc)
3 - Current (4 to 20 mAdc)
4 - Voltage (0 to 10 Vdc)
C - Low Resolution Current (4 to 20 mAdc)(Series 10 ONLY)
G - Low Resolution Voltage (0 to 10 Vdc)(Series 10 ONLY)
T - Triac (24 to 240 Vac, 1 Amp)
Alarm
A - Form A Relay for Alarm 2 or Program Event 2 or 3 (shipped as Process High Alarm)
Auxiliary Output
6 - Retransmitting Output (1 to 5 Vdc) shipped as Process Output, programmable to Setpoint Output or Percent Output.
7 - Retransmitting Output (4 to 20 mAdc) shipped as Process Output, programmable to Setpoint Output or Percent Output.
Transmitter Power Supply
8 - Regulated Power Supply (24Vdc, 35 mAdc maximum)(Series 15 ONLY)
9 - Regulated Power Supply (30Vdc, 35 mAdc maximum)(Series 15 ONLY)

Fields 6, 7. INPUT SLOT 5
Universal Input (field selectable) for TC, Current, Millivoltage, Voltage, and RTD inputs. Decimal point programmable (dependent on scale). (RTD input optional on Series 10.)
Thermocouple

KF	Type K,	-100 °F to 2400 °F	PF	PL-II,	0 °F to 2500 °F
KC	Type K,	-75 °C to 1320 °C	PC	PL-II,	-20 °C to 1375 °C
JF	Type J,	-100 °F to 1600 °F	CF	Type C,	0 °F to 4200 °F
JC	Type J,	-75 °C to 875 °C	CC	Type C,	-20 °C to 2320 °C
EF	Type E,	-100 °F to 1600 °F	NF	Type N,	-100 °F to 2400 °F
EC	Type E,	-75 °C to 875 °C	NC	Type N,	-75 °C to 1320 °C
RF	Type R,	0 °F to 3100 °F	MF	Ni/Ni Mo,	32 °F to 2500 °F
RC	Type R,	-20 °C to 1705 °C	MC	Ni/Ni Mo,	0 °C to 1371 °C
SF	Type S,	0 °F to 3100 °F	TF	Type T,	-350 °F to 700 °F
SC	Type S,	-20 °C to 1705 °C	TC	Type T,	-215 °C to 375 °C
BF	Type B,	100 °F to 3100 °F			
BC	Type B,	37 °C to 1817 °C			

Current and Voltage

C1	Current	4 to 20	mAdc	-1999 to 9999
V1	Voltage	0 to 5	Vdc	-1999 to 9999
V2	Voltage	1 to 5	Vdc	-1999 to 9999
V3	Voltage	0 to 10	Vdc	-1999 to 9999
V4	Voltage	0 to 100	mVdc	-1999 to 9999
V5	Voltage	-10 to 10	mVdc	-1999 to 9999
V6	Voltage	0 to 10	mVdc	-1999 to 9999

RTD

8F	PLT100 DIN (0.00385Ω/Ω/°C)	-199.9 °F to	999.9 °F
8C	PLT100 DIN (0.00385Ω/Ω/°C)	-199.9 °C to	850.0 °C

Field 8. INPUT SLOT 6
0 - None
1 - Dual Contact Closure, programmable to Manual Select, Second Local Setpoint and Tuning Constants, Toggle Output Action, Sample & Hold, Freeze Reset, Halt, Run/Hold Programmer, Reset Programmer, Run/Hold Timer, Reset Timer.
2 - Digital Communications (RS-485)(Series 15 ONLY)
3 - Remote Setpoint (4-20 mAdc)
4 - Remote Setpoint (1-5 Vdc)

Field 8. INPUT SLOT 6 (continued)
E - Electric Actuator Slidewire Feedback Input*
H - Heater Burnout Current Transformer Input (0 to 20 Amps)**
P - Heater Burnout Current Transformer Input (0 to 100 Amps)**
Transmitter Power Supply
8 - Regulated Power Supply (24Vdc, 35 mAdc maximum)(Series 15 ONLY)
9 - Regulated Power Supply (30Vdc, 35 mAdc maximum)(Series 15 ONLY)
*Output 1 and 2 must be Triac/Triac or Relay/Relay.
** Select an alarm from one of the alarm fields.

Field 9. OPTIONS
0 - None
1 - Auto/Manual
2 - Ten Step Ramp/Soak Programmer*
3 - Both Option 1 and Option 2
4 - Timer Function*
5 - Both Option 1 and Option 4
*Programmable from 0 to 9999 hours; or 0 to 99 hours, 59 minutes; or 0 to 99 minutes, 59 seconds (shipped as hours and minutes). Program Events or Timer Alarms can be ordered in Field 4, 5, 11 and 13.

Field 10. INPUT SLOT 7
0 - None
1 - Dual Contact Closure, programmable to Manual Select, Second Local Setpoint and Tuning Constants, Toggle Output Action, Sample & Hold, Freeze Reset, Halt, Run/Hold Programmer, Reset Programmer, Run/Hold Timer, Reset Timer.
2 - Digital Communications (RS-485)(Series 15 ONLY)
Transmitter Power Supply
8 - Regulated Power Supply (24Vdc, 35 mAdc maximum)(Series 15 ONLY)
9 - Regulated Power Supply (30Vdc, 35 mAdc maximum)(Series 15 ONLY)

Field 11. OUTPUT SLOT 4*
Alarm 2
Form A Relay; shipped NO, field configurable to NO/NC; field configurable Standby and Latching function.
0 - None
1 - High Deviation
2 - Low Deviation
3 - Deviation Band (deenergized in the band)
4 - Deviation Range Band (energized in the band)
5 - Process High
6 - Process Low
B - Loop Break Relay
H - Heater Burnout**
T - Timer Alarm Relay
Program Event 2
P - Program Event Relay
*This Field is NOT available if Field 13 (Slot 3) is "C" or "S" (Form C Relay).
** Requires Heater Burnout Current Transformer Input (Field 8).

Field 12. POWER SUPPLY
0 - 85 to 250 Vac, 50/60 Hz

Field 13. OUTPUT SLOT 3
0 - None
Alarm 1
Form A Relay; shipped NO, field configurable to NO/NC; field configurable Standby and Latching function.
1 - High Deviation
2 - Low Deviation
3 - Deviation Band (deenergized in the band)
4 - Deviation Range Band (energized in the band)
5 - Process High
6 - Process Low
B - Loop Break Relay
C - Form C Relay for Alarm 1 (shipped as Process High)
H - Heater Burnout*
T - Timer Alarm Relay
Program Event 1
P - Program Event Relay
Control Output
R - Form A Relay for Control Output 2**
S - Form C Relay for Control Output 1
*Requires Heater Burnout Current Transformer Input (Field 8).
** Only if Retransmitting Output ordered in Field 5 (Slot 2).

Fields 14, 15. SPECIALS
00 - None
01 - Shipped without Housing (order Housing separately)
02 - Hardware Security Lock

CALIBRATION

Slot 5 Input Signal Low ("SgL5") Attach the proper source (or resistor) to Terminals 38 and 39 (Terminal 38 is plus and Terminal 39 is minus for thermocouple, volt, millivolt and milliamp; the same terminals are used for RTD). Adjust the source/resistance according to the Table. Note that calibrating thermocouple inputs requires a low and high signal for each of the two thermocouple groups (pick one thermocouple type from each group).

Once the source is properly set, press the Auto/Manual key. The controller will display the message "cal busy" ("cAL bUSY") and begin the low end calibration procedure.

Once "cal busy" disappears, press the Function key to bring up Slot 5 Signal High.

Slot 5 Input Signal High ("SgH5") Adjust the source/resistance according to the Table.

Once the source is properly set, press the Auto/Manual key. The controller will display the message "cal busy" and begin the high end calibration procedure.

The "cal busy" message will be replaced by either a "cal done" ("cAL donE") or "cal bad" ("cAL bAd") message. If the "cal bad" message appears, press the Function key to return to the Signal High screen, then press the Setpoint Select key to back up to the Signal Low screen. Check connections and signal levels and repeat the Input Signal Low and Input Signal High calibration.

If "cal done" appears, press the Function key to bring up the Slot 5 Input Signal High screen, then press the Function key again to bring up the Slot 5 Compensation Low screen.

Slot 5 Compensation Low ("cPL5") Attach the precision resistance box to Terminals 37 and 39 as shown in the Figure. Adjust the resistance according to the Table. Once the source is set, press the Auto/Manual key. The controller will display the message "cal busy" and begin the low end compensation procedure.

Once the "cal busy" message disappears, press the Function key to bring up the Slot 5 Compensation High screen.

Slot 5 Compensation High ("cPH5") Adjust the resistance according to the Table. Once the source is set, press the Auto/Manual key. The controller will display the message "cal busy" and begin the high end compensation procedure.

The "cal busy" message will be replaced by either "cal done" or "cal bad." If "cal bad" appears, press the Function key to return to the Compensation High screen, then press the Setpoint Select key to back up to the Compensation Low screen. Check connections and signal levels and repeat the Compensation Low and Compensation High calibration.

If "cal done" appears, press the Function key to bring up the Slot 5 Compensation High screen, then press the Function key again to bring up the Calibration Header screen.

Repeat the entire calibration procedure for each of the input types included with the controller (2 thermocouple, millivolt, Volt, milliamp, and the optional RTD). Be sure to verify calibration before returning the controller to use.

Press the Display key to return to the Operating mode or press the Setup key to continue through the Configuration mode (or press the Run/Hold key to go backwards through the Configuration mode). There is no timeout from the Configuration mode – the Display key must be pressed to return to the Operating mode.

If the controller is equipped with any optional analog inputs, once all of the possible process input signals have been calibrated, continue on with the calibration procedure for Slot 6.

Slot 6 Input Signal Low ("SgL6") Attach the proper source to Terminals 34 and 35 (Terminal 34 is plus; Terminal 35 is minus). Note that if the controller is equipped with the heater burnout current transformer, it must be disconnected for this calibration procedure (the current transformer input is calibrated using a DC voltage input). Adjust the source according to the Table.

Once the source is set, press the Auto/Manual key. The controller will display the message "cal busy" and begin the low end calibration procedure.

Once the "cal busy" message disappears, press the Function key to bring up the Slot 6 Input Signal High screen.

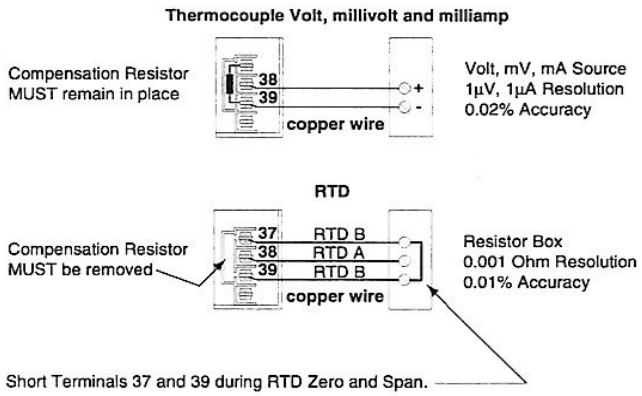
Slot 6 Input Signal High ("SgH6") Adjust the source according to the Table. Once the source is set, press the Auto/Manual key. The controller will display the message "cal busy" and begin the high end calibration procedure.

The "cal busy" message will be replaced by either "cal done" or "cal bad." If the "cal bad" message appears, press the Function key to return to the Signal High screen, then press the Function key repeatedly to return to the Signal Low screen. Check connections and signal levels and repeat the Input Signal Low and Input Signal High calibration.

If "cal done" appears, press the Function key to bring up the Slot 5 Input Signal High screen, then press the Function key again to bring up the Calibration Header screen.

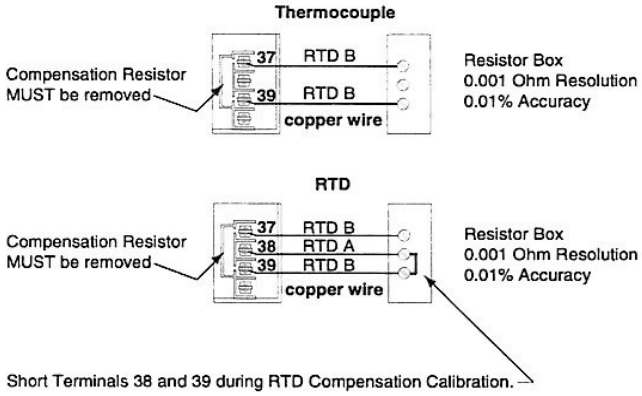
Press the Display key to return to the Operating mode. There is no timeout from the Configuration mode – the Display key must be pressed to return to the Operating mode.

Connect to Terminals as shown below for Zero (Input Signal Low) and Span (Input Signal High).



During the entire RTD calibration procedure, do not allow the resistance between ANY two of the 3 terminals to exceed 500Ω (when making connections, if the terminals should "open," allow at least 3 minutes for the input to "settle").

Connect to Terminals as shown below for Slot 5 Compensation Low and Slot 5 Compensation High.



During the entire RTD calibration procedure, do not allow the resistance between ANY two of the 3 terminals to exceed 500Ω (when making connections, if the terminals should "open," allow at least 3 minutes for the input to "settle").

	Slot 5 Input Type (Source/Resistance)					
	Thermocouples		Millivolts	Volts	Milliamps	RTDs
	K, J, E, PL-II, C, N, Ni/Ni Mo, T	R, S, B				
SgL5	0.000 mV	0.000 mV	0.000 mV	0.000 V	0.000 mA	000.000 Ω
SgH5	100.000 mV	21.000 mV	100.000 mV	10.000 V	20.000 mA	500.000 Ω
cPL5	500.000 Ω	500.000 Ω	Compensation Not Required			000.000 Ω
cPH5	1000.000 Ω	1000.000 Ω	Compensation Not Required			500.000 Ω

	Slot 6 Input Type (Source)			Electric Actuator
	HBO	Volts	Milliamps	
SgL6	0.000 Vdc	0.000 Vdc	0.000 mAdc	Closed
SgH6	7.070 Vdc	10.000 Vdc	20.000 mAdc	Open

ELECTRIC ACTUATOR POSITIONING CALIBRATION

If the controller is equipped with the electric actuator positioning input in Slot 6, the slidewire potentiometer must be left in place for the calibration procedure.

Slot 6 Input Signal Low ("SgL6") With the message "cLoS" (for close) appearing in the lower display, press the Auto/Manual key. The EA Closed output will turn on, forcing the actuator toward the closed position ("caL buSy" will be displayed). Once the actuator reaches the closed position, the input reading will be taken.

Once "cal busy" disappears, press the Function key to bring up Slot 6 Signal High.

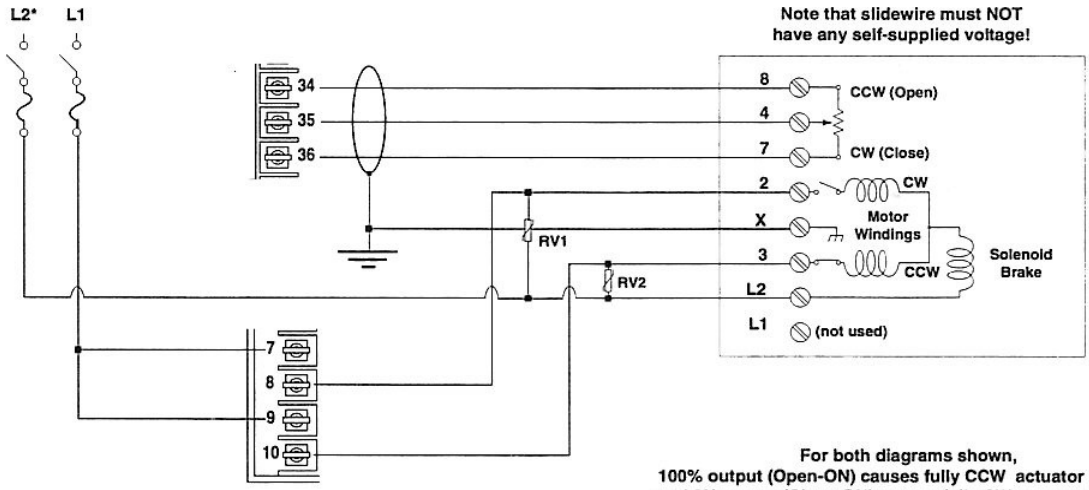
Slot 6 Input Signal High ("SgH6") With the message "oPEn" appearing in the lower display, press the Auto/Manual key. The EA Open output will turn on, forcing the actuator toward the open position ("caL buSy" will be displayed). Once the actuator reaches the open position, the input reading will be taken.

The "cal busy" message will be replaced by either "cal done" or "cal bad." If the "cal bad" message appears, press the Function key to return to the Signal High screen, then press the Function key repeatedly to return to the Signal Low screen. Check connections and signal levels and repeat the Input Signal Low and Input Signal High calibration.

If "cal done" appears, press the Function key to bring up the Slot 5 Input Signal High screen, then press the Function key again to bring up the Calibration Header screen.

Press the Display key to return to the Operating mode. There is no timeout from the Configuration mode – the Display key must be pressed to return to the Operating mode.

Barber-Colman Series EA 7X Actuator Wiring



Note that slidewire must NOT have any self-supplied voltage!

For both diagrams shown, 100% output (Open-ON) causes fully CCW actuator rotation, and 0% output (Close-ON) causes fully CW actuator rotation.

For Output 1 (Open) ON, slidewire terminals 4 and 8 of the actuator are shorted.

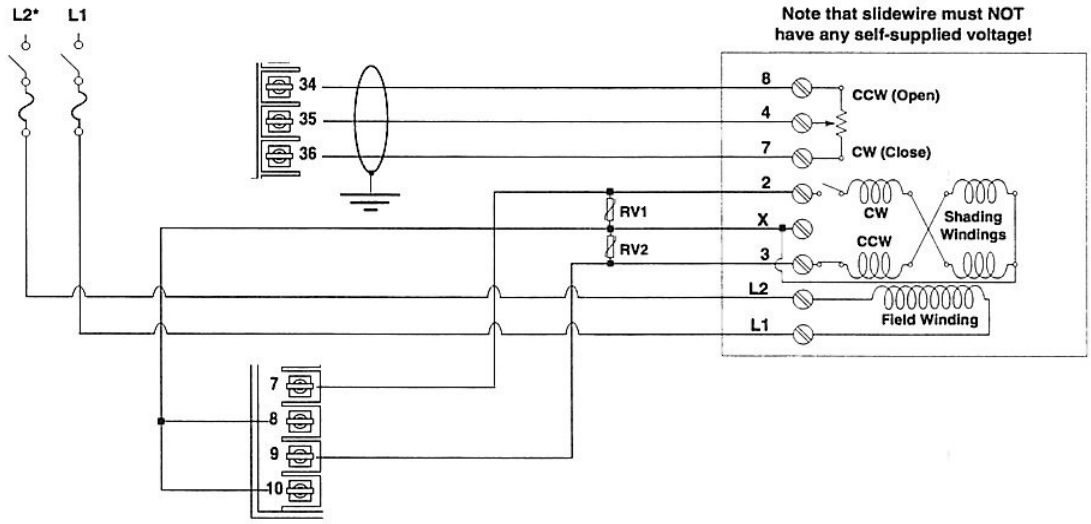
For Output 2 (Close) ON, slidewire terminals 4 and 7 of the actuator are shorted.

To reverse the direction of the actuator, interchange wires to actuator terminals 7 and 8, and also terminals 2 and 3.

Note:
When driving actuator motors, add Metal Oxide Varistors (MOVs) RV1 and RV2 to actuator terminals as shown.

RV1 and RV2 BC Part Numbers	Line Voltage
37-212	120
37-213	240

Barber-Colman Series EA 2X, 4X, 5X, 6X Actuators Wiring



Note that slidewire must NOT have any self-supplied voltage!

***Fuse L2 ONLY on 240 Vac applications. Use 1 Amp fuses on L1 and L2.**

WIRING THE CONTROLLER

Observe all Local and National Wiring Codes.

REFER TO THE MODEL NUMBER LABEL ON THE SIDE OF THE CONTROLLER.

Wire using NEC Class 1 wiring rated 75°C (167°F) minimum or in accordance with an equivalent national wiring standard. For supply connections, use No. 16 AWG copper stranded wire only. Up to 14 AWG copper stranded wire maximum may be used if the controller is wired using #6 ring lugs.

A switch or circuit breaker must be included in the enclosure (panel) in close proximity to the controller and marked as the disconnecting device.

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U.L. File E57965

Class 2 wiring must be separated a minimum of 1/4 inch from any Class 1 conductors.

The controllers described in this document may consist of the following assemblies:

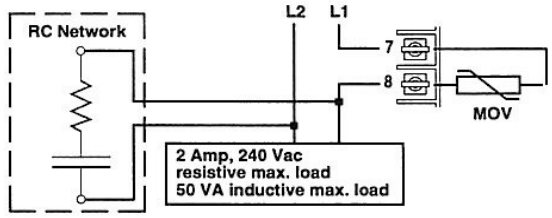
A-13843-2, -2-1, -102, -102-1, -3, -3-1, -103, -103-1, -4, -4-1, -104, -104-1
A-13856-1, -1-1, -101, -101-1, -2, -2-1, -102, -102-1, -202, -202-1
A-13857-1, -1-1, -2, -2-1, -3, -3-1
A-13873-1, -1-1, -101, -101-1, -201, -201-1
A-13947, -1, -1-1
A-13989-1, -1-1, -101, -101-1

(The assemblies shown below may be followed by suffix letters or numbers):

A-13840	A-13848	A-13855	A-13859	A-13872	A-13920	A-13958
A-13844	A-13852	A-13858	A-13860	A-13878	A-13939	A-13977

IMPORTANT WIRING NOTES:

The use of an "RC" network is recommended with all switching outputs in order to suppress electrical noise. Install the RC network as close to the load as possible and in compliance with local and national electrical codes. Barber-Colman part no. 50-1485 can be used on 120 Vac applications and 50-1486 can be used on 240 Vac applications.



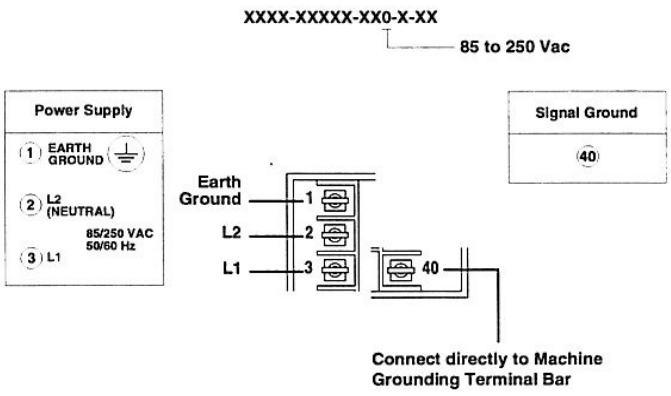
Note that MOV's are NOT polarity sensitive.

In addition, SOME relay outputs are shipped from the factory with a Metal Oxide Varistor (MOV) wired across the relay terminals. If these devices have been included, they MUST be left in place. They are provided in order to extend the life of the relay contacts.

POWER SUPPLY WIRING

Check Field 12 of the 15-digit controller model number.

A "0" indicates the controller is equipped with the standard universal (85 to 250 Vac, 50/60 Hz) power supply.



SLOT 1 WIRING

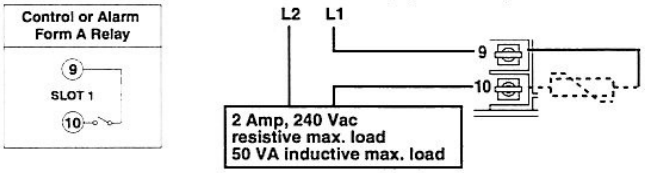
Check Field 4 of the 15-digit controller model number (see the label on the side of the case). Slot 1 is associated with Terminals 9 and 10 of the controller.

XXX□-XXXXX-XXX-X-XX

Control
- **0 = None**
- **2 = Pulse Non-Contact Voltage for SSR (12 Vdc)**
- **3 = Current (4-20 mA)**
- **4 = Voltage (0-10 Vdc)**
- **C = Low Resolution Current (4-20 mA)**
- **G = Low Resolution Voltage (0-10 Vdc)**
- **R = Relay (Form A)**
- **T = Triac (24-240 Vac, 1 Amp)**
- **V = Indicator (No Output)**

Alarm
- **A = Relay (Form A)**

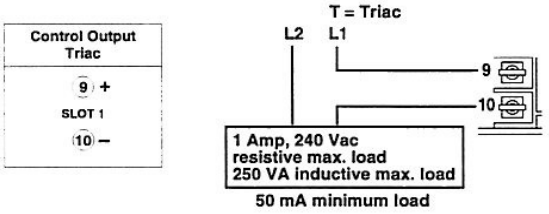
R or A = Form A Relay (NO contact)



Note that a Form A Relay ordered as an Alarm (option "A") occupying Slot 1 can be field configured to NO or NC.

A Form A Relay ordered as a Control Output (option "R") is FIXED as NO. (See "Relay Contacts")

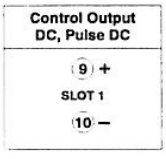
T = Triac



In order to insure that triac outputs will fully turn on, the load must draw a minimum of 50 mAac rms current when conducting. If a load is suspected or known to require less than 50 mA, the resistor kits shown below can be purchased from Barber-Colman Company. The resistor is meant to be wired in parallel with the load and will serve to increase load current above the 50 mA minimum.

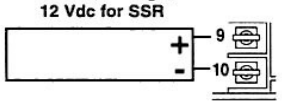
Kit Number	Description	Nominal Voltage
71-934-000	2K Ω, 10 W, leaded, wire-wound resistor.	120 Vac
71-934-100	4K Ω, 20 W, leaded, wire-wound resistor.	240 Vac

***Caution:* Resistor gets "hot" when powered. Keep away from wiring, case, etc.**



- **2 = Pulse Non-Contact Voltage for SSR (12 Vdc)**
- **3 = Current (4-20 mA)**
- **4 = Voltage (0-10 Vdc)**
- **C = Low Resolution Current (4-20 mA)**
- **G = Low Resolution Voltage (0-10 Vdc)**

Current, Voltage, 12 Vdc for SSR



- **2 = 12 Vdc for SSR: 1K Ohm minimum load**
- **3 or C = Current: 750 Ohm maximum load**
- **4 or G = Voltage: 1K Ohm minimum load (current limited to 30 mA max.)**

SLOT 2 WIRING

Check Field 5 of the 15-digit controller model number (see the label on the side of the case). Slot 2 is associated with Terminals 7 and 8 of the controller.

XXXX-□XXXX-XXX-X-XX

Slot 2

- 0 = None

Control

- 1 = Relay (Form A)
- 2 = Pulse Non-Contact Voltage for SSR (12 Vdc)
- 3 = Current (4-20 mA)
- 4 = Voltage (0-10 Vdc)
- C = Low Resolution Current (4-20 mA)
- G = Low Resolution Voltage (0-10 Vdc)
- T = Triac (24-240 Vac, 1 Aamp)

Alarm

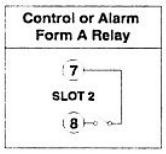
- A = Relay (Form A)

Auxiliary Output

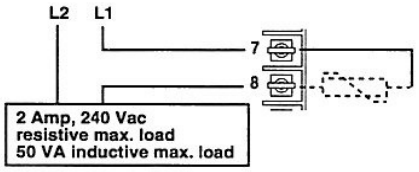
- 6 = Retransmitting Output (1-5 Vdc)
- 7 = Retransmitting Output (4-20 mAdc)

Transmitter Power Supply

- 8 = 24 Vdc Power Supply, 35 mA maximum
- 9 = 30 Vdc Power Supply, 35 mA maximum

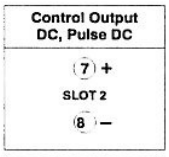


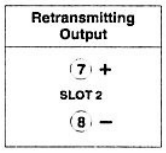
1 = Relay (Form A)
A = Relay (Form A)



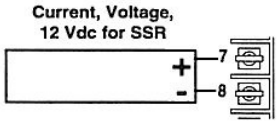
Note that a Form A Relay ordered as an Alarm (option "A") occupying Slot 2 can be field configured to NO or NC.

A Form A Relay ordered as a Control Output (option "1") is FIXED as NO. (See "Relay Contacts")





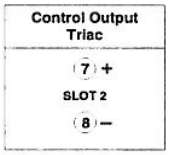
2 = Pulse Non-Contact Voltage for SSR (12 Vdc)
3 = Current (4-20 mA)
4 = Voltage (0-10 Vdc)
C = Low Resolution Current (4-20 mA)
G = Low Resolution Voltage (0-10 Vdc)
6 = Retransmitting Output (1-5 Vdc)
7 = Retransmitting Output (4-20 mAdc)



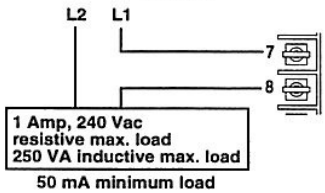
2 = 12 Vdc for SSR: 1K Ohm minimum load

3, 7 or C = Current: 750 Ohm maximum load

4, 6 or G = Voltage: 1K Ohm minimum load (current limited to 30 mA max.)

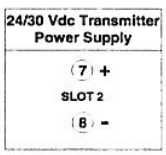


T = Triac

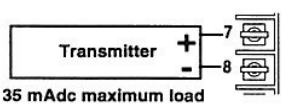


50 mA minimum load

Refer to Slot 1 wiring information for notes about Triac loads.



8 = 24 Vdc Power Supply, 35 mA maximum
9 = 30 Vdc Power Supply, 35 mA maximum



35 mAdc maximum load

SLOT 3 & 4 WIRING

Check Field 13 and Field 11 of the 15-digit controller model number (see the label on the side of the case). Slot 3 is associated with Terminals 5 and 6 of the controller. Slot 4 is associated with Terminals 4 and 5. If the controller is equipped with a Form C Relay (option "C" or "S" of Field 13), it occupies both Slot 3 and Slot 4, and is associated with Terminals 4, 5 and 6 of the controller.

XXXX-XXXXX-X□X-□-XX

Slot 4

Alarm

- 0 = None
- 1 = High Deviation
- 2 = Low Deviation
- 3 = Deviation Band (deenergized in the band)
- 4 = Deviation Range Band (energized in the band)
- 5 = Process High
- 6 = Process Low
- B = Loop Break Relay (Form A)
- H = Heater Burnout
- T = Timer Alarm Relay
- P = Program Event Relay

Slot 3

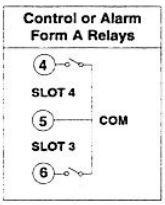
- 0 = None

Alarm

- 1 = High Deviation
- 2 = Low Deviation
- 3 = Deviation Band (deenergized in the band)
- 4 = Deviation Range Band (energized in the band)
- 5 = Process High
- 6 = Process Low
- B = Loop Break Relay (Form A)
- C = Form C Relay for Alarm
- A = Relay (Form A)
- H = Heater Burnout
- T = Timer Alarm Relay
- P = Program Event Relay

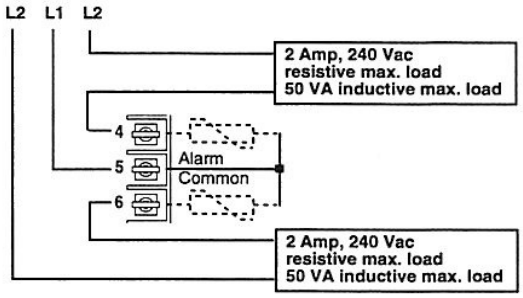
Control

- R = Form A Relay for Control Output
- S = Form C Relay for Control Output

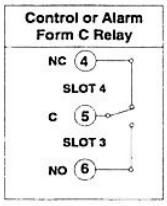


Note that Form A Relays occupying these positions (Slot 3 & 4) can be field configured to NO or NC. (See "Relay Contacts")

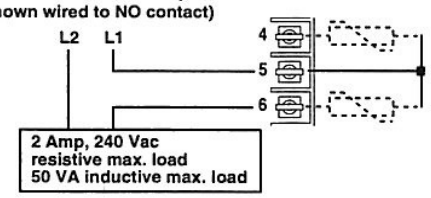
Form A Relays (shipped as NO contact)



Note that if only one pair of contacts has a load connected, then only one MOV is required.



C or S = Form C Relay
(shown wired to NO contact)



Note that the Form C Relay has specific requirements for two related jumpers. (See "Relay Contacts")

SLOT 5 WIRING

Check Fields 6 and 7 of the 15-digit controller model number.

An "8F" or "8C" in these two fields indicates that the controller is equipped with the universal input which includes the RTD selections (and has been shipped from the factory configured for an RTD input). Note that with an "8F" or "8C" in Fields 6 and 7, the input type is field selectable to thermocouple, current, voltage, millivoltage or RTD (see Input Configuration). Note that the RTD selections "8F" and "8C" are optional on the 10Q.

Slot 5 is associated with Terminals 37, 38 and 39 of the controller.

XXXX-X□□XX-XXX-X-XX

Control Input 1

RTD

- 8F - PLT100 DIN, °F
- 8C - PLT100 DIN, °C

Current and Voltage

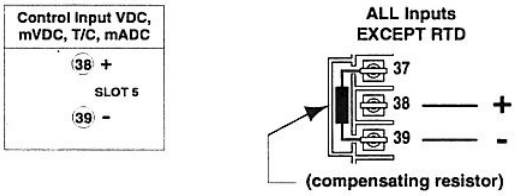
- C1 - Current (4 to 20 mA)
- V1 - Voltage (0 to 5 Vdc)
- V2 - Voltage (1 to 5 Vdc)
- V3 - Voltage (0 to 10 Vdc)
- V4 - Voltage (0 to 100 mVdc)
- V5 - Voltage (-10 to 10 mVdc)
- V6 - Voltage (0 to 10 mVdc)

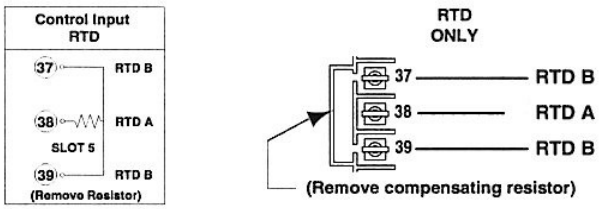
Thermocouple

KF -	Type K, °F	PF -	PL-II, °F
KC -	Type K, °C	PC -	PL-II, °C
JF -	Type J, °F	CF -	Type C, °F
JC -	Type J, °C	CC -	Type C, °C
EF -	Type E, °F	NF -	Type N, °F
EC -	Type E, °C	NC -	Type N, °C
RF -	Type R, °F	MF -	Ni/Ni Mo, °F
RC -	Type R, °C	MC -	Ni/Ni Mo, °C
SF -	Type S, °F	TF -	Type T, °F
SC -	Type S, °C	TC -	Type T, °C
BF -	Type B, °F		
BC -	Type B, °C		

WARNING!
Analog Inputs will be damaged by an overvoltage condition. Do NOT exceed the ranges listed here.

Current Input: -1 mAdc to 21 mAdc
Voltage Input: -1 Vdc to 12 Vdc





Note that the controller comes equipped with a temperature compensation resistor connected across Terminals 37 and 39. This resistor should be left in place for all input types (including volts, millivolts and current) EXCEPT RTDs.

Keep ALL Thermocouple Wiring (or Input Sensor Wiring) Physically Separated from ALL other Wiring.

Although normal electrical interference on the sensor leads is effectively eliminated by internal filters, high voltage spikes and inductive transients coupled over into the sensor circuit may bypass the filter system.

WARNING!
Hazardous Extraneous Voltage Capable of Causing Severe Injury or Death may exist between Thermocouple Leads and Ground. Disconnecting the Instrument Power Source may not remove this Voltage. Measure for the presence of Voltage between each Sensor Lead and Ground Before Servicing.

Do NOT place power wiring and sensor wiring in either the same conduit or wiring trough.

If shielded thermocouple leads are used, the shields must be insulated electrically and terminated at one location, preferably the chassis of the controller (Terminal #40).

SLOT 6 WIRING

Check Field 8 of the 15-digit controller model number (see the label on the side of the case). Slot 6 is associated with Terminals 34, 35 and 36 of the controller.

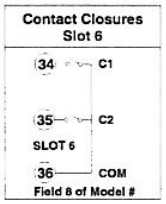
XXXX-XXX□X-XXX-X-XX

Slot 6

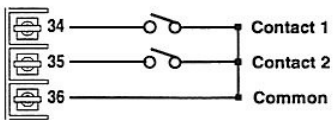
- 0 = None
- 1 = Dual Contact Closure Input
- 2 = Digital Communications
- 3 = Remote Setpoint (4-20 mAdc)
- 4 = Remote Setpoint (1-5 Vdc)
- E = Electric Actuator Slidewire Feedback
- H = Heater Burnout Current Transformer (0-20 Amps)
- P = Heater Burnout Current Transformer (0-100 Amps)

Transmitter Power Supply

- 8 = 24 Vdc Power Supply, 35 mA maximum
- 9 = 30 Vdc Power Supply, 35 mA maximum

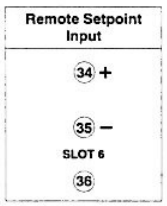


1 = Dual Contact Closure Input



6.5 Vdc nominal open circuit voltage between Common (Terminal 36) and Terminals 34 & 35. Maximum resistance (lead resistance plus contact) is 200 Ohms.

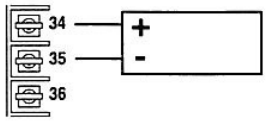
Note that contacts are assumed to be Normally Open, but opening or closing the contacts initiates a change.



3 = Remote Setpoint (4-20 mAdc) 250Ω Input Impedance

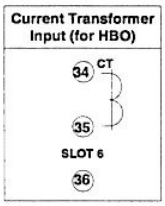
4 = Remote Setpoint (1-5 Vdc) 10MΩ Input Impedance

Current Device or Voltage Device



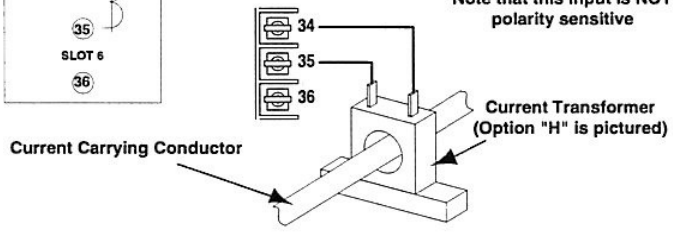
WARNING!
Analog Inputs will be damaged by an overvoltage condition. Do NOT exceed the ranges listed here.

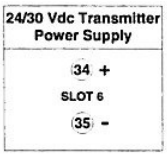
Current Transformer (HBO) Input: ±56 mA ac rms, or ±8.00 Vdc
Current Input: -1 mAdc to 21 mAdc
Voltage Input: -1 Vdc to 12 Vdc



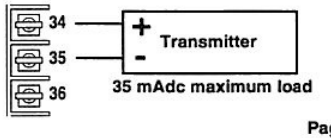
H = Heater Burnout Current Transformer (0-20 Amps)
P = Heater Burnout Current Transformer (0-100 Amps)

Note that this input is NOT polarity sensitive



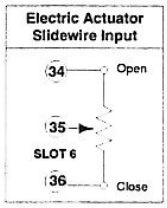


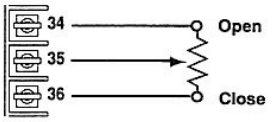
8 = 24 Vdc Power Supply, 35 mA maximum
9 = 30 Vdc Power Supply, 35 mA maximum



SLOT 6 WIRING (continued)

E = Electric Actuator Slidewire Feedback





See Electric Actuator Wiring (page 12)

1.0 Vdc slidewire excitation voltage is supplied. Slidewire must NOT have any self-supplied voltage! Resistances of 100Ω to 2500Ω can be used.

SLOT 7 WIRING

Check Field 10 of the 15-digit controller model number (see the label on the side of the case). Slot 7 is associated with Terminals 31, 32 and 33 of the controller.

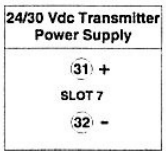
XXXX-XXXXX-□XX-X-XX

Slot 7

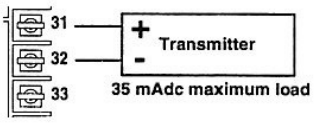
- **0 = None**
- **1 = Dual Contact Closure Input**
- **2 = Digital Communications**

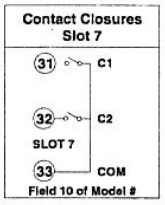
Transmitter Power Supply

- **8 = 24 Vdc Power Supply, 35 mA maximum**
- **9 = 30 Vdc Power Supply, 35 mA maximum**

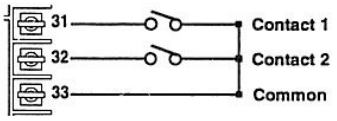


8 = 24 Vdc Power Supply, 35 mA maximum
9 = 30 Vdc Power Supply, 35 mA maximum



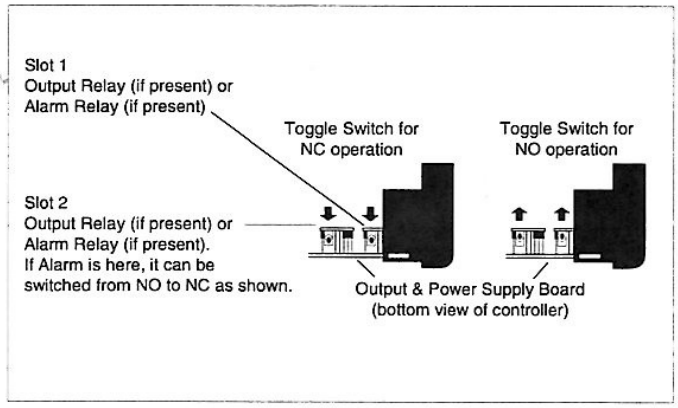


1 = Dual Contact Closure Input

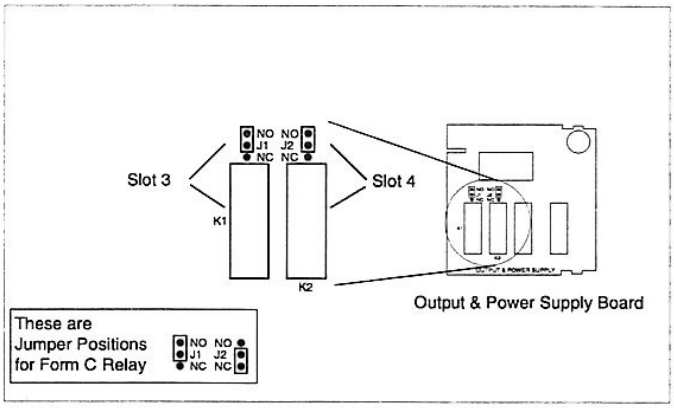


6.5 Vdc nominal open circuit voltage between Common (Terminal 33) and Terminals 31 & 32. Maximum resistance (lead resistance plus contact) is 200 Ohms.

Note that contacts are assumed to be Normally Open, but opening or closing the contacts initiates a change.



Slot 1 and Slot 2 Relay Switch Positions



Slot 3 and 4 Relay Jumper Locations

Barber-Colman Company
INDUSTRIAL INSTRUMENTS DIVISION
1354 Clifford Avenue
Loves Park, IL U.S.A. 61132-2940
1-815-637-3000