Honeywell

UDC3300
Expanded Model: DC330E
User Manual

51-52-25-79

5/00

Notices and Trademarks

Release 0 May, 2000

Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.** Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

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About This Document

Abstract

This manual contains all the information that is needed to install, configure and operate the UDC3300 Universal Digital Controller. Further details on operation, troubleshooting or calibration can be found in the full UDC3300 product manual (request document number 51-52-25-55).

Contacts

World Wide Web

The following lists Honeywell's World Wide Web sites that will be of interest to our customers.

Honeywell Organization	WWW Address (URL)
Corporate	*http://www.honeywell.com*
Sensing and Control	*http://www.honeywell.com/sensing*
International	*http://www.honeywell.com/Business/global.asp*

Telephone

Contact us by telephone at the numbers listed below.

	Organization	Phone Number	
United States and Canada	Honeywell	1-800-423-9883 (610) 641-3610	*Tech. Support*
		1-888-423-9883	*Q&A Faxback (TACFACS)*
		1-800-525-7439	*Service*
Asia Pacific	Honeywell Asia Pacific Hong Kong	(852) 2829-8298	
Europe	Honeywell PACE, Brussels, Belgium	[32-2] 728-2111	
Latin America	Honeywell, Sunrise, Florida U.S.A.	(954) 845-2600	

Symbol Definitions

The following table lists those symbols used in this document to denote certain conditions.

Symbol	Definition
	This CAUTION symbol on the equipment refers the user to the Product Manual for additional information. This symbol appears next to required information in the manual.
	**WARNING** **PERSONAL INJURY:** Risk of electrical shock. This symbol warns the user of a potential shock hazard where HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 Vpeak, or 60 Vdc may be accessible. **Failure to comply with these instructions could result in death or serious injury.**
	ATTENTION, Electrostatic Discharge (ESD) hazards. Observe precautions for handling electrostatic sensitive devices
	Protective Earth (PE) terminal. Provided for connection of the protective earth (green or green/yellow) supply system conductor.
	Functional earth terminal. Used for non-safety purposes such as noise immunity improvement. NOTE: This connection shall be bonded to protective earth at the source of supply in accordance with national local electrical code requirements.
	Earth Ground. Functional earth connection. NOTE: This connection shall be bonded to Protective earth at the source of supply in accordance with national and local electrical code requirements.
	Chassis Ground. Identifies a connection to the chassis or frame of the equipment shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.

Contents

Tables

Figures

1. Introduction

1.1 Overview

The UDC 3300 is a microprocessor-based, stand-alone controller. It combines the highest degree of functionality and operating simplicity offered in a 1/4 DIN size controller.

With a typical accuracy of ± 0.20 % of span, the UDC 3300 is an ideal controller for regulating temperature and other process variables in numerous heating and cooling applications, in metal working, food, and pharmaceuticals, and testing and environmental work.

1.2 CE Conformity (Europe)

This product is in conformity with the protection requirements of the following European Council Directives: **73/23/EEC**, the Low Voltage Directive, and **89/336/EEC**, the EMC Directive. Conformity of this product with any other "CE Mark" Directive(s) shall not be assumed.

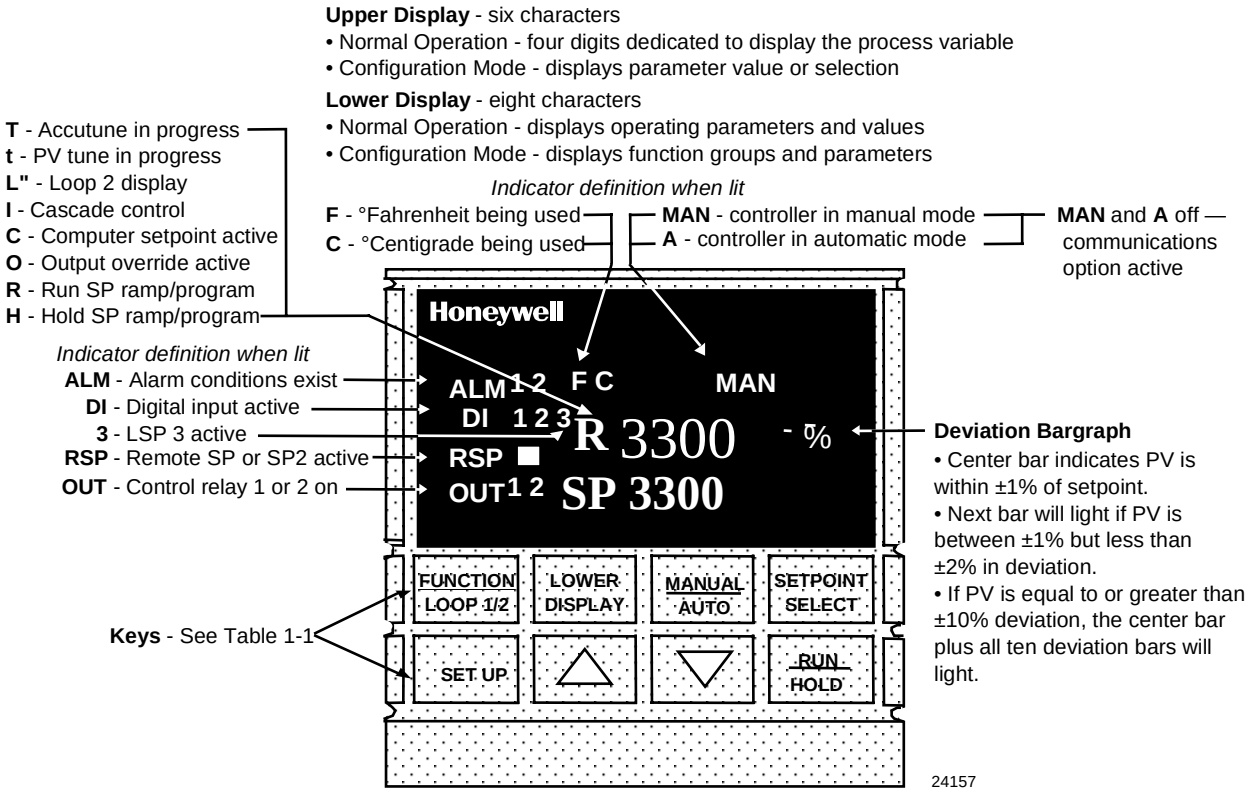


Figure 1-1 Operator Interface Displays and Indicators

1.3 Function Keys

Table 1-1 Function of Keys

Key	Function
SET UP	Places the controller in the Configuration Set Up group select mode. Sequentially displays Set Up groups and allows the FUNCTION key to display individual functions in each Set Up group.
FUNCTION LOOP 1/2	• Used in conjunction with the SET UP key to select the individual functions of a selected Configuration Set Up group. . • Selects Display of Loop 1 or Loop 2 during operation.
LOWER DISPLAY	Selects an operating parameter to be shown in the lower display.
MANUAL AUTO	Alternately selects AUTO or MAN .
SETPOINT SELECT	Hold key down to cycle through configured setpoints.
RUN HOLD	• Alternate action switch initiates or holds the Setpoint Ramp or Setpoint Program. • Acknowledges a latched alarm 1.
▲	Increases the selected parameter value.
▼	Decreases the selected parameter value.

2. Installation

2.1 Mounting

Physical Considerations

The controller can be mounted on either a vertical or tilted panel using the mounting kit supplied. Adequate access space must be available at the back of the panel for installation and servicing activities.

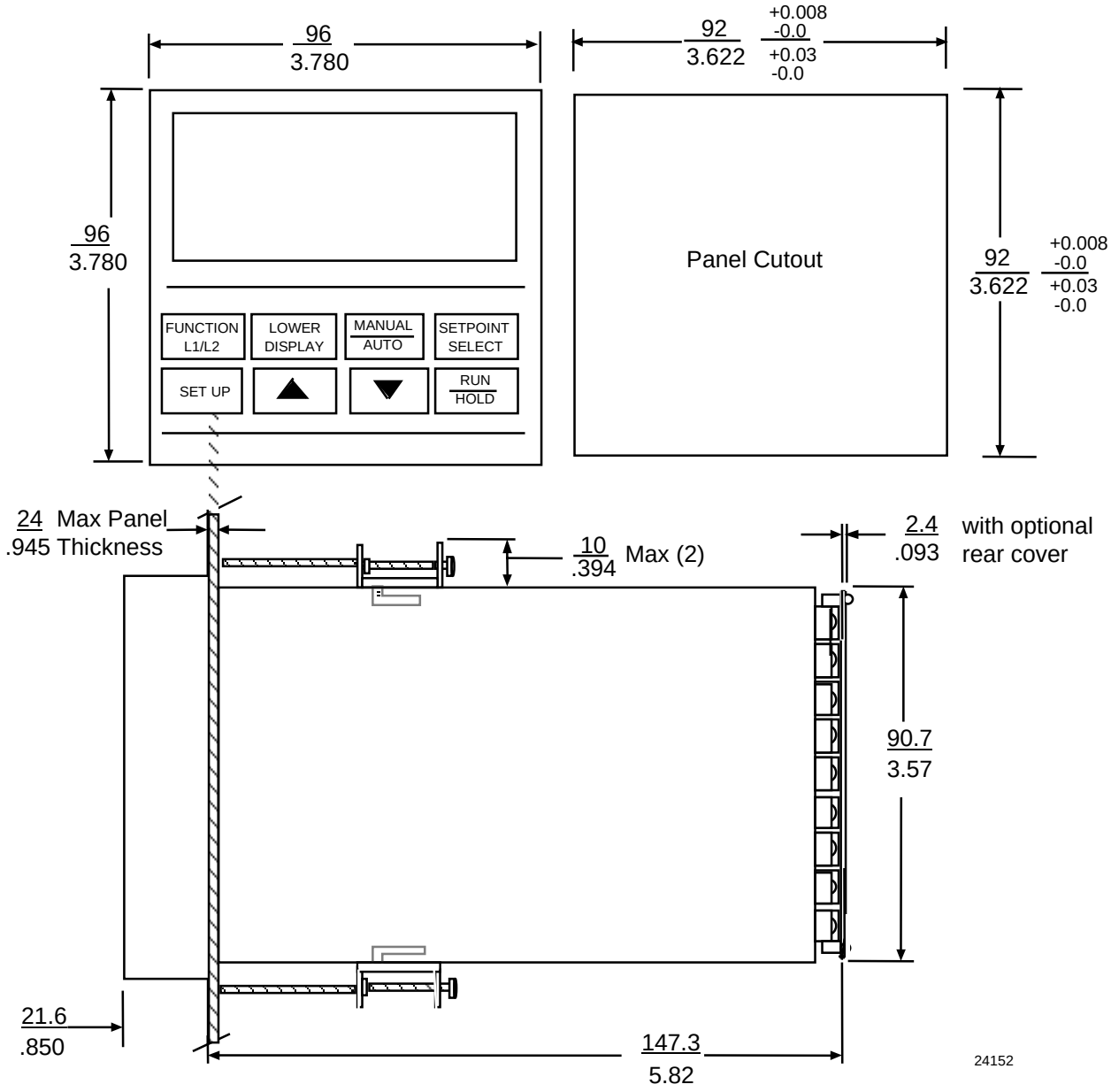
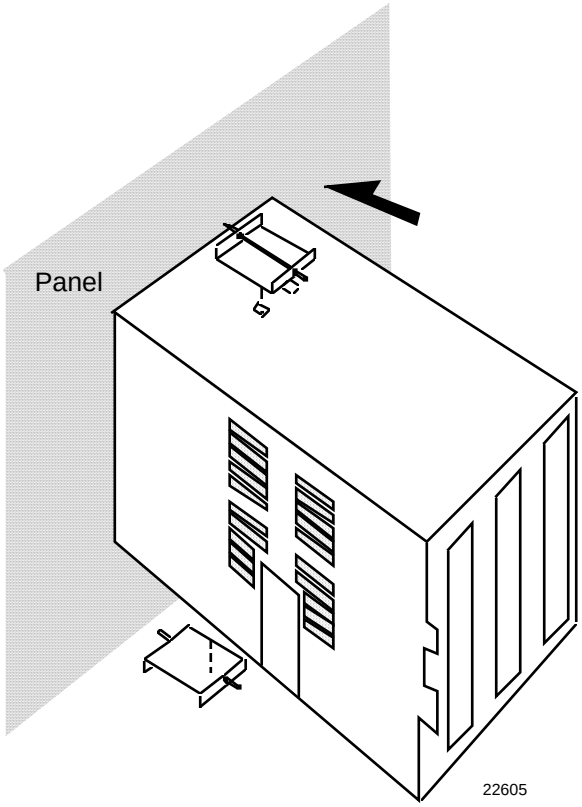


Figure 2-1 Dimensions

Mounting Method

Before mounting the controller, refer to the nameplate on the inside of the case and make a note of the model number. It will help later when selecting the proper wiring configuration.



Remove the mounting kit from the shipping container, and install the kit as follows:

- Install the screws into the threaded holes of the clips.
- Insert the prongs of the clips into the two holes in the top and bottom of the case.
- Tighten both screws to secure the case against the panel.
- Carefully slide the chassis assembly into the case, press to close and tighten the screw. Replace the screw cover.

Figure 2-2 Mounting Method

2.2 Wiring

Electrical Considerations/Precautions

The controller is considered “rack and panel mounted equipment” per EN 61010-1, Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements. Conformity with 72/23/EEC, the Low Voltage Directive requires the user to provide adequate protection against a shock hazard. The user shall install this controller in an enclosure that limits OPERATOR access to the rear terminals.

Controller Grounding

PROTECTIVE BONDING (grounding) of this controller and the enclosure in which it is installed shall be in accordance with National and local electrical codes. To minimize electrical noise and transients that may adversely affect the system, supplementary bonding of the controller enclosure to a local ground, using a No. 12 (4 mm^2) copper conductor, is recommended.

Control/Alarm Circuit Wire Rating 

The insulation of wires connected to the Control/Alarm terminals shall be rated for the highest voltage involved. Extra Low Voltage (ELV) wiring (input, current output, and low voltage Control/Alarm circuits) shall be separated from HAZARDOUS LIVE (>30 Vac, 42.4 Vpeak, or 60 Vdc) wiring per Table 2-1.

Electrical Noise Precautions

Electrical noise is composed of unabated electrical signals which produce undesirable effects in measurements and control circuits.

Digital equipment is especially sensitive to the effects of electrical noise. Your controller has built-in circuits to reduce the effect of electrical noise from various sources. Be sure to separate external wiring into bundles (see Table 2-1) and route the individual bundles through separate conduits or metal trays.

ATTENTION

For installation where high EMI/RFI noise cannot be avoided, we recommend you use shielded twisted pair wires for the signals in bundle 2.

Table 2-1 Permissible Wiring Bundling

Bundle No.	Wire Functions
1	• Line power wiring • Earth ground wiring • Control relay output wiring • Line voltage alarm wiring
2	Analog signal wire, such as: • Input signal wire (thermocouple, 4 to 20 mA, etc.) • 4-20 mA output signal wiring • Slidewire feedback circuit wiring • Digital input signals • Communications
3	• Low voltage alarm relay output wiring • Low voltage wiring to solid state type control circuits

Composite Wiring

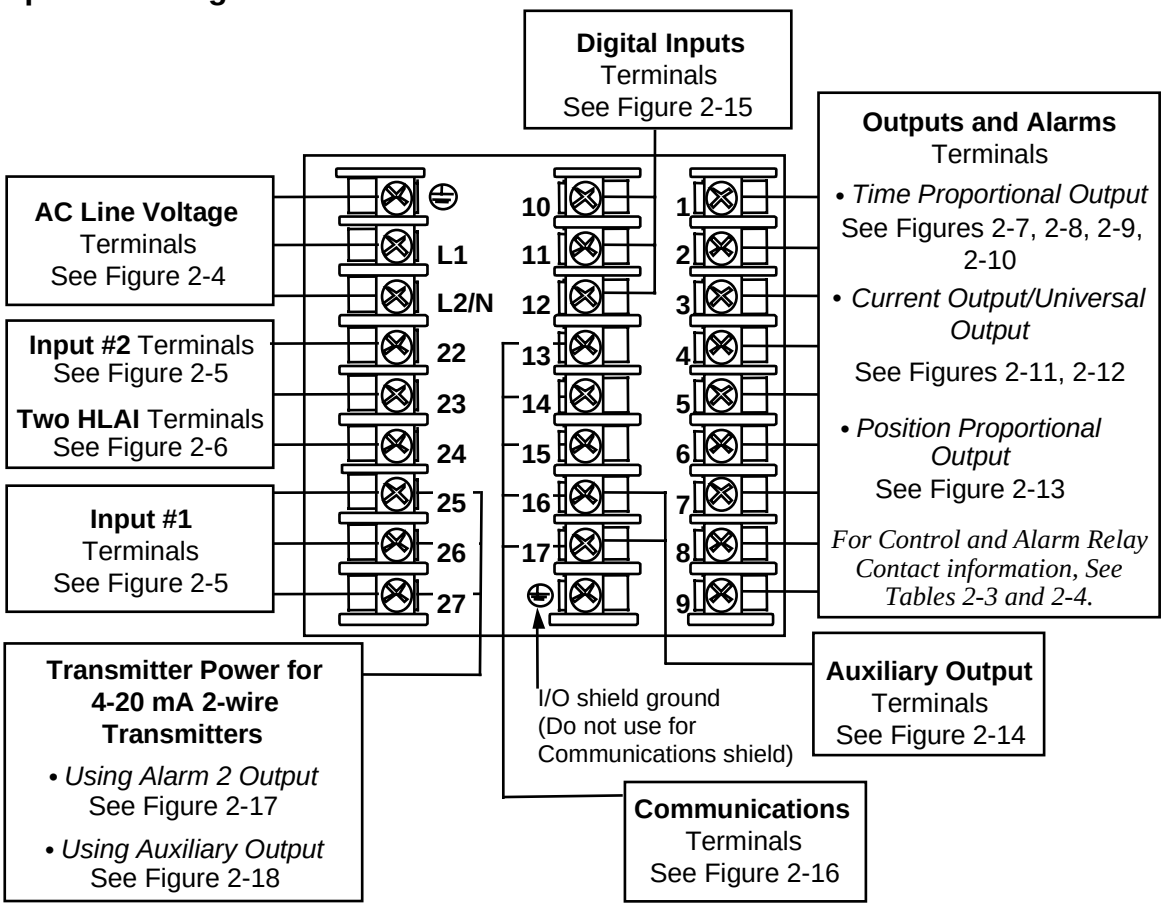


Figure 2-3 Composite Wiring Diagram

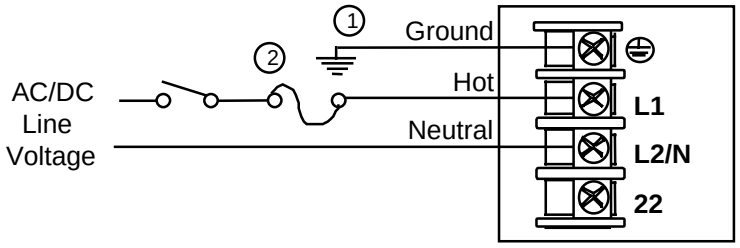
Line Voltage Wiring

This equipment is suitable for connection to 90-264 Vac or 24 Vac/dc, 50/60 Hz, power supply mains. It is the user's responsibility to provide a switch and non-time delay (North America), quick-acting, high breaking capacity, Type F, (Europe) 1/2 A, 250 V fuse(s) or circuit-breaker for 90-264 V; or 1 A, 125 V fuse or circuit breaker for 24 Vac/dc operation, as part of the installation. The switch or circuit-breaker should be located close to the controller, *within easy reach of the operator.* The switch or circuit-breaker should be marked as the disconnecting device for the controller (4 mm^2).

CAUTION

Applying 90-264 Vac to a controller rated for 24 Vac/dc will severely damage the controller and is a fire and smoke hazard.

When applying power to multiple instruments, make sure that sufficient current is supplied. Otherwise, the instruments may not start up normally due to the voltage drop caused by the in-rush current.



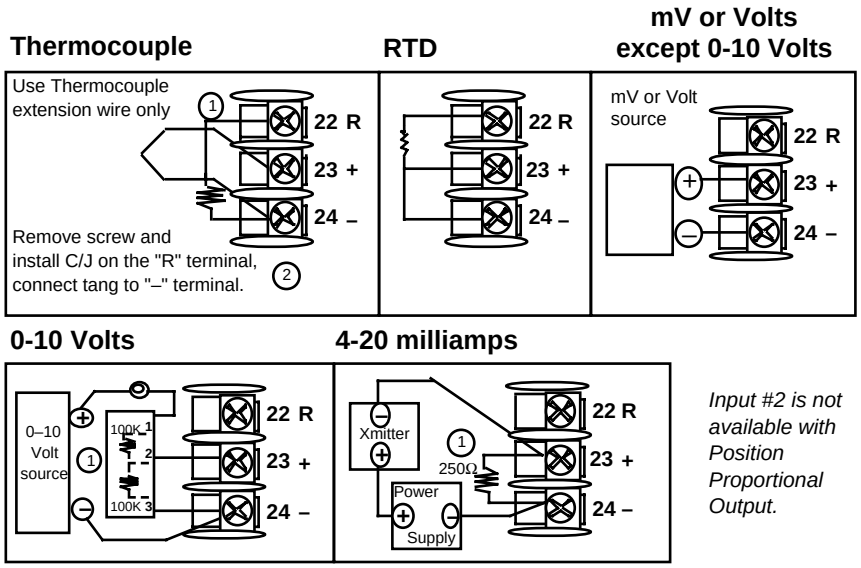
(1) PROTECTIVE BONDING (grounding) of this controller and the enclosure in which it is installed, shall be in accordance with National and local electrical codes. To minimize electrical noise and transients that may adversely affect the system, supplementary bonding of the controller enclosure to a local ground, using a No. 12 (4 mm^2) copper conductor, is recommended.

(2) Provide a switch and non-time delay (North America), quick-acting, high breaking capacity, Type F (Europe), 1/2A, 250V fuse(s) or circuit-breaker for 90-264V; or 1A, 125V fuse or circuit breaker for 24 Vac/dc operation, as part of the installation.

Figure 2-4 Line Voltage Wiring

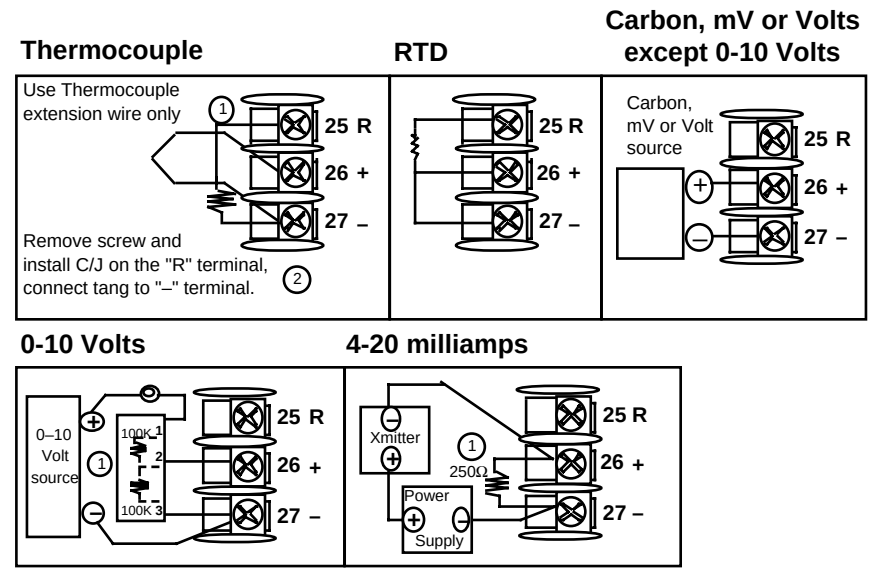
Input#1/Input #2

INPUT #2 ③ Refer to Table 2-2 for Input 2 Jumper selections.



Input #2 is not available with Position Proportional Output.

INPUT #1 ③



① The 250Ω load resistor for 4-20 mA or the voltage divider for 0-10 volts or the 500 ohm C/J compensation resistor is supplied with the controller when the input is specified. These items must be installed when you wire the controller before start-up.

② When installing the cold junction (Part number 30757088-001) for a T/C input, remove the screws from terminals 25 and 27 (Input 1) or 22 and 24 (Input 2), and install the assembly into place.

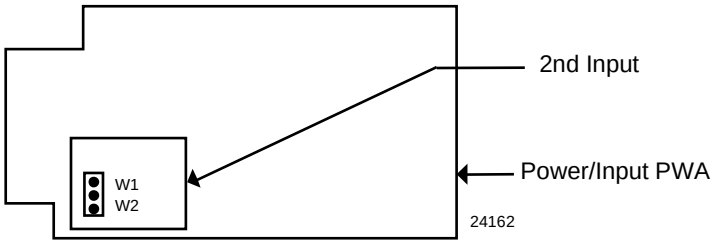
③ For **Relative Humidity** option, use Input 1 as the wet bulb input and Input 2 as the dry bulb input.

For **Carbon Potential** option, use Input 1 as the Carbon Probe input.

Figure 2-5 Input #1/#2 Connections

Input 2 Jumper

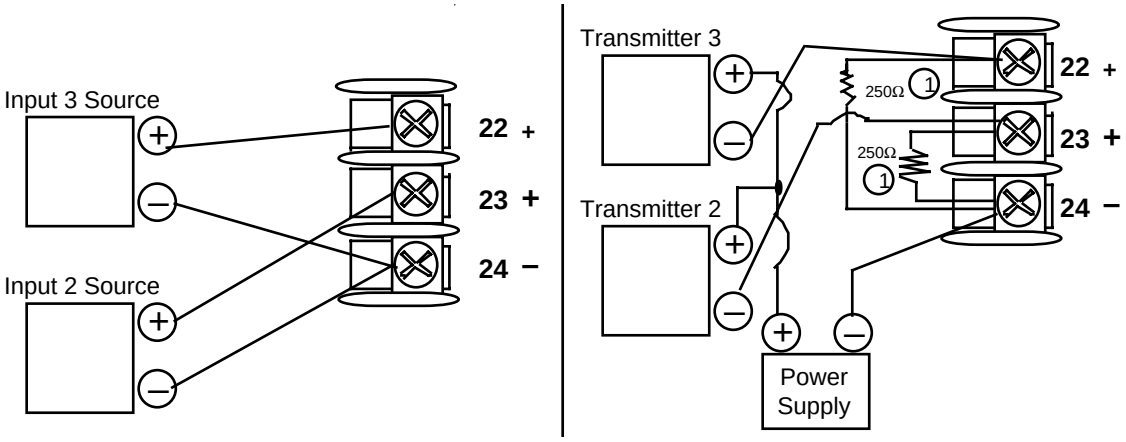
Table 2-2 Input 2 Jumper Selections

Jumper Location			
Jumper Position	W1	W2	None (remove jumper)
Input Types Available	Slidewire	Thermocouple, RTD, mV, Radiamatic, Carbon, Oxygen, 4-20 mA, 0-20 mA, 1-5 V, 0-5 V	Two HLAI replace LLAI 4-20 mA, 0-20 mA, 1-5 V, 0-5 V

High Level Analog Input Connections

ATTENTION: *Remove Input 2 jumper when replacing second LLAI with two HLAI. Refer to Table 2-2.*

1-5V Connections **4-20 mA Connections**



① The 250Ω load resistors are supplied by Honeywell with the controller when the input is specified. These items must be installed when you wire the controller before start-up.

Figure 2-6 Two HLAI Replace 2nd LLAI Connections

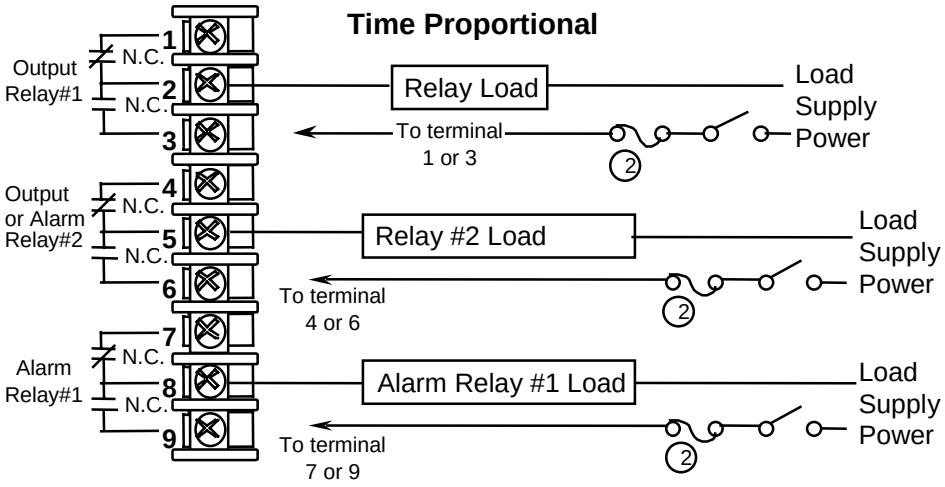
Time Proportional Output

The three types of Time Proportional outputs available on the UDC 3300 are shown in the following figures.

The Alarm wiring connections are the same for all three outputs.

For Control and Alarm Relay Contact information, see Table 2-3 and Table 2-4.

Figure 2-7 shows the Output and Alarm wiring connections for models with Electromechanical Relay Output.

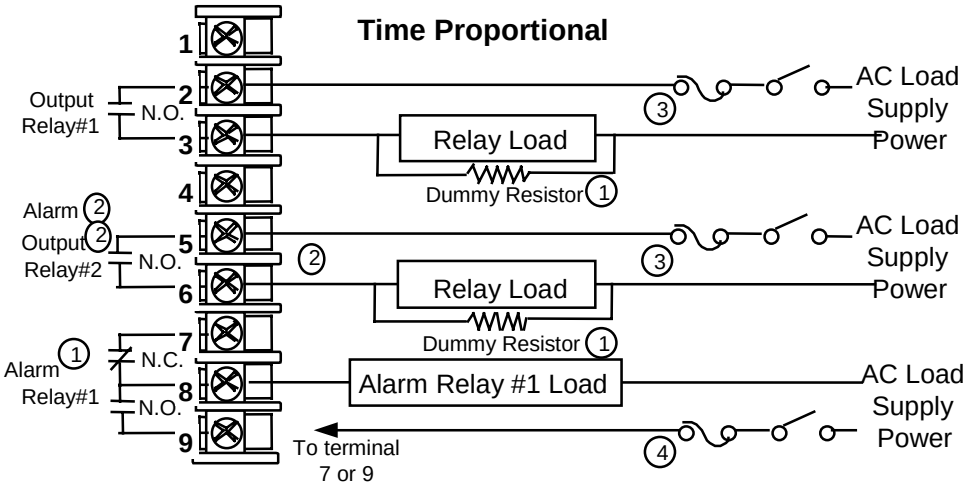


(1) Alarm #2 is not available with Time Proportional Duplex or Three Position Step Control or Position Proportional Control.

(2) Electromechanical relays are rated at 5 Amps @120 Vac or 30 Vdc and 2.5 Amps at 240 Vac.

Customer should size fuses accordingly. Use Fast Blo fuses only.

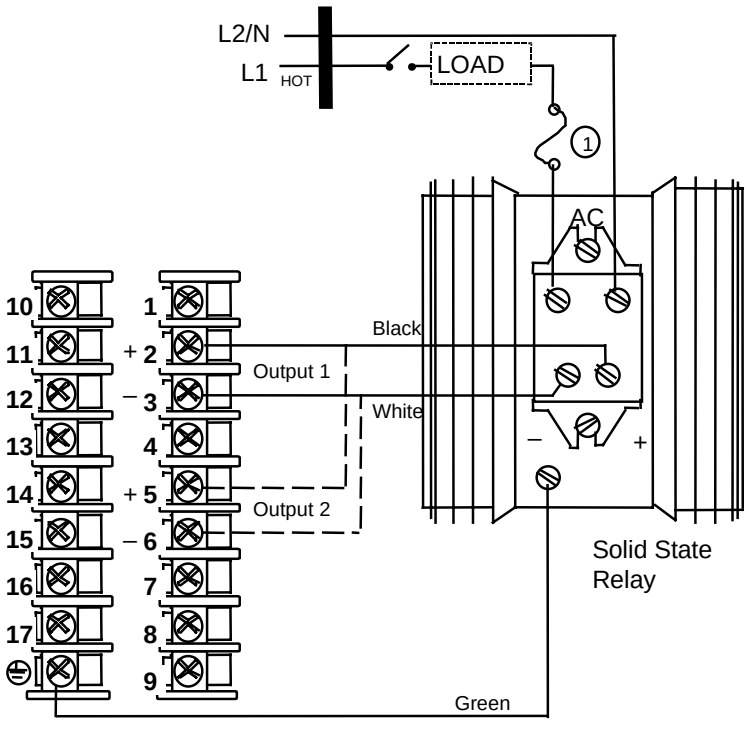
Figure 2-7 Electromechanical Relay Output – Model DC330X-EE-XXX



1. If the load current is less than the minimum rated value of 20 mA, there may be a residual voltage across both ends of the load even if the relay is turned off. Use a dummy resistor as shown to counteract this. The total current through the resistor and the load current must exceed 20 mA.
2. Alarm #2 not available with Time Proportional Duplex or Three Position Step Control or Position Proportional control.
3. Solid State relays are rated at 0.5 amps. Customer should size fuses accordingly. Use FastBlo fuses only.
4. Electromechanical relays are rated at 5 Amps @120 Vac or 30 Vdc and 2.5 Amps at 240 Vac. Customer should size fuses accordingly. Use Fast Blo fuses only.

WARNING: Only connect Vac to solid state relays.

Figure 2-8 Solid State (SS) Relay Output — Model DC33-X-AA-XX



1. External solid state relays are rated at 15 amps @25°C derated to 10 amps at 55°C. Customer should size fuses accordingly. Use Fast Blo fuses only.

Figure 2-9 10-amp SS External Relay Output — Model DC330X-SS-XX

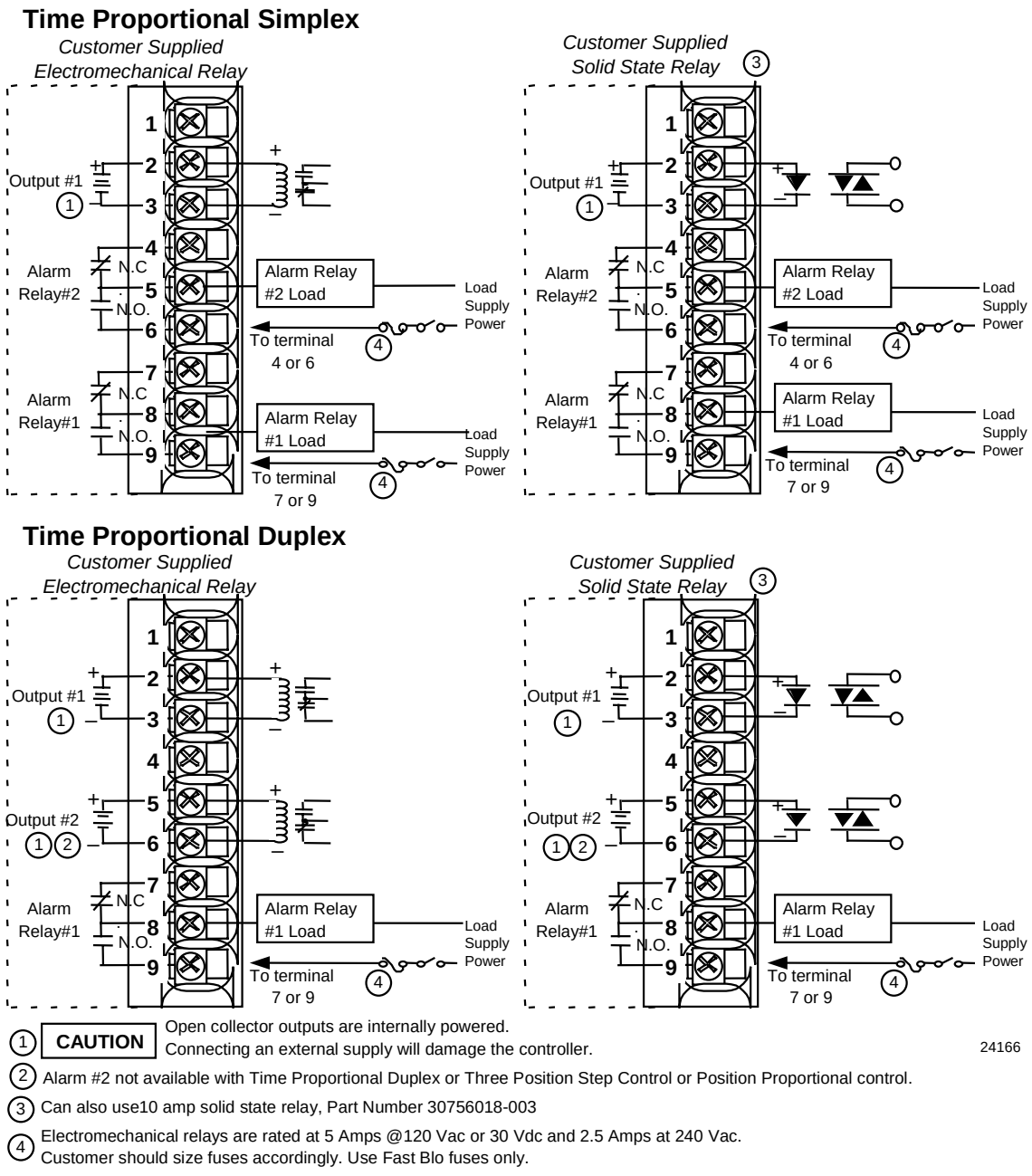


Figure 2-10 Open Collector Output — Model DC330X-TT-XXX

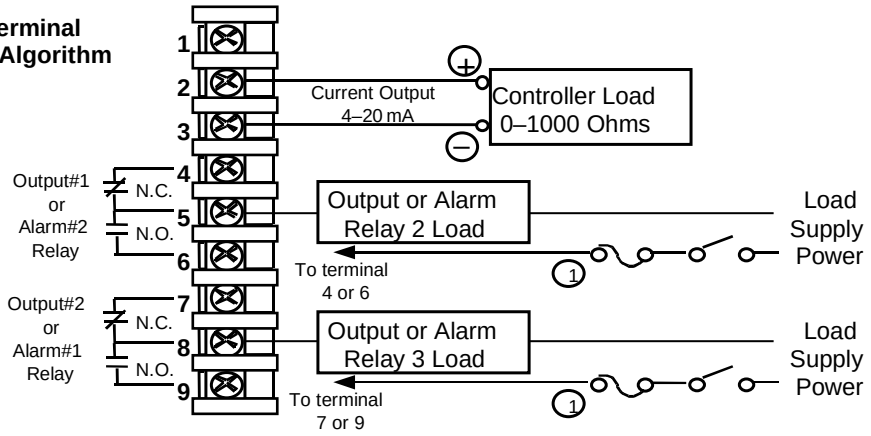
Current Output/Universal Output

Figure 2-11 shows the Output and Alarm wiring connections for models with Current Output and two-relay outputs (**Model DC330X-KE-XXX**).

See Table 2-3 for relay terminal connections for Output Algorithm selected.

For Duplex Current Output use Auxiliary Output for Output 2 (cool) (see Figure 2-14).

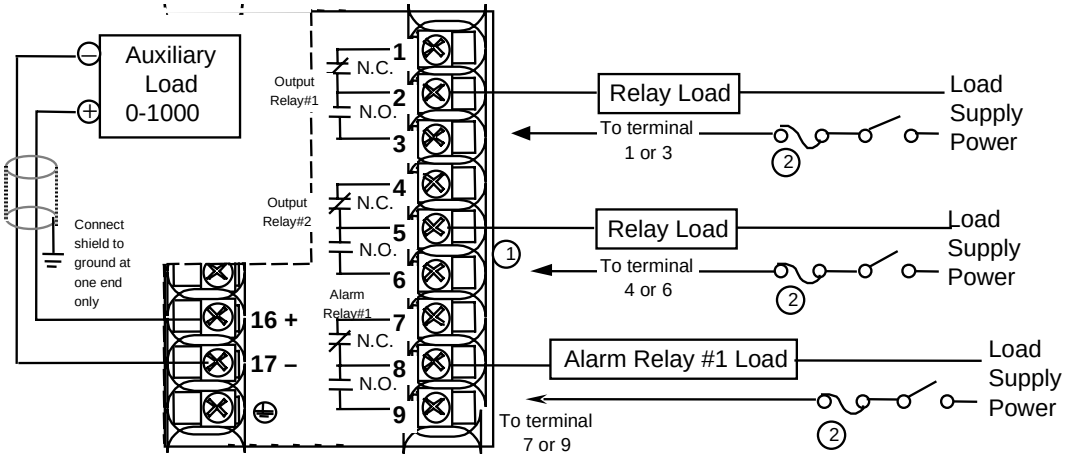
ATTENTION:
All current outputs are isolated from each other, case ground, and all inputs.



(1) Electromechanical relays are rated at 5 Amps @120 Vac or 2.5 Amps at 240 Vac. Customer should size fuses accordingly. Use Fast Blo fuses only.
Relays are NOT available on DC330X-C0-XXX.

Figure 2-11 Current Output Current/Time Duplex, Time/Current Duplex, Position Proportional or Three Position Step Control

Figure 2-12 shows the Output and Alarm wiring connections for models with a Current Output (Auxiliary Output) and three Relay Outputs (**Model DC330X-EE-2XX**).



(1) Alarm #2 is not available with Time Proportional Duplex or Three Position Step Control or Position Proportional Control.

(2) Electromechanical relays are rated at 5 Amps @ 120 Vac or 2.5 Amps at 240Vac. Customer should size fuses accordingly. Use Fast Bio fuses only.

All current outputs are isolated from each other, case ground, and all inputs.

Figure 2-12 Auxiliary Output and Three-Relay Output

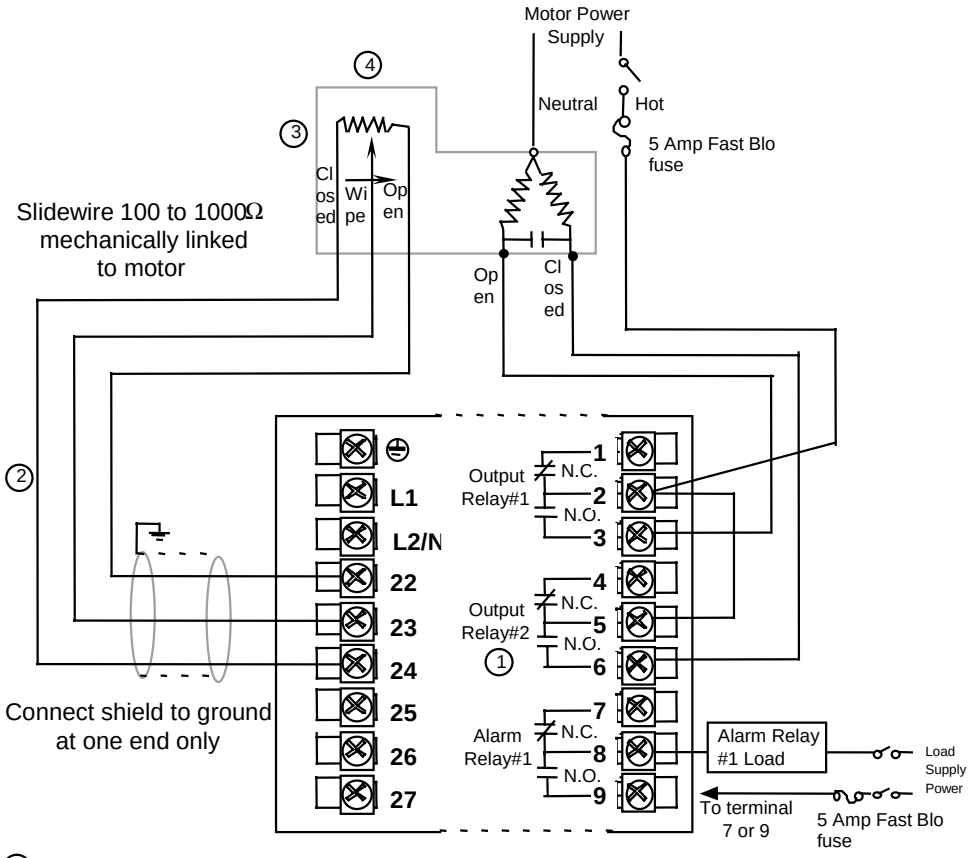
Position Proportional Output

Figure 2-13 shows models with Position Proportional Output (**Model DC330X-EE-XXX-X2)** or Three Position Step Control (**Model DC330X-AA-XXX-X2**).

Calibration

Position Proportional Output models must have the output calibrated after installation.

Three Position Step models only require that the motor time be entered. Full calibration is not required.



① Alarm #2 is not available with Position Proportional output or Three Position Step control.

② Do not run slidewire cable in the same conduit as AC power.

③ Electrical noise suppression may be required.

④ Slidewire input is not required for Three Position Step control but can be used for motor position indication.

Figure 2-13 Position Proportional Output or Three Position Step—Models DC330X-EE-XXX-X2, DC330X-AA-XXX-X2

Auxiliary Output

For Duplex Current Output use Control Output for Output 1 (heat)

ATTENTION:
Both current outputs (control and auxiliary) are isolated from each other, case ground, and all inputs.

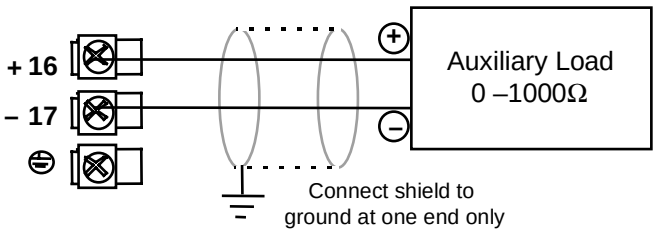


Figure 2-14 Auxiliary Output Connections—
Models DC330X-XX-2XX, DC330X-XX-5XX

Digital Inputs

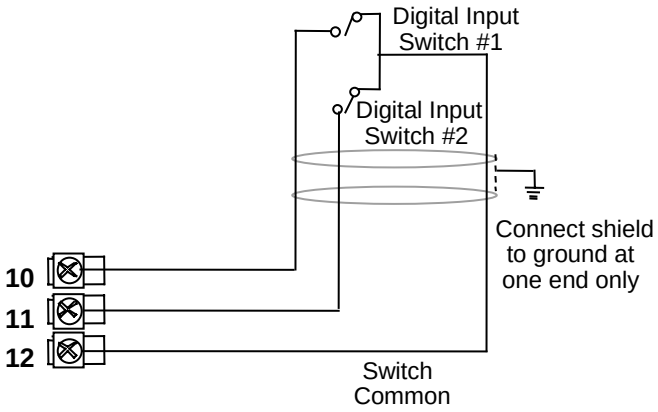


Figure 2-15 Digital Inputs Connections—Model DC330X-XX-XX3

Communications Option

There are two types of Communications option available:

- RS422/485/ASCII or Modbus (**Model DC330X-XX-1XX** or **DC330X-XX-5XX**)—Figure 2-16 [also refer to Document #51-51-25-35 (RS422/485 ASCII) or #51-52-25-66 and #51-52-25-70 (Modbus)]
- DMCS (**Model DC330X-XX-4XX**)—Figure 2-16 (also refer to Document #82-50-10-23)

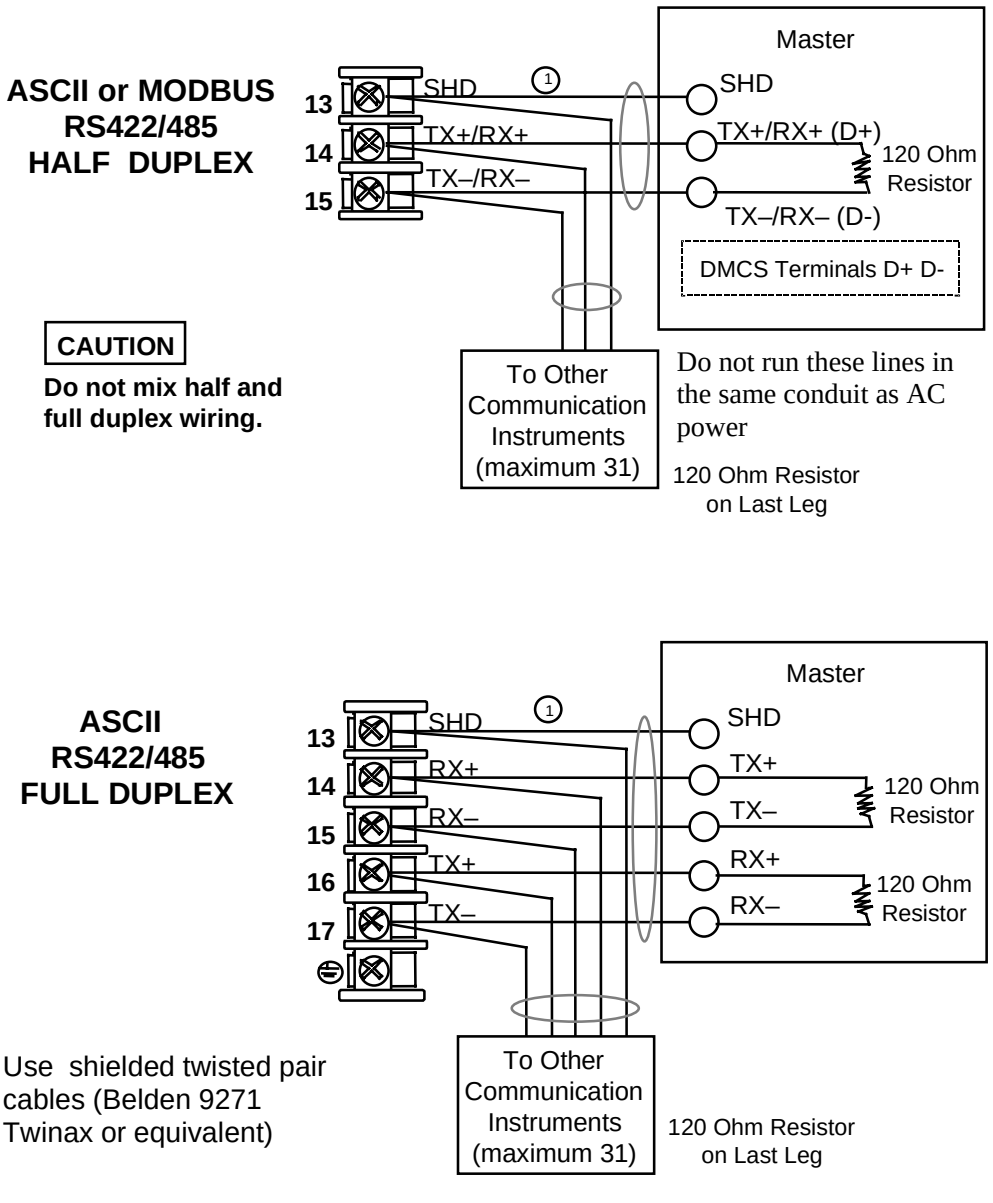


Figure 2-16 RS422/485/ASCII or Modbus Communications Option Connections

Transmitter power for 4-20 mA 20 Wire Transmitter— Using Open Collector Alarm 2 Output

The wiring diagram example shown in Figure 2-17 (**Model DC330X-XT-XXX**) provides 30 Vdc at terminals 5 and 6 with the capability of driving up to 22 mA.

If the transmitter terminal voltage must be limited to less than 30 volts, you can insert a zener diode between the positive transmitter terminal and terminal 5. For example, an IN4733A zener diode will limit the voltage at the transmitter to 25 Vdc.

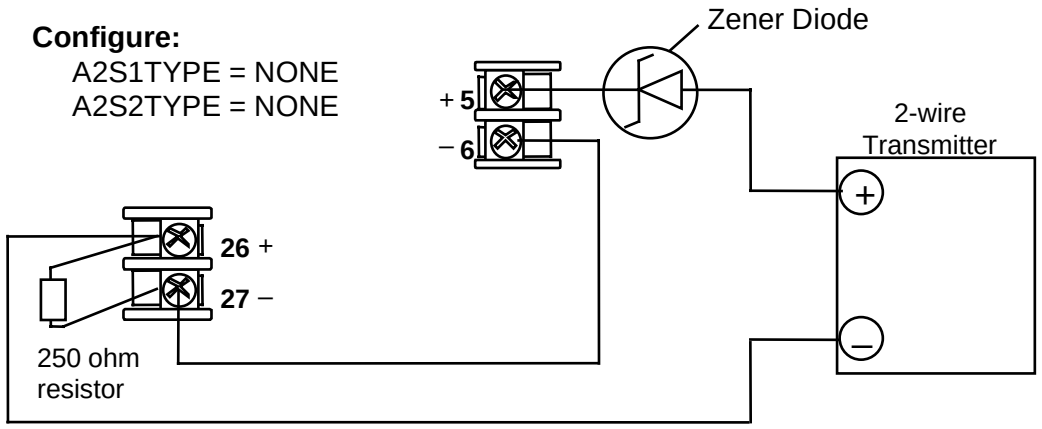


Figure 2-17 Transmitter Power for 4-20 mA 2-wire Transmitter Using Open Collector Alarm 2 Output—Model DC330X-XT-XXX

Transmitter power for 4-20 mA 20 wire Transmitter—Using Auxiliary Output

The wiring diagram example shown in Figure 2-18 (**Model DC330X-XX-2XX** or **DC330X-XX-5XX**) provides 30 Vdc at terminal 16 with the capability of driving up to 22 mA.

If the transmitter terminal voltage must be limited to less than 30 volts, you can insert a zener diode between the positive transmitter terminal and terminal 16. For example, an IN4733A zener diode will limit the voltage at the transmitter to 25 Vdc.

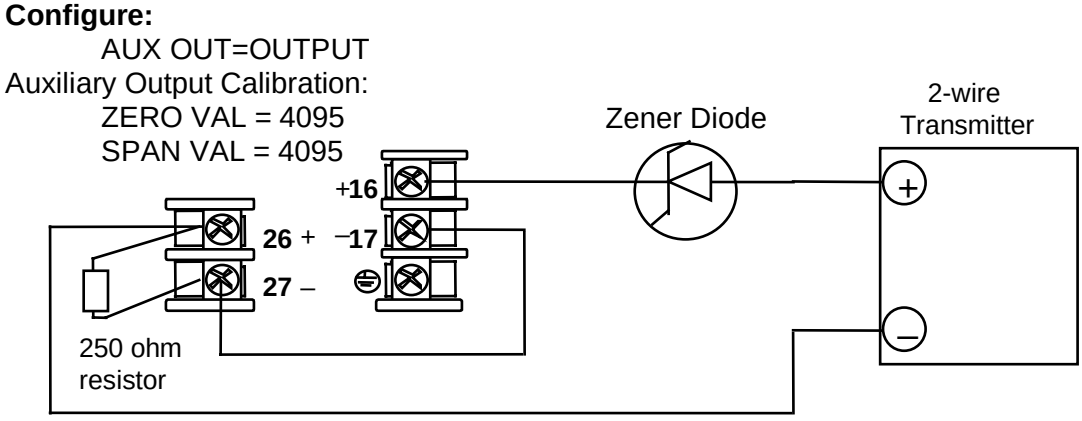


Figure 2-18 Transmitter Power for 4-20 mA 2-wire Transmitter Using Auxiliary Output—Model DC330X-XX-2XX or DC330X-XX-5XX

Control Relays

ATTENTION

Control relays operate in the standard control mode: i.e., energized when output state is on.

Table 2-3 Control Relay Contact Information

Unit Power	Control Relay Wiring	Control Relay Contact	#1 or #2 Output Indicator Status
Off	N.O.	Open	**Off**
	N.C.	Closed	
On	N.O.	Open Closed	**Off** **On**
	N.C.	Closed Open	**Off** **On**

Alarm Relays

ATTENTION

Alarms relays are designed to operate in a failsafe mode; i.e., de-energized during alarm state. This results in alarm actuation when power is OFF or when initially applied, until the unit completes self-diagnostics. If the unit loses power, the alarms will function.

Table 2-4 Alarm Relay Contact Information

Unit Power	Alarm Relay Wiring	Variable NOT in Alarm State		Variable in Alarm State	
		Relay Contact	Indicators	Relay Contact	Indicators
Off	N.O.	Open	**Off**	Open	**Off**
	N.C.	Closed		Closed	
On	N.O.	Closed	**Off**	Open	**On**
	N.C.	Open		Closed	

3. Configuration

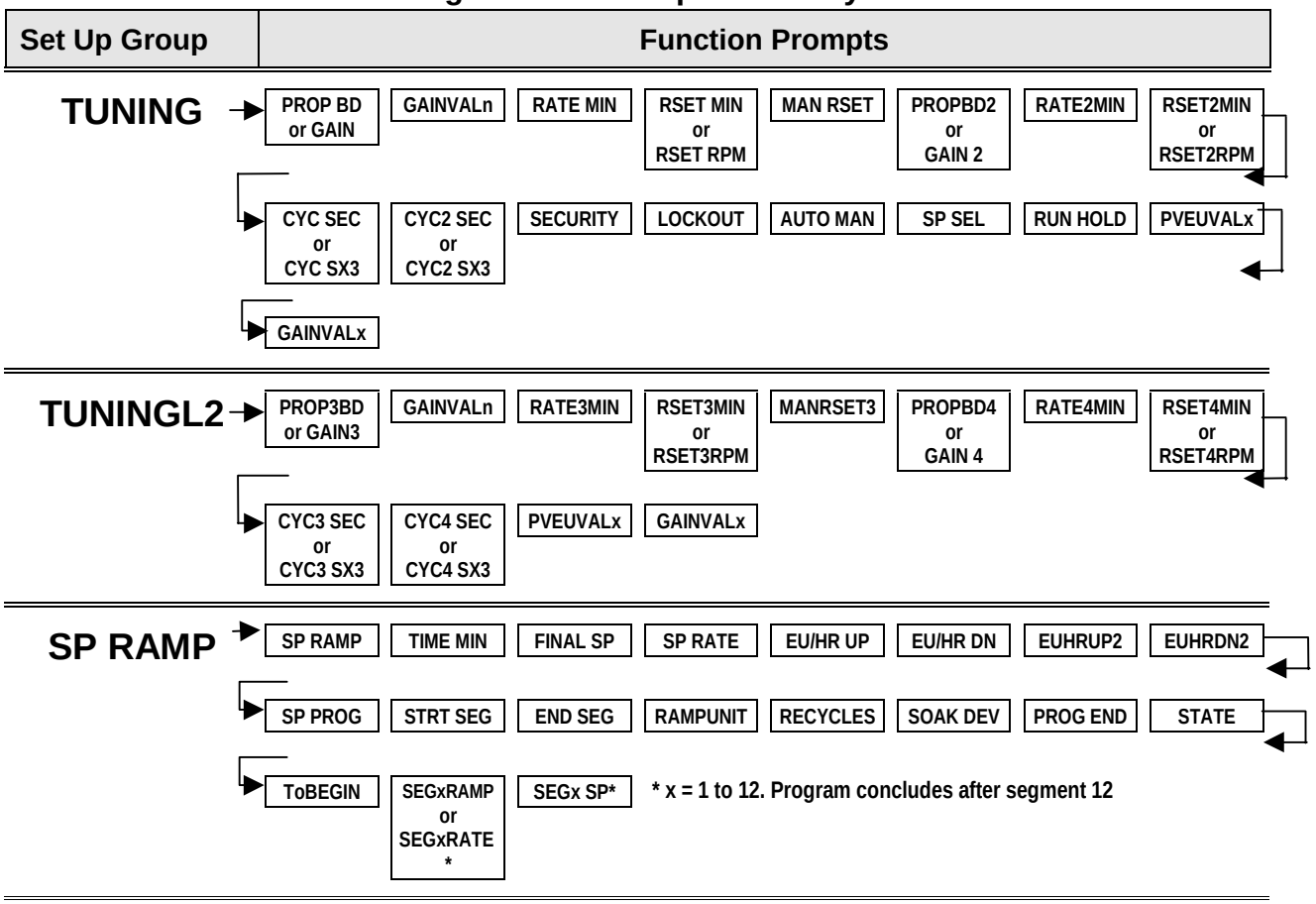
3.1 Overview

The controller is pre-configured at the factory for typical controller settings for a heating process except the input type and output algorithm must be configured to match your process. The controller must also be tuned. See *Section 4.3*.

To assist you in the configuration process, there are prompts that appear in the upper and lower displays. These prompts let you know what group of configuration data (Set Up prompts) you are working with and also, the specific parameters (Function prompts) associated with each group.

Figure 3-1 shows you an overview of the prompt hierarchy. As you will see, the configuration data is divided into 15 main Set Up groups plus prompts for calibration and prompts that show the status of the continuous background tests that are being performed.

Figure 3-1 Prompt Hierarchy



Set Up Group	Function Prompts
ACCUTUNE	FUZZY → ACCUTUNE → ACCUTUN2 → SP CHANG → KPG → SP CHAN2 → KPG 2 → CRITERIA CRITERA2 → AT ERROR or AT ERR2
ALGORTHM	CONT ALG → PIDLOOPS → CONT2ALG → OUT OVRD → TIMER → PERIOD → START → L DISP INP ALG1 → MATH K → CALC HI → CALC LO → ALG1 INA → ALG1 INB → ALG1 INC → ALG1BIAS PCO SEL → PCT CO → ATM PRES → INP ALG2 → MATH K2 → CALC HI → CALC LO → ALG2 INA ALG2 INB → ALG2 INC → PCT H2 → ALG2BIAS → 8SEG CH1 → Xx VALUE* → Yx VALUE* → 8SEG CH2 Xx VALU2 → Yx VALU2 → TOTALIZER → ΣXXXXXXX → TOT SEC → Σ RSET ? → TOT RATE * x = 0 to 8
OUT ALG	OUT ALG → 4-20 RNG → OUT2 ALG → RLYSTATE → RLY TYPE
INPUT 1	IN1 TYPE → XMITTER1 → ANALYTIC → IN1 HI → IN1 LO → RATIO 1 → BIAS IN1 → FILTER 1 BURNOUT1 → EMISSIV1
INPUT 2	IN2 TYPE → XMITTER2 → ANALYTIC → IN2 HI → IN2 LO → RATIO 2 → BIAS IN2 → FILTER 2 BURNOUT2 → EMISSIV2
INPUT 3	IN3 TYPE → XMITTER3 → IN3 HI → IN3 LO → RATIO 3 → BIAS IN3 → FILTER 3
CONTROL	PV SOURC → PID SETS → SW VALUE → LSP'S → RSP SRC → AUTOBIAS → SP TRACK → PWR MODE PWR OUT → SP HiLIM → SP LoLIM → ACTION → OUT RATE → PCT/M UP → PCT/M DN → OUTHiLIM OUTLoLIM → I Hi LIM → I Lo LIM → DROPOFF → DEADBAND → OUT HYST → FAILMODE → FAILSAFE MAN OUT → AUTO OUT → PBorGAIN → MINorRPM
CONTROL2	PV 2 SRC → FORCE MA → PID SETS → SW VALUE → LSP'S → RSP SRC → AUTOBIAS → SPTRACK SP HiLIM → SP LoLIM → ACTION → OUT RATE → PCT/M UP → PCT/M DN → OUTHiLIM → OUTLoLIM I Hi LIM → I Lo LIM → DROPOFF → DEADBAND → FAILMODE → FAILSAFE

Set Up Group	Function Prompts
OPTIONS	AUX OUT or CUR OUT2 → 4 mA VAL → 20mA VAL → DIG IN 1 → DIG1 COM → DIG IN 2 → DIG2 COM
COM	ComSTATE → Com ADDR → ComADDR2 → SHEDENAB → SHEDTIME → PARITY → BAUD → DUPLEX → WSFLOAT → TX DELAY → SHEDMODE → SHEDSP → UNITS → CSP RATO → CSP BIAS → CSP2RATO → CSP2BIAS → LOOPBACK
ALARMS	A1S1 VAL → A1S2 VAL → A2S1 VAL → A2S2 VAL → A1S1TYPE → A1S2 TYPE → A2S1TYPE → A2S2TYPE → A1S1 H L → A1S1 EV → A1S2 H L → A1S2 EV → A2S1 H L → A2S1 EV → A2S2 H L → A2S2 EV → AL HYST → ALM OUT1 → BLOCK
DISPLAY	DECIMAL → DECIMAL2 → TEMPUNIT → PWR FREQ → RATIO 2 → LANGUAGE
CALIB	USED FOR FIELD CALIBRATION
MAINTNCE	TIME1 → HRS.MIN1 → TIME2 → HRS.MIN2 → TIME3 → HRS.MIN3 → COUNTER1 → COUNTS1 → COUNTER2 → COUNTS2 → COUNTER3 → COUNTS3 → PASSWORD → RES TYPE
STATUS	VERSON → FAILSAFE → FAILSF 2 → RAM TEST → CONFTEST → CALTEST → FACT CRC

3.2 Configuration Procedure

Each of the Set Up groups and their functions are pre-configured at the factory. The factory settings are shown in Table 3-2 through Table 3-16. Follow the procedure in Table 3-1 if you want to make changes to any of these selections or values. Record your selections on the Configuration Record Sheet found in Appendix C.

Table 3-1 Configuration Procedure

Step	Operation	Press	Result
1	Select Set Up mode	**SET UP**	*Upper Display:* SET UP *Lower Display:* TUNING (This is the first Set Up group title.)
2	Select any Set Up group	**SET UP**	Sequentially displays the other Set Up group titles. You can also use the [▲] [▼] keys to scan the Set Up groups in both directions. Stop at the Set Up group title that describes the group of parameters you want to configure. Then proceed to the next step.
3	Select a Function parameter	**FUNCTION**	*Upper Display:* Shows the current value or selection for the first Function prompt of the selected Set Up group. *Lower Display:* Shows the first Function prompt within that Set Up group. Sequentially displays the other function prompts of the selected Set Up group. Stop at the function prompt that you want to change, then proceed to the next step.
4	Change the value or selection	**▲ or ▼**	Increments or decrements the value or selection that appears for the selected function. If the display flashes, you are trying to make an unacceptable entry.
5	Enter the value or selection	**FUNCTION or SET UP**	This key selects another Function prompt. This key selects another Set Up group. The value or selection you have made will be entered into memory after another key is pressed.
6	Exit Configuration	**LOWER DISPLAY**	Exits configuration mode and returns the controller to the same state it was in immediately preceding entry into the Set Up mode. It stores any changes you have made.

3.3 Loop 1 Tuning Parameters Set Up Group

Table 3-2 Loop 1 Tuning Group Function Prompts

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
PROP BD	Proportional Band	0.1 to 9999%	- -
or	or		
GAIN	Gain	0.001 to 1000	1.000
or	Or		
GAINVALn	Gain Value being used by **Gain Scheduling** when enabled	Read Only	- -
RATE MIN	Rate in Minutes	0.00 to 10.00 minutes	0.00
RSET MIN	Reset in minutes/repeat	0.02 to 50.00	1.00
or	or		
RSET RPM	Reset in repeats/minute		- -
MAN RSET	Manual Reset	–100 to 100% output	0
PROPBD2	Proportional Band 2	0.1 to 9999%	- -
or	or		
GAIN 2	Gain 2	0.001 to 1000	1.000
RATE2MIN	Rate 2 in Minutes	0.00 to 10.00 minutes	0.00
RSET2MIN	Reset 2 in minutes/repeat	0.02 to 50.00	1.00
or	or		
RSET2RPM	Reset 2 in repeats/minute		- -
CYC SEC or **CYC SX3**	Cycle Time (Heat)	1 to 120	20
CYC2 SEC or **CYC2 SX3**	Cycle Time (Cool)	1 to 120	20
SECURITY	Security Code	0 to 4095	0

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
LOCKOUT	Configuration Lockout	NONE CALIB + CONF + VIEW MAX	CALIB
AUTO MAN	Manual/Auto Key Lockout	DISABL ENABLE	ENABLE
SP SEL	Setpoint Select Key Lockout	DISABL ENABLE	ENABLE
RUN HOLD	Run/Hold Key Lockout	DISABL ENABLE	ENABLE
PVEUVAL1 **PVEUVAL2** **PVEUVAL3** **PVEUVAL4** **PVEUVAL5** **PVEUVAL6** **PVEUVAL7** **PVEUVAL8**	PV1 (through PV8) Value for Gain Scheduling	PV value within the PV limits. In engineering units	0
GAINVAL1 **GAINVAL2** **GAINVAL3** **GAINVAL4** **GAINVAL5** **GAINVAL6** **GAINVAL7** **GAINVAL8**	Gain 1 (through Gain 8) Value for Gain Scheduling	0.001 to 1000 floating Gain or Proportional Band	1.000

3.4 Loop 2 Tuning Parameters Set Up Group

Table 3-3 Loop 2 Tuning Group Function Prompts

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
PROPBD3	Proportional Band 3	0.1 to 9999	- -
or	or		
GAIN 3	Gain 3	0.001 to 1000	1.000
or	or		
GAINVALn	Gain Value being used by **Gain Scheduling** when enabled	Read Only	- -
RATE3MIN	Rate 3 in minutes	0.00 to 10.00 minutes	0.00
RSET3MIN	Reset 3 in minutes/repeat	0.02 to 50.00	1.00
or	or		
RSET3RPM	Reset 3 in repeats/minute		- -
MANRSET3	Manual Reset 3	–100 to 100% Output	0.0
PROPBD4	Proportional Band 4	0.1 to 9999%	- -
or	or		
GAIN 4	Gain 4	0.001 to 1000	1.000
RATE4MIN	Rate 4 in minutes	0.00 to 10.00 minutes	0.00
RSET4MIN	Reset 4 in minutes/repeat	0.02 to 50.00	1.00
or	or		
RSET4RPM	Reset 4 in repeats/minute		- -
CYC3 SEC	Cycle Time 3 (Heat)	1 to 120	20
or			
CYC3 SX3			
CYC4 SEC	Cycle Time 4 (Cool)	1 to 120	20
or			
CYC4 SX3			

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
PVEUVAL1 **PVEUVAL2** **PVEUVAL3** **PVEUVAL4** **PVEUVAL5** **PVEUVAL6** **PVEUVAL7** **PVEUVAL8**	PV1 (through PV8) Value for Gain Scheduling	PV value within the PV limits. In engineering units	0
GAINVAL1 **GAINVAL2** **GAINVAL3** **GAINVAL4** **GAINVAL5** **GAINVAL6** **GAINVAL7** **GAINVAL8**	Gain 1 (through Gain 8) Value for Gain Scheduling	0.001 to 1000 floating Gain or Proportional Band	1.000

3.5 SP Ramp, SP Rate, or SP Programming Set Up Group

Table 3-4 SP Ramp Function Prompts

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
If SP Rate and SP Programming are disabled			
SP RAMP	Single Setpoint RampSelection	DISABL ENABLE ENABL2 ENAB12	DISABL
TIME MIN	Single Setpoint Ramp Time (SP Ramp enabled)	0 to 255 minutes	3
FINAL SP	Sinlge Setpoint Final Setpoint (SP Ramp enabled)	Enter a value within the setpoint limits.	1000
If SP Ramp and SP Programming are disabled			
SP RATE	Setpoint Rate	DISABL ENABLE ENABL2 ENAB12	DISABL
EU/HR UP	Rate Up Value for Loop 1 (SP Rate enabled)	0 to 9999 in engineering units per hour	0
EU/HR DN	Rate Down Value for Loop 1 (SP Rate enabled)	0 to 9999 in engineering units per hour	0
EU/HRUP2	Rate Up Value for Loop 2 (SP Rate enabled)	0 to 9999 in Units per Hour	0
EU/HRDN2	Rate Down Value for Loop 2 (SP Rate enabled)	0 to 9999 in Units per Hour	0
If SP Ramp and SP Rate are disabled			
SP PROG* ***requires SP Program option**	Setpoint Ramp/Soak Programming	DISABL ENABLE ENABL2 ENAB12 **SP PROG must be enabled to view the remaining prompts.**	DISABL
STRT SEG	Start Segment Number	1 to 11	—
END SEG	End Segment Number	2 to 12 Always end in a soak segment (2, 4, ... 12)	—

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
RAMPUNIT	Engineering Units for Ramp Segments	TIME (hours.minutes) EU/MIN (engineering units/minute) EU/HR (engineering units/hour)	TIME
RECYCLES	Number of Program Recycles	0 to 99 recycles	—
SOAK DEV	Guaranteed Soak Deviation Value	0 to 99 The number selected will be the PV value (in engineering units) above or below the setpoint outside of which the timer halts.	—
PROG END	Program Termination State	LASTSP (Hold at last setpoint in the program) F SAFE (Manual mode/Failsafe output)	—
STATE	Program State at Program End	DISABL HOLD	—
KEYRESET	Reset SP Program	DISABL TOBEGN RERUN	DISABL
HOT START	Hot Start	DISABL ENAB	DISABL
SEG1RAMP or **SEG1RATE**	Segment #1 Ramp Time or Segment #1 Ramp Rate	0-99 hours.0-59 minutes Engineering units/minute or Engineering units/hour **Select TIME, EU/MIN, or EU/HR at prompt RAMPUNIT. All ramps will use the same selection.**	—
SEG2 SP	Segment #2 Soak Setpoint Value	Within the Setpoint limits	—
SEG2TIME	Segment #2 Soak Duration	0-99 hours.0-59 minutes	—

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
SEG 3, 5, 7, 9 & 11 RAMP **SEG 3, 5, 7, 9, & 11 RATE** **SEG 4, 6, 8, 10 & 12 SP** **SEG 4, 6, 8, 10 & 12 TIME**	Same as above	Selections are same as above.	—

3.6 Accutune Set Up Group

Table 3-5 Accutune Group Function Prompts

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
FUZZY	Fuzzy Overshoot Suppression	DISABL ENABLE ENABL2 ENAB12	DISABL
ACCUTUNE	Accutune	DISABL TUNE (Demand Tuning) SP (SP Tuning) TUN+PV SP+PV	DISABL
ACCUTUN2	Accutune – Loop 2	DISABL TUNE (Demand Tuning) SP (SP Tuning) TUN+PV SP+PV	DISABL
SP CHANG	Setpoint Change Value – Loop 1	5 to 15% Input Span	10
KPG	Process Gain – Loop 1	0.10 to 10.00	1.00
SP CHAN2	Setpoint Change Value – Loop 2	5 to 15% Input Span	10
KPG 2	Process Gain – Loop 2	0.10 to 10.00	1.00
CRITERIA	Tuning Criteria – Loop 1	NORMAL FAST	FAST

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
CRITERA2	Tuning Criteria – Loop 2	NORMAL FAST	FAST
AT ERROR OR **AT ERR2**	Accutune Error Codes	Read Only RUNING (Accutune process in operation) NONE OUTLIM IDFAIL ABORT LOW PV	- -

3.7 Algorithm Data Set Up Group

Table 3-6 Algorithm Group Function Prompts

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
CONT ALG	Control Algorithm	ON-OFF PID A PID B PD+MR 3PSTEP	PID A
PIDLOOPS	PID Loop Selection	1 LOOP 2LOOPS CASCAD	1 or 2
CONT2ALG	Control 2 Algorithm	PID A PID B PD+MR	PID A
OUT OVRD	Output Override Select	DISABL HI SEL LO SEL	DISABL
TIMER	Timer Enable/Disable	ENABLE DISABL	DISABL
PERIOD*	Timeout Period	00:00 to 99:59	00:01
START*	Start Initiation	KEY (Run/Hold key) ALARM2	KEY
L DISP*	Lower Display Selection	TI REM (time remaining) E time (elapsed time)	TI REM

***prompts appear only when Timer is enabled**

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display		Factory Setting
INP ALG1	Input 1 Algorithm **ATTENTION** All Input Algorithms operate in engineering units except feedforward which operates in percent of output units. PV or RSP source in the Control Set Up group must be set to IN AL1.	NONE W AVG F FWRD FFWDMu RELHUM SUMMER HI SEL LO SEL √MuDIV √MULT	MuDIV MULT CARB A CARB B CARB C CARB D FCC DEW PT OXYGEN	NONE
MATH K	Weighted Average Ratio or K Constant for Math Selections	0.001 to 1000 floating		- -
CALC HI	Calculated Variable High Scaling Factor for Input Algorithm	–999. to 9999. floating (in engineering units)		- -
CALC LO	Calculated Variable Low Scaling Factor for Input Algorithm	–999. to 9999. floating (in engineering units)		- -
ALG1 INA	Input Algorithm 1 Input A Selection	INPUT 1 INPUT 2 LP1OUT LP2OUT	IN AL1 IN AL2 INPUT 3	- -
ALG1 INB	Input Algorithm 1 Input B Selection	INPUT 1 INPUT 2 LP1OUT LP2OUT	IN AL1 IN AL2 INPUT 3	- -
ALG1 INC	Input Algorithm 1 Input C Selection	NONE INPUT 1 INPUT 2 LP1OUT	LP2OUT IN AL1 IN AL2 INPUT 3	- -
PCO SEL	Percent Carbon Source (Input 3 must be enabled)	DISABL ONLINE		DISABL
PCT CO	Percent Carbon Monoxide	0.020 to 0.350 (fractional percent of CO)		0.200
ATM PRES	Atmospheric Pressure Compensation	590.0 to 760.0 (mm Hg)		760.0
ALG1BIAS	Input Algorithm 1 Bias	-999 to 9999 floating (in engineering units)		0.000

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display		Factory Setting
INP ALG2	Input 2 Algorithm **ATTENTION** All Input Algorithms operate in engineering units except feedforward which operates in percent of range units.	NONE W AVG F FWD FFWDMu A–B/C HI SEL	LO SEL √MuDIV √MULT MuDIV MULT DEW PT	NONE
MATH K2	Weighted Average Ratio or K Constant for Math Selections	0.001 to 1000		- -
CALC HI	Calculated Variable High Scaling Factor for Input Algorithm 2	–999. to 9999. floating (in engineering units)		- -
CALC LO	Calculated Variable Low Scaling Factor for Input Algorithm 2	–999. to 9999. floating (in engineering units)		- -
ALG2 INA	Input Algorithm 2 Input A Selection	INPUT 1 INPUT 2 LP1OUT LP2OUT	IN AL1 IN AL2 INPUT 3	- -
ALG2 INB	Input Algorithm 2 Input B Selection	INPUT 1 INPUT2 LP1OUT LP2OUT	IN AL1 IN AL2 INPUT 3	- -
ALG2 INC	Input Algorithm 2 Input C Selection	NONE INPUT 1 INPUT 2 LP1OUT	LP2OUT IN AL1 IN AL2 INPUT 3	- -
PCT H2	Hydrogen Content for Dewpoint	1.0 to 99.0%		1.0
ALG2BIAS	Input Algorithm 2 Bias	-999 to 9999 floating (in engineering units)		0.000
8SEG CH1	Eight Segment Characterizer **If Characterizer 1 is enabled, the following Xn VALUE and Yn VALUE parameters appear.**	DISABL INPUT1 INPUT2 L1 OUT L2 OUT		DISABL

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
X0 VALUE **X1 VALUE** **X2 VALUE** **X3 VALUE** **X4 VALUE** **X5 VALUE** **X6 VALUE** **X7 VALUE** **X8 VALUE**	Xn Input Value (X Axis) (n = 0 through 8)	0 to 99.99 %	0
Y0 VALUE **Y1VALUE** **Y2VALUE** **Y3VALUE** **Y4VALUE** **Y5VALUE** **Y6VALUE** **Y7VALUE** **Y8 VALUE**	Yn Output Value (Y Axis) (n = 0 through 8)	0 to 99.99 %	0
8SEG CH2	Eight Segment Characterizer 2 **If Characterizer 2 is enabled, the following Xn VALU2 and Yn VALU2 parameters appear.**	DISABL INPUT1 INPUT2 L1 OUT L2 OUT	DISABL
X0 VALU2 **X1 VALU2** **X2 VALU2** **X3 VALU2** **X4 VALU2** **X5 VALU2** **X6 VALU2** **X7 VALU2** **X8 VALU2**	Xn Input Value (X Axis) (n = 0 through 8)	0 to 99.99%	0
Y0 VALU2 **Y1 VALU2** **Y2 VALU2** **Y3 VALU2** **Y4 VALU2** **Y5 VALU2** **Y6 VALU2** **Y7 VALU2** **Y8 VALU2**	Yn Output Value (Y Axis) (n = 0 through 8)	0 to 99.99 %	0

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
TOTALIZE	Totalization Function	DISABL INPUT1 IN AL1 IN AL2	DISABL
ΣXXXXXXX	Current Scale Factor *(upper display)* Actual Current Totalized Value *(lower display)*	Σ*En Where: n = Totalizer Scale Factor Value	- -
TOT SCAL	Totalizer Scale Factor	*E0 *E1 *E2 *E3 *E4 *E5 *E6	E0
TOT SEC	Totalizer Reset Lock	UNLOCK LOCK	UNLOCK
Σ RSET ?	Totalizer Reset	NO YES	NO
TOT RATE	Totalizer Rate of Integration	SECOND (once per second) MINUTE (once per minute) HOUR (once per hour) DAY (once per day) ML/DAY (millions per day)	SECOND

3.8 Output Algorithm Parameters Set Up Group

Table 3-7 Output Algorithm Group Function Prompts

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
OUT ALG	Loop 1 Output Algorithm	TIME Time Simplex CURRNT Current Simplex POSITN Position Proportional TIME D Time Duplex CUR D Current Duplex CUR TI Current /Time Duplex TI CUR Time/Current Duplex	CURRNT
4–20 RNG	Current Duplex Range	100PCT 50 PCT	100PCT

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display		Factory Setting
OUT2 ALG	Loop 2 Output Algorithm	NONE TIME CURRNT CUR D CUR TI TI CUR		CURRNT
RLYSTATE	Digital Output State at 0% Output	1OF2OF	(Output relays 1 and 2 are both de-energized)	1OF2ON
		1ON2OF	(Output relay 1 is energized, output relay 2 is de-energized)	
		1OF2ON	(Output relay 1 is de-energized, output relay 2 is energized)	
		1ON2ON	(Output relays 1 and 2 are both energized)	
RLY TYPE	Relay Cycle Time Increments	MECHAN	(Cycle time in one second increments)	MECHAN
		SOL ST	(Cycle time in 1/3 second increments: 1 = .33 seconds, 120 = 40 seconds)	

3.9 Input 1 Parameters Set Up Group

Table 3-8 Input 1 Group Function Prompts

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
IN1 TYPE	Input 1 Actuation Type ***For Input Range Minimum and Maximum see Appendix E***	DISABL B TC E TC H E TC L J TC H J TC L K TC H K TC L NNM H NNM L NM90 H NM90 L NIC TC R TC S TC T TC H T TC L W TC H W TC L 100 PT 100 LO 200 PT 500 PT RAD RH RAD RI 0-20mA 4-20mA 0-10mV 0-50mV 0-5 V 1-5 V 0-10 V CARBON OXYGEN	0-10mV
XMITTER1	Transmitter Characterization	B TC E TC H E TC L J TC H J TC L K TC H K TC L NNM H NNM L NM90 H NM90 L NIC TC R TC S TC T TC H T TC L W TC H W TC L 100 PT 100 LO 200 PT 500 PT RAD RH RAD RI LINEAR SQROOT ANALYT	LINEAR
ANALYTIC	Analytic Selections XMITTER1 must be set to ANALYT for this prompt to appear	NONE PH ORP Mv (Millivolts) CONDms (Milli Siemens) CONDus (Micro Siemens) RSTVM^ (Megaohms) TDS PPm (Parts per Million) TDS PPb (Parts per Billion) CONCPt (Parts per Thousand) DO PPm (Parts per Million) DO PPb (Parts per Billion)	NONE

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
IN1 HI	Input 1 High Range Value (Linear Inputs only)	–999. to 9999. floating (in engineering units)	1000
IN1 LO	Input 1 Low Range Value (Linear Inputs only)	–999. to 9999. floating (in engineering units)	0
RATIO 1	Input 1 Ratio	–20.00 to 20.00 (floats to 3 decimal places)	1.000
BIAS IN1	Input 1 Bias	–999. to 9999. (in engineering units)	0
FILTER 1	Input 1 Filter	0 to 120 seconds	0
BURNOUT1	Burnout Protection	NONE DOWN UP NO_FS	NONE
EMISSIV1	Emissivity	0.01 to 1.00	0.00

3.10 Input 2 Parameters Set Up Group

Table 3-9 Input 2 Group Function Prompts

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
IN2 TYPE	Input 2 Actuation Type ***For Input Range Minimum and Maximum see Appendix E***	DISABL, B TC, E TC H, E TC L, J TC H, J TC L, K TC H, K TC L, NNM H, NNM L, NM90 H, NM90 L, NIC TC, R TC, S TC, T TC H, T TC L, W TC H, W TC L, 100 PT, 100 LO, 200 PT, 500 PT, RAD RH, RAD RI, 0-20mA, 4-20mA, 0-10mV, 0-50mV, 0-5 V, 1-5 V, 0-10 V, SLIDEW	0-10mV

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
XMITTER2	Transmitter Characterization	B TC S TC E TC H T TC H E TC L T TC L J TC H W TC H J TC L W TC L K TC H 100 PT K TC L 100 LO NNM H 200 PT NNM L 500 PT NM90 H RAD RH NM90 L RAD RI NIC TC LINEAR R TC SQROOT ANALYT	LINEAR
ANALYTIC	Analytic Selections XMITTER2 must be set to ANALYT for this prompt to appear	NONE PH ORP Mv (Millivolts) CONDms (Milli Siemens) CONDus (Micro Siemens) RSTVM^ (Megaohms) TDS PPm (Parts per Million) TDS PPb (Parts per Billion) CONCPt (Parts per Thousand) DO PPm (Parts per Million) DO PPb (Parts per Billion)	NONE
IN2 HI	Input 2 High Range Value (Linear Inputs only)	–999. to 9999. floating (in engineering units)	1000
IN2 LO	Input 2 Low Range Value (Linear Inputs only)	–999. to 9999. floating (in engineering units)	0
RATIO 2	Input 2 Ratio	–20.00 to 20.00	1.000
BIAS IN2	Input 2 Bias	–999. to 9999. (in engineering units)	0
FILTER 2	Input 2 Filter	0 to 120 seconds	1
BURNOUT2	Burnout Protection	NONE DOWN UP NO_FS	NONE
EMISSIV2	Emissivity	0.01 to 1.00	0.00

3.11 Input 3 Parameters Set Up Group

Table 3-10 Input 3 Group Function Prompts

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
IN3 TYPE	Input 3 Actuation Type	DISABL 0-20mA 4-20mA 0-5 V 1-5 V	DISABL
XMITTER3	Transmitter Characterization	B TC E TC H E TC L J TC H J TC L K TC H K TC L NNM H NNM L NM90 H NM90 L NIC TC R TC S TC T TC H T TC L W TC H W TC L 100 PT 100 LO 200 PT 500 PT RAD RH RAD RI LINEAR SQROOT	LINEAR
IN3 HI	Input 3 High Range Value (Linear Inputs only)	–999. to 9999. floating (in engineering units)	1000
IN3 LO	Input 3 Low Range Value (Linear Inputs only)	–999. to 9999. floating (in engineering units)	0
RATIO 3	Input 3 Ratio	–20.00 to 20.00	1.000
BIAS IN3	Input 3 Bias	–999. to 9999. (in engineering units)	0
FILTER 3	Input 3 Filter	0 to 120 seconds	1

3.12 Loop 1 Control Parameters Set Up Group

Table 3-11 Control Group Function Prompts

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
PV SOURC	Process Variable Source	INP 1 IN AL1 INP 3 INP 2 IN AL2	INP 1
PID SETS	Tuning Parameter Sets	1 ONLY 2KEYBD 2PV SW 2SP SW GAIN S (Gain scheduling automatically disables Accutune for this loop)	1 ONLY
SW VALUE	Automatic Switchover Value	Value in engineering units within PV or SP range limits	0.00
LSP'S	Local Setpoint Source	1 ONLY TWO THREE (Selection automatically disables RSP SRC)	1 ONLY
RSP SRC	Remote Setpoint Source	NONE IN AL1 INP 3 INP 2 IN AL2	NONE
AUTOBIAS	Automatic Bias	ENABLE DISABL	DISABL
SP TRACK	Local Setpoint Tracking	NONE PV RSP	NONE
PWR MODE	Power Up Mode Recall	MANUAL A LSP A RSP AM SP AM LSP	MANUAL
PWR OUT	TPSC Output Start-up Mode	LAST F'SAFE	LAST
SP HiLIM	Setpoint High Limit	0 to 100% of span input in engineering units	1000
SP LoLIM	Setpoint Low Limit	0 to 100% of span input in engineering units	0
ACTION	Control Output Direction	DIRECT REVRSE	REVRSE

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
OUT RATE	Output Change Rate	ENABLE DISABL **Does not apply to 3 Position Step Control algorithm.**	DISABL
PCT/M UP	Output Rate Up Value	0 to 9999 % per minute	0
PCT/M DN	Output Rate Down Value	0 to 9999 % per minute	0
OUTHiLIM	High Output Limit	–5.0 to 105 % of output	100
OUTLoLIM	Low Output Limit	–5.0 to 105 % of output	0.0
I Hi LIM	High Reset Limit	Within the range of the output limits	100.0
I Lo LIM	Low Reset Limit	Within the range of the output limits	0.0
DROPOFF	Controller Dropoff Value	–5 to 105 % of output	0
DEADBAND	Output Relay Deadband	*Time Duplex:* –5.0 to 25.0 % *On/Off Duplex:* 0.0 to 25.0 % *Position Prop. and 3P Step:* 0.5 to 5.0 %	1.0
OUT HYST	Output Relay Hysteresis	0.0 to 100.0 % of PV Span for On/Off control.	0.5
FAILMODE	Failsafe Mode	NO LAT LATCH	NO LAT
FAILSAFE	Failsafe Output Value for all outputs except 3P Step	Set within the range of the output limits. 0 to 100 %	0.0
	Failsafe Output Value for 3P Step	0 PCT (motor to closed position) 100PCT (motor to open position)	- -
SW FAIL	PDMR/Position Proportional motor position when slidewire fails.	0 PCT (motor to closed position) 100PCT (motor to open position)	
MAN OUT	Power-up Preset Output for Manual Output	Within the range of output limits	- -
AUTO OUT	Power-up Preset Output for Automatic Output	Within the range of output limits	- -
PBorGAIN	Proportional Band or Gain Units	PB PCT GAIN	GAIN
MINorRPM	Reset Units	RPM MIN	MIN

3.13 Loop 2 Control Parameters Set Up Group

Table 3-12 Loop 2 Control Parameters Set Up Group

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
PV 2 SRC	Process Variable Source	INP 1 INP 2 IN AL1 IN AL2 INP 3	INP 2
FORCE MA	Force Manual	DISABL LINK12	DISABL
PID SETS	Tuning Parameter Sets	1 ONLY 2KEYBD 2PV SW 2SP SW GAIN S (Gain scheduling automatically disables Accutune for this loop)	1 ONLY
SW VALUE	Automatic Switchover Value	Value in engineering units within PV or SP range limits	0.00
LSP'S	Local Setpoint Source	1 ONLY TWO THREE (Selection automatically disables RSP SRC)	1 ONLY
RSP SRC	Remote Setpoint Source	NONE INP 2 IN AL1 IN AL2 INP 3	NONE
AUTOBIAS	Automatic Bias	ENABLE DISABL	DISABL
SPTRACK	Local Setpoint Tracking	NONE PV RSP	NONE
SP HiLIM	Setpoint High Limit	0 to 100 % of PV span input in engineering units	1000
SP LoLIM	Setpoint Low Limit	0 to 100 % of PV span input in engineering units	0

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
ACTION	Control Output Direction	DIRECT REVRSE	REVRSE
OUT RATE	Output Change Rate	ENABLE DISABL	DISABL
PCT/M UP	Output Rate Up Value	0 to 9999 % per minute	0
PCT/M DN	Output Rate Down Value	0 to 9999 % per minute	0
OUTHiLIM	High Output Limit	–5 to 105 % of output	100
OUTLoLIM	Low Output Limit	–5 to 105 % of output	0
I HiLIM	High Reset Limit	Within the range of the output limits	100.0
I LoLIM	Low Reset Limit	Within the range of the output limits	0.0
DROPOFF	Controller Dropoff Value	–5 to 105 % of output	0
DEADBAND	Output Relay Deadband	–5.0 to 5.0 %	1.0
FAILMODE	Failsafe Mode	NO LAT LATCH	NO LAT
FAILSAFE	Failsafe Output Value	Set within the range of the output limits. 0 to 100 %	0

3.14 Options Set Up Group

Table 3-13 Options Group Function Prompt

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
AUX OUT or **CUR OUT2**	Auxiliary Output One Loop Selection OR Auxiliary Output Two Loops/Cascade Selection	DISABL, INP 1, INP 2, INP 3, CBOUT, PV, OUTPUT, SP, LSP 1, IN AL1, IN AL2, DEV, PV 2, DEV 2, OUTPT2, SP L2, LSP1 2, CBOUT2	DISABL
4mA VAL	Auxiliary Output Low Scaling Factor	Low scale value to represent 4 mA. Value in % for output, all others in engineering units.	0.0
20mA VAL	Auxiliary Output High Scaling Factor	High scale value to represent 20 mA. Value in % for output, all others in engineering units.	0
DIG IN 1	Digital Input 1 Selections NOTE: DIG IN 1 applies to Loop 1 when 2 LOOPS or CASCAD is configured.	NONE, TO MAN, TO LSP, TO 2SP, TO 3SP, TO DIR, ToHOLD, ToPID2, PV 2IN, PV 3IN, RERUN, TO RUN, ToBEGN, STOP I, MAN FS, ToLOCK, ToAout, TIMER, AM STA, ToTUNE, Spinit, TRACK1, TRACK2, ToOUT2, TO RSP, D L1/2, RST FB, ToPURG, LoFIRE, MAN LT, REStot, HealthWatch, RESETT1, RESETT2, RESETT3, R ALL T, RESETC1, RESETC2, RESETC3, R ALL C, R ALL TC	NONE
DIG1 COM	Digital Input 1 Combinations	DISABL, +PID2, +ToDIR, +ToSP2, +DISAT, +ToSP1, +RUN	DISABL
DIG IN 2	Digital 2 Input Selections	Same as DIG IN 1 NOTE: DIG IN 2 applies to Loop 2 when 2 LOOPS or CASCAD is configured.	NONE
DIG2 COM	Digital Input 2 Combinations	Same as DIG1 COM	DISABL

3.15 Communications Set Up Group

If your controller does not have this option, the prompts will not appear.

Table 3-14 Communications Group Function Prompts

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
ComSTATE	Communications Option State	DISABL MODBUS MB3K RS422	DISABL
Com ADDR	Communications Station Address	1 to 99	0
ComADDR2	Loop 2 Communications Station Address	1 to 99 When ComSTATE = MODBUS, ComADDR2 = Com ADDR	0
SHED ENAB	Shed Enable	DISABL ENABL	DISABL
SHEDTIME	Shed Time	0 to 255 sample periods (1 sample period = 0.666 seconds) 0 = No Shed	0
PARITY	Parity	NONE ODD EVEN Fixed at NONE when ComSTATE = MODBUS	ODD
BAUD	Baud Rate	2400 4800 9600 19200	2400
DUPLEX	Duplex Operation	HALF FULL • When ComSTATE = MODBUS, this selection is fixed at HALF. • When the RS422/485/Auxiliary output option board is installed, this selection is fixed at HALF.	HALF

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
WS FLOAT	Word Swap Order	FP B Floating Point big endian FP BB Floating Point big endian with byte-swapped FP L Floating Point little endian FP LB Floating Point little endian with Byte-swapped	
TX DELAY	Transmission Delay	1 to 500 milliseconds	1
SHEDMODE	Shed Controller Mode and Output Level	LAST TO MAN FSAFE ToAUTO	LAST
SHEDSP	Shed Setpoint Recall	TO LSP TO CSP	TO LSP
UNITS	Communication Units	PERCNT ENG	PERCNT
CSP RATO	Loop 1 Computer Setpoint Ratio	–20.0 to 20.0	1.0
CSP BIAS	Loop 1 Computer Setpoint Bias	–999. to 9999. (in engineering units)	0
CSP2RATO	Loop 2 or Cascade Computer Setpoint Ratio	–20.0 to 20.0	1.0
CSP2BIAS	Loop 2 or Cascade Computer Setpoint Bias	–999. to 9999. (in engineering units)	0
LOOPBACK	Local Loop Back	DISABL ENABLE	DISABL

3.16 Alarms Set Up Group

Table 3-15 Alarms Group Function Prompts

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
A1S1 VAL	Alarm 1, Setpoint 1 Value	Value in Engineering Units	90
A1S2 VAL	Alarm 1, Setpoint 2 Value	Value in Engineering Units	10
A2S1 VAL	Alarm 2, Setpoint 1 Value	Value in Engineering Units	95
A2S2 VAL	Alarm 2, Setpoint 2 Value	Value in Engineering Units	5
A1S1TYPE	Alarm 1, Setpoint 1 Type	NONE INP 1 INP 2 INP3 PV (Loop 1 Process Variable) DEV (Loop 1 Deviation) OUTPUT (Loop 1 Output) SHED (Both Loops) EV ON (Event On – SP Program) EV OFF (Event Off – SP Program) MANUAL (Loop 1) REM SP (Loop 1 Remote Setpoint) F SAFE (Loop 1 Failsafe) PVRATE (Loop 1 PV Rate of Change) PV 2 (Loop 2 Process Variable) DEV 2 (Loop 2 Deviation) OUT 2 (Loop 2 Output) MAN 2 (Loop 2 Manual) RSP 2 (Loop 2 Remote Setpoint) F SAF2 (Loop 2 Failsafe) PVRAT2 (Loop 2 PV Rate of Change) BREAK BREAK2 TOTAL	NONE

continued

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
A1S1TYPE **continued**	Alarm 1, Setpoint 1 Type continued	***Health Watch*** TIMER 1 TIMER 2 TIMER 3 COUNT 1 COUNT 2 COUNT 3	
A1S2TYPE	Alarm 1, Setpoint 2 Type	Same as A1S1TYPE	NONE
A2S1TYPE	Alarm 2, Setpoint 1 Type	Same as A1S1TYPE	NONE
A2S2TYPE	Alarm 2, Setpoint 2 Type	Same as A1S1TYPE	NONE
A1S1 H L	Alarm 1, Setpoint 1 State	LOW HIGH	HIGH
A1S1 EV	SP Programming Event Alarm State for Alarm 1, Setpoint 1	BEGIN END	- -
A1S2 H L	Alarm 2, Setpoint 1 State	LOW HIGH	LOW
A1S2 EV	SP Programming Event Alarm State for Alarm 1, Setpoint 2	BEGIN END	- -
A2S1 H L	Alarm 21, Setpoint 1 State	LOW HIGH	HIGH
A2S1 EV	SP Programming Event Alarm State for Alarm 2, Setpoint 1	BEGIN END	- -
A2S2 H L	Alarm 2, Setpoint 2 State	LOW HIGH	LOW
A2S2 EV	SP Programming Event Alarm State for Alarm 2, Setpoint 2	BEGIN END	- -
AL HYST	Alarm Hysteresis	0.0 to 100.0 % of output or span, as appropriate	0.1
ALM OUT1*	Latching Alarm for Output 1	NO LAT LATCH	NO LAT

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
BLOCK	Alarm Blocking	DISABL BLOCK1 BLOCK2 BLK 12	DISABL

*For CE Conformity, Performance Criterion A, Select NO LAT

3.17 Display Parameters Set Up Group

Table 3-16 Display Group Function Prompts

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
DECIMAL	Control Loop 1 Decimal Place	XXXX XXX.X XX.XX X.XXX **ATTENTION** Auto-ranging will occur to whichever decimal place has been selected.	XXXX
DECIMAL2	Control Loop 2 Decimal Place	XXXX XXX.X XX.XX X.XXX	XXXX
TEMPUNIT	Control Loop 1 Temperature Units	DEG F DEG C NONE	NONE
PWR FREQ	Power Frequency	60 HZ or 50 HZ	60 HZ
RATIO 2	Ratio for Input 2—Set from the front of the controller	DISABL ENABLE	DISABL
LANGUAGE	Display Language	ENGLIS FRENCH GERMAN SPANIS ITALAN	ENGLIS

3.18 Calibration Group

The prompts used here are for field calibration purposes. Refer to *Section 7 - Calibration* in manual #51-52-25-55 for complete information and instructions.

3.19 Maintenance Parameters Set Up Group

Table 3-17 Maintenance Group Function Prompts

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
Time 1	Timer 1	DISABL LASTR (Last Reset) AL1SP1 (Alarm 1 Setpoint 1) AL1SP2 (Alarm 1 Setpoint 2) AL2SP1 (Alarm 2 Setpoint 1) AL2SP2 (Alarm 2 Setpoint 2) MANUAL (Loop 1 Manual) GSOAK (Guaranteed Soak) SOOTING (Sooting State) DIGIN1 (Digital Input 1) DIGIN2 (Digital Input 2) MAN2 (Loop 2 Manual)	DISABL
HRS.MIN1 or DAYS.HRS1	Elapsed Time 1	Read Only	
TIME 2	Timer 2	Same as TIME 1	Disabl
HRS.MIN2 or DAYS.HRS2	Elapsed Time 2	Read Only	
TIME 3	Timer 3	Same as TIME 1	Disabl
HRS.MIN3 or DAYS.HRS3	Elapsed Time 3	Read Only	
COUNTER 1	Counter 1	DISABL MANUAL (Loop 1 Manual) AL1SP1 (Alarm 1 Setpoint 1) AL1SP2 (Alarm 1 Setpoint 2) AL2SP1 (Alarm 2 Setpoint 1) AL2SP2 (Alarm 2 Setpoint 2) DIGIN1 (Digital Input 1) DIGIN2 (Digital Input 2)	DISABL

Function Prompt Lower Display	Function Name	Selections or Range of Setting Upper Display	Factory Setting
COUNTER 1 **continued**	Counter 1 continued	OUT1*1K (Output 1 Relay x 1000) OUT2*1K (Output 2 Relay x 1000) GSOAK (Guaranteed Soak) PWRCYC (Power Cycle) PV_RNG (Loop 1 PV Range) FAILSF (Loop 1 Failsafe) TUNE (Loop 1 Tune) MAN2 (Loop 2 Manual) PVRNG2 (Loop 2 PV Range) FSF2 (Loop 2 Failsafe) TUNE2 (Loop 2 Tune)	
COUNTS 1	Number of Counts 1	Read Only	
COUNTER 2	Counter 2	Same as Counter 1	DISABL
COUNTS 2	Number of Counts 2	Read Only	
COUNTER 3	Counter 3	Same as Counter 1	DISABL
COUNTS 3	Number of Counts 3	Read Only	
PASSWORD	Password	0-9999	0
RESTYPE	Reset Type	NONE (No value will be reset) TIMER1 (Timer 1 will be reset) TIMER2 (Timer 2 wil be reset) TIMER3 (Timer 3 will be reset) ALLTM (All timers will be reset) COUNT1 (Counter 1 will be reset) COUNT2 (Counter 2 will be reset) COUNT3 (Counter 3 will be reset) ALL CO (All counters reset) ALL TC (All timers/counters reset)	NONE

3.20 Status Group

The prompts used hare are read only. They are used to determine the reason for a controller failure. Refer to *Section 9 – Troubleshooting* in manual #51-52-25-55 for complete information.

4. Operation

4.1 How to Power Up the Controller

When the power is applied, the controller will run three diagnostic tests. All the displays will light and then the controller will go into automatic mode after 20 seconds.

If one or more of these tests fail, the controller will go to the Fail-safe Manual Mode, and “FAILSAFE” will flash in the lower display.

If the output type is Position Proportional, and AUTO-CAL has never been done, a prompt “CAL MTR” will appear suggesting that the controller be calibrated. *(See Appendix D – Position Proportional Calibration.)*

Key Error

When a key is pressed and the prompt “KEY ERROR” appears in the lower display, it will be for one of the following reasons:

- parameter is not available,
- not in Set Up mode, press **SET UP** key first,
- key malfunction, do keyboard test.

4.2 Monitoring Your Controller

Operator Interface

The indicators and displays on the operator interface let you see what is happening to your process and how the controller is responding. Figure 1-1 is a view of the operator interface. A description of the displays and indicators is included.

Decimal Point Position

None, one or two decimal places are indicated on configuration. When a single decimal position has been configured and values greater than 1000 are displayed, the right-most character is blank, but the decimal point will be lit.

Viewing the Operating Parameters

Press the LOWER DISPLAY key to scroll through the operating parameters listed in Table 4-1. The lower display will show only those parameters and their values that apply to your specific model and the way in which it was configured.

Table 4-1 Lower Display Key Parameter Prompts

Indication	Description
OUT	OUTPUT #1—Output value is percent; for Three Position Step control, this is an estimated motor position when no slidewire exists.
OT2	OUTPUT #2—Appears only if 2-loop or Cascade control is configured.
SP	LOCAL SETPOINT #1—Also current setpoint when using SP Ramp.
2SP	LOCAL SETPOINT #2
3SP	LOCAL SETPOINT #3
RSP	REMOTE SETPOINT
1IN	INPUT 1—Used only with combinational input algorithms.
2IN	INPUT 2
3IN	INPUT 3
POS	SLIDEWIRE POSITION—Used only with TPSC.
CSP	COMPUTER SETPOINT—When SP is in override.
DEV	DEVIATION—Maximum negative display is –999.9.
PIDSETX	TUNING PARAMETER SET 1—Selected set for single loop or **primary** loop configuration where X is either 1 or 2.
2PIDSETX	TUNING PARAMETER SET 2—Selected set for **secondary** loop configuration where X is either 1 or 2.
ET XX.XX	ELAPSED TIME—Time that has elapsed on timer in Hours.Minutes.
TR XX.XX	TIME REMAINING—Time that remains on timer in Hours.Minutes
RAMPXXXM	SETPOINT RAMP TIME—Time remaining in the setpoint ramp in minutes.
O SK XXXX	Soak # and TIME REMAINING IN SOAK
1PV	PROCESS VARIABLE 1—For Cascade or 2-loop applications.
2PV	PROCESS VARIABLE 2—For Cascade or 2-loop applications.
AUX	AUXILIARY OUTPUT—Displayed only when Loop 2 is not used, or when Loop 2 is Time Simplex and Loop 1 is not Current Duplex.
OC1	CHARACTERIZED OUTPUT 1—Displayed if Loop 1 output is characterized.
OC2	CHARACTERIZED OUTPUT 2—Displayed if Loop 2 output is characterized.
SPn	SP RATE SETPOINT—Current setpoint for setpoint rate applications
Σ (Sigma)	CURRENT TOTALIZATION VALUE—Displays the total flow volume being measured.
BIA	BIAS—Displays the manual reset value for algorithm PD+MR.
TUNE OFF	LIMIT CYCLE TUNING NOT RUNNING—Appears when Accutune is disabled.
TUNE RUN	LIMIT CYCLE TUNING RUNNING—Appears when Accutune is enabled.
ToBEGIN	RESET SP PROGRAM TO BEGINNING OF FIRST SEGMENT
OTI	OUTPUT OVERRIDE (2 PID LOOPS ONLY)—Appears when internal Loop 1 Output value is displayed. This represents the internal output 1 value before override.

Diagnostic Error Messages

The UDC 3300 performs background tests to verify data and memory integrity. If there is a malfunction, an error message will be displayed. In the case of more than one simultaneous malfunction, only the one with the highest priority will appear on the lower display. A list of error messages is contained in Table 4-2. If any of these error messages occur, refer to *Section 9 – Troubleshooting* in manual #51-52-25-55 for information to correct the failure.

Table 4-2 Error Messages

Prompt	Description
EE FAIL	Unable to write to nonvolatile memory.
INP1FAIL	Two consecutive failures of input 1 integration.
INP2FAIL	Two consecutive failures of input 2 integration.
INP3FAIL	Two consecutive failures of input 3 integration.
SW FAIL	Slidewire input failure. Position proportional control automatically switched to TPSC.
CONF ERR	Configuration Errors for Loop 1—Low limit greater than high limit for PV, SP, Reset, or Output.
CONF ER2	Configuration Errors for Loop 2—Low limit greater than high limit for PV, SP, Reset, or Output, or Loop 2 output has not been selected.
SOOTING	Input Combination Errors—Percent Carbon falls outside of “sooting boundary.”
IN1 RNG	Input 1 Out-of-Range
IN2 RNG	Input 2 Out-of-Range
IN3 RNG	Input 3 Out-of-Range
PV RNG	PV Out-of-Range PV = (PV source x PV source ratio) + PV source bias
FAILSAFE	Failsafe Loop 1—Check inputs or configuration.
FAILSF2	Failsafe Loop 2—Check inputs or configuration.
RV LIMIT	Remote Variable Out-of-Range RV = (RV source x RV source ratio) + RV source bias
RH LO	RH Excessive Temperature Depression—Calculated %RH is less than 0%.
SEG ERR	Segment Error—SP Program starting segment number is less than ending segment number.
CAL MTR	Not calibrated. Perform Position Proportional calibration.

4.3 Start-up Procedure

Table 4-3 Procedure for Starting Up the Controller

Step	Operation	Press	Action
1	Select the loop	**FUNCTION LOOP 1/2**	to toggle between Loop 1 and Loop 2, if configured.
2	Select manual mode	**MANUAL AUTO**	until "MAN" indicator is ON. The controller is in manual mode.
3	Adjust the output	**▲ or ▼**	to adjust the output value and ensure that the final control element is functioning correctly. Upper Display shows the PV value Lower Display shows OUT and the output value in %.
4	Enter the local setpoint	**LOWER DISPLAY**	Upper Display shows the PV Value Lower Display shows SP and the local setpoint value
		▲ or ▼	to adjust the local setpoint to the value at which you want the process variable maintained. The local setpoint cannot be changed if the Setpoint Ramp function is running. "R" appears in the upper display.
5	Select automatic mode	**MANUAL AUTO**	until "A" indicator is ON. The controller is in Automatic mode. The controller will automatically adjust the output to maintain the process variable at setpoint, if the controller is properly tuned.
6	Tune the controller	**SET UP**	Tuning will be required on the first startup. First enable "TUNE" selection in the Accutune Group. Refer to Tuning Set Up group to ensure that the proper selections for PROP BD or GAIN, RATE MIN, and RSET MIN, or RSET RPM have been entered. Use Accutune to tune the controller as follows: 1. Adjust setpoint to the desired value. 2. Switch to Automatic mode by pressing the MANUAL/AUTO key. 3. Initiate Tuning by: • Pressing the up arrow key when the lower display prompt shows TUNE-OFF, or • Pressing the LOWER DISPLAY and Up arrow keys simultaneously, or… • Using the Digital Input, if configured. If it is necessary to stop or abort the tuning process, press the MANUAL/AUTO key and the controller will return to manual mode.

4.4 Operating Modes

The controller can operate in any of three basic modes:

- Manual – One or Two Loops
- Automatic with Local Setpoint – One or Two Loops
- Automatic with Remote Setpoint – One or Two Loops
- Manual Cascade
- Automatic Cascade

4.5 Setpoints

You can configure the following setpoints for the UDC 3300 controller in the control group.

- A single local setpoint (SP)
- Two local setpoints (SP, 2SP)
- One local setpoint and one remote setpoint (SP, RSP)
- Three local setpoints (SP, 2SP, 3SP)
- Two local setpoints and one remote setpoint (SP, 2SP, RSP)

Changing Local Setpoint 1, 2 or 3

To scroll through the setpoint type menu, press and hold in the SETPOINT SELECT key. Release when the desired active setpoint selection is displayed.

ATTENTION

"KEY ERROR" will appear in the lower display if:

- You choose either local setpoint 2 or 3 or remote setpoint and your choice has not been configured as the setpoint source.
- You attempt to change the setpoint while a Setpoint Ramp is enabled.
- Setpoint Ramp rate will apply to Local SP changes, if enabled.

After changing a local setpoint value, if no other key is pressed, a minimum of 30 seconds time will elapse before the new value is stored in nonvolatile memory. If power is removed before this time, the new setpoint value is lost and the previous setpoint value is used at power up. If after changing the LSP value another key is pressed, then the value is stored immediately.

Setpoint Selection Indication

Table 4-4 Setpoint Selection Indication

	Using Local Setpoint	Using Remote Setpoint	Using 2nd Local Setpoint	Using 3rd Local Setpoint
	SP	**RSP**	**2SP**	**3SP**
Upper Display	**PV** and the PV value	**PV** and the PV value	**PV** and the PV value	**PV** and the PV value
Lower Display	**SP** and the Local Setpoint Value	**RSP** and Remote Setpoint Value	**2SP** and the 2nd Local Setpoint Value	**3SP** and the 3rd Local Setpoint Value
Annunciator	**None**	"■" lights	"■" lights	"3" lights

4.6 Using Two Sets of Tuning Constants

Select Two Sets or Gain Scheduling

Table 4-5 Procedure for Selecting Two Sets of Tuning Constants

Step	Operation	Press	Action
1	Select Control Set Up group	**SET UP**	until you see SET UP in Upper Display and CONTROL or CONTROL2 in Lower Display
2	Select PID SETS function	**FUNCTION LOOP 1/2**	until you see the function desired in the Upper Display and PID SETS in the Lower Display
		▲ or ▼	to select the type of PID SET.

Set Switchover Value

If you select 2 PVSW or 2 SPSW, you must set a value at which the sets will switch over. The procedure in Table 4-6 shows you how to set this value. ***This procedure assumes that you are still in the Control Set Up group from Table 4-5.***

Table 4-6 Procedure for Setting Switchover Values

Step	Operation	Press	Action
1	Select Switchover value function	**FUNCTION LOOP 1/2**	until you see the switch over value in the Upper Display and SW VALUE in the Lower Display.
		▲ or ▼	to select the switch-over value in the upper display.

Set Tuning Constant Values for Each Set

There are specific tuning constants that must be set for each set. The procedure below shows you how to access these constants and change their value.

Table 4-7 Procedure for Setting Tuning Constant Values

Step	Operation	Press	Action
1	Select Tuning Set Up Group	**SET UP**	until you see TUNING in the Lower Display
2	Select the tuning constants	**FUNCTION LOOP 1/2**	to successively display the available constants in the Lower Display. The value is displayed in the Upper Display
		▲ or ▼	To change the value of any of the above listed prompts in the lower display.

Switch Between Two Sets via the Keyboard (Without Automatic Switchover)

This procedure is operational only if 2 PID SETS was configured at the Control Set Up group.

Table 4-8 Procedure for Switching PID SETS from the Keyboard

Step	Operation	Press	Action
1	Access the PID set display	**LOWER DISPLAY**	until you see the PV value displayed in the Upper Display and the PIDSETx in the Lower Display.
		▲ or ▼	to change PID SET 1 to PID SET 2 or vice versa. You can use Accutune on each set.

4.7 Alarm Setpoints

Procedure for Displaying the Alarm Setpoints

Table 4-9 Procedure for Displaying or Changing the Alarm Setpoints

Step	Operation	Press	Action
1	Access the Alarm Set Up group	**SET UP**	until you see ALARMS in the Lower Display.
2	Access the Alarm Setpoint Values	**FUNCTION LOOP 1/2**	to successively display the alarm setpoints and their values.
		▲ or ▼	to change any alarm setpoint value you select in the upper display.
3	Return to normal operation	**LOWER DISPLAY**	

4.8 Two Loops of Control

The UDC3300 can operate using two independent loops of control or internal Cascade control.

Two Independent Loops

The following rules apply for two independent loops:

- Current output on Loop 2 requires auxiliary output.
- Loop 2 Current Duplex output is limited to 2nd Current output signal only.
- Loop 2 relay output is always dedicated to relay output 2.
- No Time Duplex outputs on Loop 2.
- No ON/OFF or 3 Position Step algorithms on Loop 2.
- No Position Proportional output is available on 2-loop controllers.

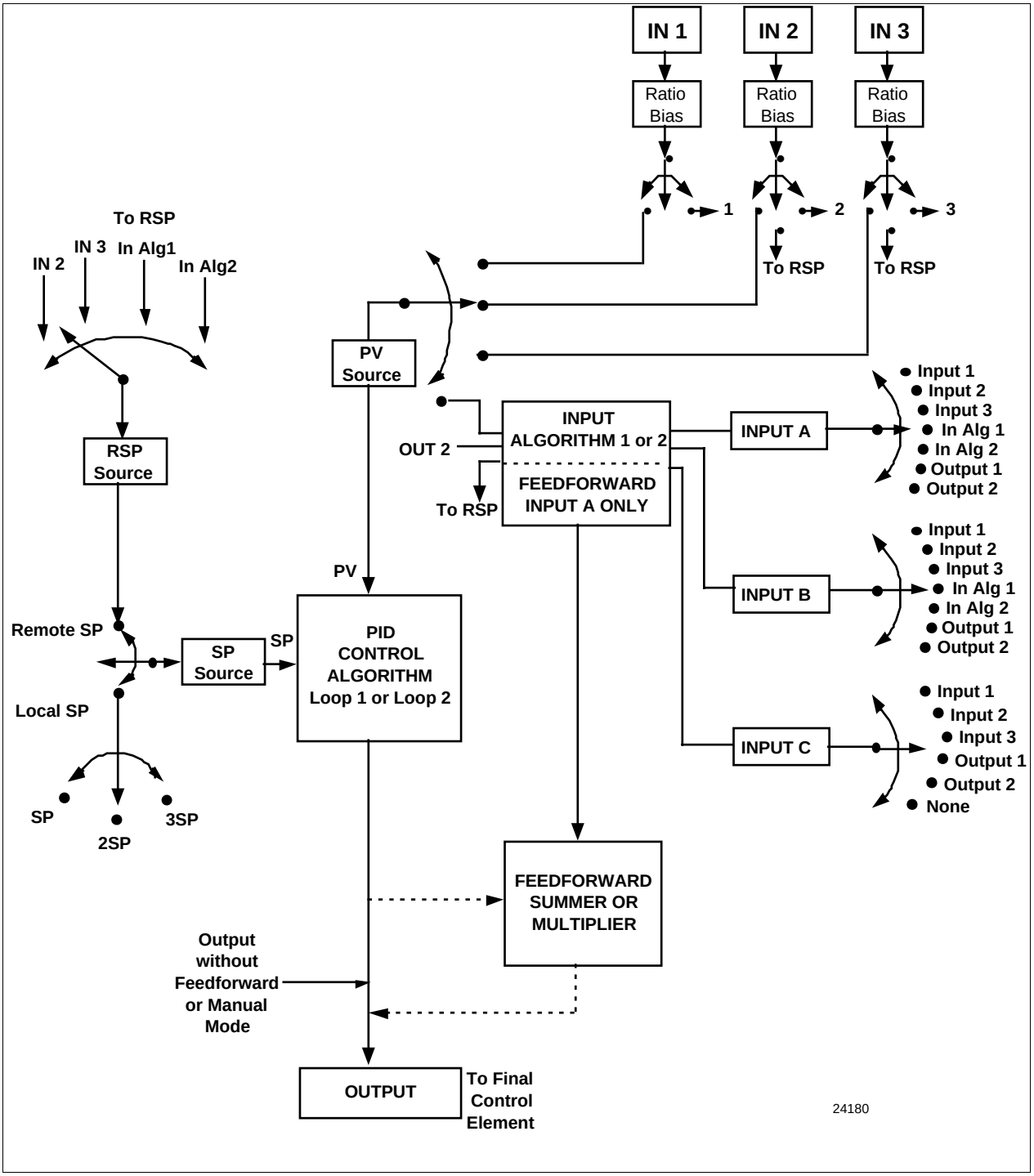


Figure 4-1 Functional Overview Block Diagram of a Single Loop (Loop #1) or Dual Loop Controller (Loop #1 and Loop #2)

Internal Cascade Control

The following rules apply for internal Cascade control:

- Loop 2 must be the primary loop.
- Loop 1 must be the secondary (internal or slave) loop because all output forms exist on Loop 1.
- Loop 1 remote setpoint is fixed as Loop 2 output.
- No Position Proportional output is available on cascade controllers.

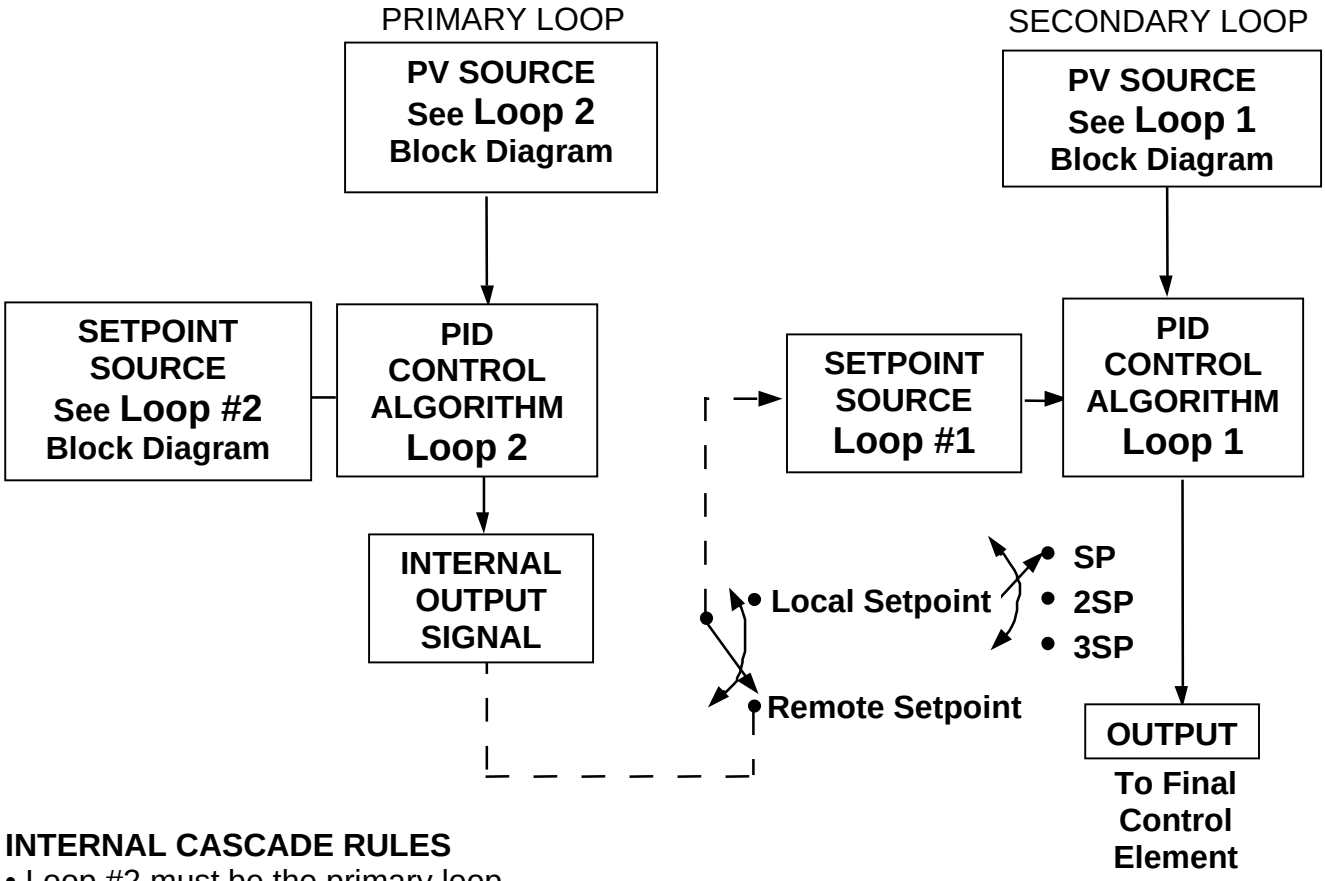


Figure 4-2 Functional Overview Block Diagram of Internal Cascade of a 2-loop Controller

Table 4-10 Control Loops Selections

Loop		Input 1	Input 2	Input Algorithm
LOOP 1	Process Variable*	Via Configuration or Digital Inputs	Via Configuration or Digital Inputs	Yes
	Remote Setpoint	No	Via configuration or Digital Inputs	Yes
	Feedforward	No	Yes	Yes
LOOP 2	Process Variable*	Via Configuration or Digital Inputs	Via Configuration or Digital Inputs	Yes
	Remote Setpoint	No	Via Configuration or Digital Inputs	Yes
	Feedforward	No	Yes	Yes

Override Rules

The UDC 3300 allows you to select high or low output override. Refer to *Section 3 - Configuration* to select High or Low.

The following rules apply for high/low override:

- Only one physical output is required when override is enabled. It is the output from Loop 1 because Loop 2's internal output is routed through the selector.
- Loop 2 output can also be available at all times if desired.
- In Manual mode, the Output may be overridden.
- Does not apply for Three Position Step Control.
- OTI on bottom display shows value of the internal Loop 1 output before any override.

ATTENTION

The output of the unselected loop tracks the selected loop to within 5% when in Auto mode to eliminate windup. This tracking is done in the direction opposite to the Override Select configuration; i.e., for High Select, the unselected output tracks within 5% of lower and vice versa.

Two Loop Restrictions

Table 4-11 Two Loop Functionality and Restrictions (Models DC330E-EE-2XX or DC330E-EE-5XX)

Controller with One Current Output (Auxiliary Output) and Three Relay Outputs					
Output Type	**Current**	**Auxiliary**	**Relay #1**	**Relay #2**	**Relay #3**
Loop 1 is TIME SIMPLEX, Loop 2 is:					
Time Simplex	N/A	Not used	Loop 1 Out	Loop 2 Out	Alarm 1
Current or Current Duplex (100%)	N/A	Loop 2 Out	Loop 1 Out	Alarm 2	Alarm 1
Current/Time or Time/Current	N/A	Loop 2: Out 1 or 2	Loop 1 Out	Loop 2: Out 1 or 2	Alarm 1
Loop 1 is TIME DUPLEX/TPSC, Loop 2 is:					
Time Simplex (N/A)	—	—	—	—	—
Current or Current Duplex (100%)	N/A	Loop 2 Out	Loop 1, Output 1	Loop 1, Output 2	Alarm 1
Current/Time or Time/Current (N/A)	—	—	—	—	—
Loop 1 is CURRENT OUTPUT or CURRENT DUPLEX – 100%, Loop 2 is:					
Time Simplex	N/A	Loop 1 Out	Loop 2 Out	Alarm 2	Alarm 1
Current or Current Duplex (N/A)	—	—	—	—	—
Current/Time or Time/Current (N/A)	—	—	—	—	—
Loop 1 is TIME/CURRENT or CURRENT/TIME, Loop 2 is:					
Time Simplex	N/A	Loop 1: Out 1 or 2	Loop 1: Out 1 or 2	Loop 2 Out	Alarm 1
Current or Current Duplex (N/A)	—	—	—	—	—
Current/Time or Time/Current(N/A)	—	—	—	—	—

Table 4-12 Two Loop Functionality and Restrictions (Models DC330E-KE-2XX or DC330E-KE-5XX)

Controller with Two Current Outputs (including Auxiliary Output) and Three Relay Outputs					
Output Type	**Current**	**Auxiliary**	**Relay #1**	**Relay #2**	**Relay #3**
Loop 1 is TIME SIMPLEX, Loop 2 is:					
Time Simplex	Not used	Not used	N/A	Loop 1 Out	Loop 2 Out
Current or Current Duplex (100%)	Not used	Loop 2 Out	N/A	Loop 1 Out	Alarm 1
Current/Time or Time/Current	Not used	Loop 2: Out 1 or 2	N/A	Loop 1 Out	Loop 2: Out 1 or 2
Loop 1 is TIME DUPLEX/TPSC, Loop 2 is:					
Time Simplex (N/A)	—	—	—	—	—
Current or Current Duplex (100%)	Not used	Loop 2 Out	N/A	Loop 1, Output 1	Loop 1, Output 2
Current/Time or Time/Current (N/A)	—	—	—	—	—
Loop 1 is CURRENT OUTPUT or CURRENT DUPLEX – 100%, Loop 2 is:					
Time Simplex	Loop 1 Out	Not used	N/A	Loop 2 Out	Alarm 1
Current or Current Duplex (100%)	Loop 1 Out	Loop 2 Out	N/A	Alarm 2	Alarm 1
Current/Time or Time/Current (N/A)	Loop 1 Out	Loop 2: Out 1 or 2	N/A	Loop 2: Out 1 or 2	Alarm 1
Loop 1 is CURRENT DUPLEX – 50%, Loop 2 is:					
Time Simplex	Loop 1, Output 1	Loop 1, Output 2	N/A	Loop 2 Out	Alarm 1
Current (N/A)	—	—	—	—	—
Current/Time or Time/Current (N/A)	—	—	—	—	—
Loop 1 is TIME/CURRENT or CURRENT/TIME, Loop 2 is:					
Time Simplex	Loop 1: Out 1 or 2	Not used	N/A	Loop 1: Out 1 or 2	Loop 2 Out
Current or Current Duplex (100%)	Loop 1: Out 1 or 2	Loop 2 Out	N/A	Loop 1: Out 1 or 2	Alarm 1
Current/Time or Time/Current	Loop 1: Out 1 or 2	Loop 2: Out 1 or 2	N/A	Loop 1: Out 1 or 2	Loop 2: Out 1 or 2

Select 2-loop Algorithm

Table 4-13 Procedure for Selecting 2-loop Algorithm

Step	Operation	Press	Action
1	Select Algorithm Set Up Group	**SET UP**	until you see ALGORTHM in the Lower Display
2	Select the PID Loops	**FUNCTION LOOP 1/2**	to successively display the PID loop constants
		▲ or ▼	To select two Loops or Cascade control.

Select the Output Algorithm for Each Loop

Table 4-14 Procedure for Selecting Output Algorithm

Step	Operation	Press	Action
1	Select Output Algorithm Set Up Group	**SET UP**	until you see OUT ALG in the lower display.
2	Select Loop 1 Algorithms	**FUNCTION LOOP 1/2**	to successively display the Loop 1 algorithms.
		▲ or ▼	to select Loop 1 algorithm from the selections that are available.
3	Select Loop 2 Algorithms	**FUNCTION LOOP 1/2**	until you see OUT ALG2 in the lower display.
		▲ or ▼	to select Loop 2 algorithm from the selections that are available.

Select Control Parameters for Each Loop

Table 4-15 Procedure for Selecting Control Parameters

Step	Operation	Press	Action
1	Select Control Set Up Group	**SET UP**	until you see: CONTROL for Loop 1 or CONTROL2 for Loop 2 in the Lower Display. Refer to *Table 4-11, Table 4-12, and Table 4-13* for rules and restrictions **and** to *Section 3 – Configuration* to select the individual parameters.

Selecting Tuning Parameters for Each Group

Table 4-16 Procedure for Selecting Tuning Parameters

Step	Operation	Press	Action
1	Select Tuning Set Up Group	**SET UP**	until you see: TUNING FOR Loop 1 or TUNING2 for Loop 2. PID sets 1 and 2 (TUNING) are for Loop 1 and single loop applications. PID sets 3 and 4 (TUNING 2) are for Loop 2 in two-loop and cascade control applications.
2	Select Tuning constants	**FUNCTION LOOP 1/2**	to successively display the constants for the Primary Loop OR Loop 2. Refer to *Section 3 - Configuration* for detailed information. You can Autotune both sets on either loop. Refer to *Section 4.15.* Use the FUNCTION key to switch between loops for display and monitoring.
		▲ or ▼	to change the values.

4.9 Monitoring Two Loops of Control

Loop Display

Display of Loop 1 or Loop 2 (if configured) is selected by toggling the FUNCTION / LOOP 1/2 key.

The indicator which identifies which loop is being monitored is displayed in the left-most character in the Upper Display

Table 4-17 Digital Display Indication—Two Loops

Loop Indicator	Loop Indication	Definition
None (If Two Loops are configured) **I** (If cascade is configured)	Loop 1 is being displayed.	• Upper display shows the Process Variable (PV) for Loop 1 • Lower display shows the Loop 1 parameters and the PV and Output for Loop 2 • Controller setpoint annunciators show the setpoint currently being used for Loop 1
L”	Loop 2 is being displayed	• Upper display shows the Process Variable (PV) for Loop 2 • Lower display shows the Loop 2 parameters and the PV and Output for Loop 1 • Controller setpoint annunciators show the setpoint currently being used for Loop 2

Viewing Each Loop's Process Variable

Regardless of which loop is being displayed, 1 or 2, the process variable of the non-displayed loop can be shown in the lower display by repeated presses of the LOWER DISPLAY key until **1PVXXXX** or **2PVXXXX** is displayed.

Internal Cascade Indication

When internal Cascade has been configured, an "I" will appear on the left side of the upper display as long as Loop 1 is operating in the remote setpoint mode. Hold in the SETPOINT SELECT key until RSP appears in the lower display then release the key to select remote setpoint.

Switching between automatic and manual mode on either loop will not affect the internal Cascade indication.

4.10 Operating Two Loops of Control

Operation of two individual loops of control is identical to operating a single loop of control except that TUNING 2 group applies to Loop 2 only and two PID sets, 3 and 4, are available. TUNING group applies to Loop 1 with PID sets 1 and 2 applicable.

Operating Modes and Setpoint Source

The rules for Auto/Manual modes and changing setpoint sources are the same as single loop operation.

Keyboard Operation

Note that the loop being displayed is the only loop affected by normal keyboard operation. However, either loop can be reconfigured when in the Set Up mode regardless of which is being displayed during normal operation.

Accutune

Two independent loops can be tuned at the same time, if configured. For Cascade applications the secondary loop (Loop1) should be tuned first, then the primary loop (Loop 2) should be tuned with Loop 1 in the Cascade Automatic Mode. For more details on Accutune, see *Section 4.15.*

Setpoint Ramp or SP Programming

Either loop or both loops can be configured for a single setpoint ramp operation by enabling the desired loop or loops (see *Section 3 – Configuration*).

An "H" for Hold or "R" for Run will appear when applicable in the left-most character in the upper display, depending upon which loop is being displayed.

The RUN/HOLD operation is shown in Table 5-1.

Digital Inputs (Remote Mode Switching)

Digital Input 1 is dedicated to Loop 1 and Digital Input 2 is dedicated to Loop 2 when two loops or Cascade control is configured. Otherwise, both DI's apply to single loop configurations.

Output Override Hi/Lo Select

Output Override allows you to select the higher of Output 1 and Output 2 (Hi Select) or the lower of Output 1 and Output 2 (Lo Select) to appear at Output 1 terminals to drive the final control element. Refer to *Section 4.8* for Override rules.

Override prompts appear under the Algorithm Set Up group, function prompt OUT OVRD.

4.11 Three Position Step Control Algorithm

The Three Position Step Control algorithm (Loop 1 only) allows the control of a valve (or other actuator) with an electric motor driven by two controller output relays; one to move the motor upscale, the other to move it downscale, without a feedback slidewire linked to the motor shaft. Accutune **SP** or **SP+PV** tuning does not function with this algorithm. Accutune **TUNE** will operate with this algorithm.

Displaying the Motor Position

Table 4-18 Procedure for Displaying the 3PSTEP Motor Position

Step	Operation	Press	Action
1	Access the displays	**LOWER DISPLAY**	until you see the PV Value in the Upper Display and either POS or OUT in the Lower Display.

4.12 Input Math Algorithms

If selected via Math options, this controller has two input algorithms available. Each algorithm can be configured to provide a derived (calculated) PV or a derived remote setpoint. Up to three inputs may be applied to the calculation. In addition, the two algorithms may be “linked” to combine two calculations by configuring one algorithm to be an input to the other algorithm.

Standard functionality:

- Basic models (DC330B) contain as standard: Weighted Average, Feedforward Summer, Feedforward Multiplier.
- Expanded models (DC330E) provide as standard: Weighted Average, Feedforward Summer, Feedforward Multiplier, Relative Humidity.

The Math option, which provides additional algorithms plus two Characterizers, Totalizer, and Gain Scheduling, is available only on Expanded Model DC330E-XX-XXX.

Input Algorithm Selections

Algorithm selections are made in *Section 3 – Configuration.* The following function prompts can be found in the Algorithm Set Up group:

IN ALG1

IN ALG2These selections include the following algorithms:

Weighted Average
Feedforward Summer
Relative Humidity
Summer
Hi Select
Lo Select
√ Multiply Divide
√ Multiply
Multiply Divide
Multiply
Feedforward Multiplier
Carbon Potential (several types)
Dewpoint

Input A, Input B, and Input C selections for these formulas are found in *Section 3 – Configuration;* Set Up group ALGORTHM, under the following function prompts:

ALG1 INA
ALG1 INB
ALG1 INC

ALG2 INA
ALG2 INB
ALG2 INC

8-Segment Characterization

This is available as part of the Math Algorithm option. Two 8- selections can made in *Section 3 – Configuration*; Set Up group ALGORTHM, under function prompts:

8SEG CH1
Xn VALUE
Yn VALUE
8SEG CH2
Xn VALU2
Yn VALU2

An 8-segment characterizer can be applied to either Input 1, Input 2, Output 1, or Output 2. When Input 1 or Input 2 is used, the selected input's Ratio and Bias are applied to the Xn values.

When one of the loop outputs is selected, the Xn Values are the output from the control algorithm, and the Yn Output is the final control element action.

Totalizer Function

A **Flow Totalizer** is available as part of the Math Algorithm option. This calculates and displays the total flow volume being measured by Input 1. Alternatively, it can be applied to either Input Algorithm 1 or Input Algorithm 2 to totalize the compensated flow rate being calculated by the algorithm.

The **totalizer displays** the current totalized flow value (up to seven digits maximum). Seven **scaling factors** are available (from one to one million). The desired scaling factor is applied to the calculated value to extend the maximum total flow range that can be displayed.

Five integration rates are available to match the totalizer rate to the rate of flow being measured. The rates are:

Engineering units (EU) per second
EU per minute
EU per hour
EU per day
Millions of units per day

The totalizer value is stored in nonvolatile memory once every eight hours. If **power is lost** while the totalizer is in operation, the current value of the totalizer will be lost. When **power is restored**, the totalizer will start operation for the last value stored in nonvolatile memory. The Σ **(Sigma)** display will blink to indicate this condition. Reset the totalizer.

The totalizer can be **reset** from the keyboard whenever desired. The totalizer should always be reset to initialize the counters whenever it is enabled, otherwise, the "Σ" (Sigma) display will blink.

Refer to *Section 3 – Configuration*, Set Up group ALGORTHM, function prompt TOTALIZER to select an application, and the function prompts that follow TOTALIZER to enter your scale factor and rate of integration.

Alarm on Totalizer Value

The alarm type configuration includes an Alarm on Totalizer value. This allows an alarm setpoint value to be used to cause an alarm when exceeded. The alarm setpoint represents the lowest four digits of the selected Totalizer Scale Factor and has a range from 0 to 9999 x Totalizer Scale Factor.

Totalizer Reset Via Digital Input

The digital input type configuration includes a Reset Totalizer that resets the accumulated totalizer value when the DI is closed.

4.13 Digital Input Option (Remote Switching)

The Digital Input option detects the state of external contacts for either of two inputs. On contact closure, the controller will respond according to how each digital input is configured. Make your selection under the Options Set Up group function prompt "DIG IN1" or "DIG IN2." See *Section 3 – Configuration*.

Table 4-19 Digital Input Option Action on Contact Closure

DIG IN1 or DIG IN2 Selections	Display Indication	Action on Contact Closure Returns (toggles) to original state when contact opens, unless otherwise noted.
None	**DI 1 2** always off*	No Digital Input selection
TO MAN	**MAN** blinks	Puts the controller into manual mode.
TO LSP		Puts the controller into local setpoint 1.
TO 2SP	**RSP** annunciator blinks	Puts the controller into local setpoint 2.
TO 3SP	**RSP** annunciator blinks	Puts the controller into local setpoint 3.
TO DIR		Selects direct controller action.
ToHOLD	**H** blinks	Suspends setpoint program or setpoint ramp operation.
ToPID2	**PIDSET 2** in lower display	Selects PID set 2.
PV 2IN	**II** (II blinks) **IN**	Selects the PV to equal Input 2.
PV 3IN	**III** (III blinks) **IN**	Selects the PV to equal Input 3.
RERUN		Resets the Setpoint Program back to the beginning of the first segment in the program and leaves the program in the same Run Or Hold mode that it was in when the DI closed. Opening the DI has no further effect.
TO RUN	**R** indicator blinks	Starts a stopped SP Program.
ToBEGN		Resets the Setpoint Program back to the beginning of the first segment in the program and places the program into the Hold mode.
STOP I		Disables PID Integral (I) action.
MAN FS	**MAN** blinks	Unit goes to manual mode, output goes to the failsafe value.

DIG IN1 or DIG IN2 Selections	Display Indication	Action on Contact Closure Returns (toggles) to original state when contact opens, unless otherwise noted.
ToLOCK	**LOCKED** when a key is pressed	Disables all keys.
ToAout		Output is forced to value set at control prompt “AUTO OUT” when controller is in automatic mode.
TIMER	Timer clock () and time appear in lower display.	Starts timer (momentary). Reopening switch has no effect.
AM STA		Causes switch to Auto Manual Station mode.
ToTUNE	**TUNE ON** in lower display	Starts the Accutune process.
SPinit		Forces the SP to initialize at the current PV value.
TRACK1	**O** blinks	Allows Output 1 to track Input 2.
TRACK2	**O** blinks	Allows Output 2 to track Input 2.
ToOUT2	**O** blinks	Allows Output 2 to override Input 1.
TO RSP	**RSP** annunciator blinks	Selects remote setpoint, if enabled.
D L1/2		Displays loop not being displayed at time of closure.
RST FB		Allows Input 2 to override the internal reset value, providing external reset feedback.
ToPURG	**MAN** blinks and output value shows in lower display	Forces loop to manual mode with the output values set to the Output High Limit configuration.
LoFIRE	**MAN** blinks and output value shows in lower display	Forces loop to manual mode with the output set to the Output Low Limit configuration.
MAN LT		Forces loop to manual mode, latched. Opening DI has no effect on Mode. UDC remains in manual mode.
REStot		Resets the accumulated totalizer value. Opening the switch has no effect.

Keyboard Operation

Front panel keys have no effect on the digital input action in the closed state.

Digital Inputs 1 and 2 Combination Selections

Table 4-20 Digital Input Combinations "DIG IN1" or "DIG IN2"

Selections used in Combination with "DIG IN1" or "DIG IN2"	Display Indication	Action on contact closure Returns (toggles) to original state when contact opens.
+PID2	**PIDSET 2** in lower display	Selects PID set 2.
+ToDIR		Puts the controller into direct action.
+ToSP2	**RSP** blinks	Selects the second local setpoint.
+DISAT	**T** indicator is no longer lit	Disables Adaptive tune.
+ToSP1		Selects the local setpoint.
+RUN	**R** indicator blinks	Starts or restarts RUN of SP RMP/PROG.

4.14 Fuzzy Overshoot Suppression

Fuzzy Overshoot Suppression minimizes overshoot after a setpoint change or a process disturbance. This is especially useful in processes which experience load changes or where even a small overshoot beyond the setpoint may result in damage or lost product. It can be configured to apply to Loop 1, Loop 2, or both loops.

Configuration

To configure this item, refer to *Section 3 – Configuration:*

- Set Up Group **ACCUTUNE**
- Function Prompt **FUZZY**
- Select **ENABLE** or **DISABL** (▲ or ▼)

4.15 Accutune

There are several types of Accutune from which to choose in DC330E Models:

- **(TUNE) Demand Tuning**—Tuning is done on demand
  - by pressing the LOWER DISPLAY and ▲ keys simultaneously,
  - by selecting prompt "TUNE" in the lower display,
  - via digital input.
- **(SP) Setpoint Tuning**—SP only tuning will continually adjust the Gain or Proportional Band (P), Reset (I), and Rate (D) tuning constants in response to setpoint changes.
- **(TUN+PV) Demand Tuning + PV Adapt**—Provides TUNE On Demand tuning plus PV adaptive tuning whenever a PV process disturbance of 0.3% span or greater occurs.
- **(SP+PV) Setpoint Tuning + PV Adapt**—Provides SP only tuning plus PV adaptive tuning whenever a PV process disturbance of 0.3% span or greater occurs.

Configuration

To configure this item, refer to *Section 3 – Configuration.*

Two-loop and Cascade Operation

Accutune can be used on either or both loops. However, while one loop is operating by **SP** tuning, the configuration of either loop cannot be changed. When one loop is operating by **PV** adaptive tuning, the other loop can have its configuration changed.

Rules

Table 4-21 Accutune Rules and Regulations

TUNE	SP	Applicable Rule
X		**TUNE** On Demand tuning will work for all control algorithms except ON/OFF. Process line out is not required.
X		**TUNE** On Demand tuning works for integrating processes.
	X	**SP** tuning will work only for algorithm PID a or PID B selections; i.e., it will **NOT** work with ON/OFF, Three Position Step, or PD+MR control algorithms.
	X	**SP** tuning can tune on all local or computer setpoints *except ramping setpoints;* i.e., cannot be done during SP Ramp or SP Program or when using remote setpoint.
X	**X**	Tuning is done in automatic mode.
X	**X**	Tuning can be monitored or reconfigured using communications option.
X	**X**	Tuning can be enabled via digital inputs.
X	**X**	Tuning can be aborted by going to manual mode or disabling via configuration.
X	**X**	When tuning is in progress, a large **T** appears in the upper display and disappears as soon as tuning is completed.
X	**X**	Can tune two independent loops.
X		Setpoint changes can be made during operation. The setpoint at the time tuning starts is captured and Tune runs until completion, then proceeds to the new SP value following the completion of tuning.

Starting TUNE (Demand Tuning)

After TUNE or TUN+PV has been enabled use the following procedure to start tuning.

Table 4-22 Procedure for Starting TUNE (Demand) Tuning

Step	Action
1	Set the setpoint to the desired value.
2	Switch to Automatic mode by pressing the Manual/Auto key.
3	Initiate Tuning by: • pressing the ▲ key when the lower display prompt = TUNE-OFF, • pressing the Lower Display and ▲ keys simultaneously, or • using the digital input, if configured.

Aborting Tuning

If it is necessary to stop or abort the tuning process, press the MANUAL/AUTO key and the controller will return to manual mode. You can also disable TUNE or TUN+PV in the ACCUTUNE or ACCUTUN2 Set Up group

Tune for Duplex (Heat/Cool)

TUNE can be done for applications using duplex (heat/cool) control. During tuning, Accutune requires that **setpoint 1** will cause a Heating demand, and then the calculated tuning parameters will be automatically entered as PID set 1. Likewise, it requires that tuning at local **setpoint 2** will cause a Cooling demand, and then the cooling parameters will be entered as PID set 2.

The tuning sequence will cycle the controller's output two full cycles between the high output limit and 50% for HEAT or between 50% and the low output limit for COOL while allowing only a small process variable change above and below the setpoint during each cycle.

Configuring TUNE for Duplex (Heat/Cool)

To configure this item, refer to *Section 3 – Configuration.*

Using TUNE at Start-Up for Duplex (Heat/Cool)

Table 4-23 Procedure for Using TUNE at Start-up for Duplex

Step	Action
1	***Heat Zone:***
	• Adjust **Local Setpoint 1** to a value within the **Heat** zone.
	• Put the controller in *Automatic* mode.
	• Press the Lower Display and ▲ keys simultaneously to initiate **Heat** tuning.
	The output will cycle between 50% and 100% (or high output limit). A large **T** appears in the upper display until tuning is completed and final **Heat** parameters are entered for **PID set 1** in the Tuning group.
2	***Cool Zone:***
	• Adjust **Local Setpoint 2** to a value within the **Cool** zone.
	• Put the controller in *Automatic* mode.
	• Press the Lower Display and ▲ keys simultaneously to initiate **Cool** tuning.
	The output will cycle between 0% and 50% (or low output limit). A large **T** appears in the upper display until tuning is completed and final **Cool** parameters are entered for **PID set 2** in the Tuning group.

Using SP Tuning at Start-Up

Table 4-24 Procedure for Using SP Tuning at Start-Up

Step	Action
1	Put the controller in manual mode by pressing the MANUAL/AUTO key.
2	Let the PV stabilize.
3	Adjust the setpoint to the desired value.
4	Put the controller in automatic mode by pressing the MANUAL/AUTO key.
	The controller will switch to automatic mode and the process will start to move toward the setpoint and will line out with the proper tuning constants. A large **T** appears on the left side of the upper display to indicate that SP tuning is in progress.

SP Tuning for Duplex (Heat/Cool)

SP tuning can be done for applications using duplex (heat/cool) control.

Configuring SP Tuning for Duplex (Heat/Cool)

To configure this item, refer to *Section 3 – Configuration.*

SP Tuning After Start-Up

SP tuning will occur whenever the controller is in automatic mode and a setpoint change occurs which is greater than the previously configured minimum setpoint change value.

The controller will delay using any setpoint changes for 30 seconds to enable it to calculate whether to SP tune or not. But if the controller is toggled between LSP1 and LSP2 or if any other key (such as LOWER DISPLAY) is pressed, the setpoint change is immediate.

A large **T** is displayed in the upper display whenever tuning is in progress. During this time, no changes to the configuration parameters, including the setpoint, are permitted.

Aborting SP Tuning

If it is necessary to stop or abort the tuning:

- Press the MANUAL/AUTO key to return to manual mode. This will cause an immediate abort of tuning.
- Disable SP or SP+PV in the Accutune Set Up group at function prompt ACCUTUNE or ACCUTUN2.

Retuning

The controller will evaluate current tuning as SP changes occur. When retuning is required, the controller operates in automatic mode and identifies new tuning constants. At the point, the **T** appears and tuning values are entered and used until retuning occurs again.

TUN+PV or SP+PV (Process Variable Disturbance)

The TUNE demand tuning or the SP tuning portions of these selections work as stated previously.

During process variable (PV) disturbances which result from non-linearities, process dynamics, load changes, or other operating conditions, PV adapt tuning will occur whenever a PV disturbance of 0.3 % span or larger occurs. When this condition exists, the controller monitors the process response to determine whether there has been a true process change or a momentary upset. It will take 1 and 1/2 process cycles around the setpoint before any process recognition can occur to an oscillating process.

However, if no oscillation occurs, Adaptive may alter the parameters to speed up or slow down the process response, if it determines the time to return to the SP is excessive or too fast (overshoot occurs).

For this configuration, the controller operates with only one set of tuning parameters for each loop. The second set, normally used for duplex output or for keyboard, PV or SP switching, is not used because Adaptive tune continually updates the tuning parameters based on the PV deviation.

PV Tuning Indications

A small **t** is displayed in the upper display whenever PV adapt mode is in progress. During this time, changes to the configuration parameters are permitted. Whenever the **t** is displayed it signifies that the process response is being monitored and this may or may not result in parameter retuning.

The selection of Fast or Normal criteria has no effect on PV adaptive tuning.

Aborting PV Adaptive Tuning

If it is necessary to stop or abort the tuning:

- Press the MANUAL/AUTO key to return to manual mode. This will cause an immediate abort of tuning.
- Disable SP or SP+PV in the Accutune Set Up group at function prompt ACCUTUNE or ACCUTUN2.

4.16 Entering a Security Code

The level of keyboard lockout may be changed in the Set Up mode. However, knowledge of a security code number (0 to 4095) may be required to change from one level of lockout to another. When a controller leaves the factory, it has a security code of 0, which permits changing from one lockout level to another without entering any other code number.

If you require the use of a security code, select a number from 0001 to 4095 and enter it when the lockout level is configured as NONE. Thereafter, that selected number must be used to change the lockout level from something other than NONE.

CAUTION Write the number on the Configuration Record Sheet in Appendix C so you will have a permanent record.

Table 4-25 Procedure to Enter a Security Code

Step	Operation	Press	Result
1	Enter Set Up Mode	**SET UP**	*Upper Display* = **SET UP** *Lower Display* = **TUNING**
2	Select any Set Up Group	**FUNCTION** **LOOP 1/2**	*Upper Display* = **0** *Lower Display* = **SECUR**
3	Security Code Entry	▲ or ▼	To enter a four digit number in the upper display (0001 to 4095) This will be your security code.

4.17 Carbon Potential

A carbon probe consisting of a ZrO2 sensor and a thermocouple (to measure the temperature at the sensor) provides two inputs to the controller. The controller computes the atmosphere's actual carbon potential from these two inputs and compares the computed value with the desired setpoint. An on-off or PID control algorithm determines the controller output necessary to keep the actual carbon potential at the setpoint. Usually only one output is used to add more or less enriching gas (typically natural gas) to the furnace's base atmosphere, which has a relatively low carbon potential.

The enriching gas then raises the carbon potential to the desired level; however, there are occasions when it is necessary to add dilution air to lower the carbon potential instead of enriching gas to raise it. In those instances, a second output from the controller provides this function. When proportional control is used, a different set of PID tuning constants is used for the dilution air than those used for the enriching gas.

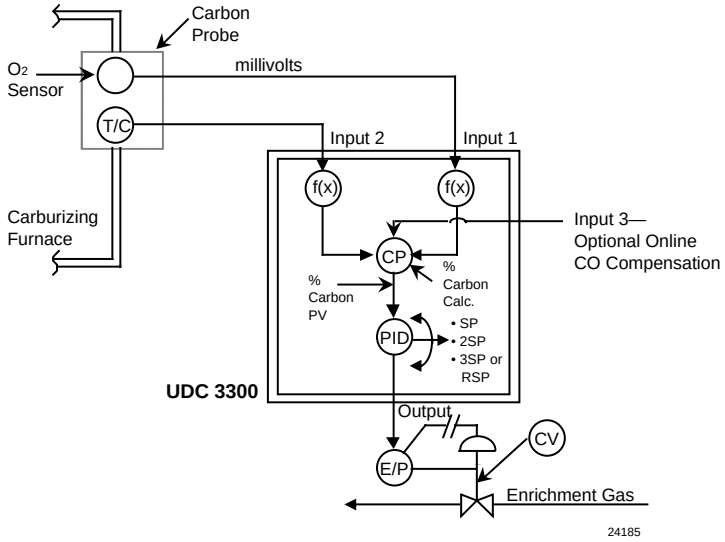


Figure 4-3 UDC 3300 Controller Being Used to Control the Carbon Potential of a Furnace's Atmosphere

The following rules apply for Carbon Potential control

- For Carbon control, set Input Algorithm 1 to the proper carbon sensor used and set the PV source to IN AL 1. Input 1 will automatically become CARBON.
- For % Oxygen control, set Input Algorithm 1 to OXYGEN. Input 1 will automatically become OXYGEN.
- For Dewpoint control, set Input Algorithm 1 or Input Algorithm 2 to DEW PT. Input 1 will automatically become CARBON. The availability of Dewpoint on Input Algorithm 2 provides the capability of controlling Carbon Potential on Loop 1 and also reading the Dewpoint value from the same probe.
- CO Compensation—Receives external CO transmitter signal via Input 3 to provide online compensation of the carbon calculation. Requires that the Input 2 temperature signal be a transmitter type input.

4.18 Health Watch

The HealthWatch feature puts diagnostic data at your fingertips so you can monitor vital performance status to improve your process, predict failures, and minimize downtime.

Valuable data regarding maintenance and diagnostic selections can be read by operator-accessed displays. Alarms can be configured to activate when the desired threshold is reached.

See Section 3.19 for details on configuring the various HealthWatch timers and counters. See Section 3.16 for details on HealthWatch maintenance alarms.

5. Setpoint Rate/Ramp/Soak Program Operation

5.1 Setpoint Ramp Rate

Introduction

When you have configured a Setpoint Ramp Rate, it will apply immediately to any local setpoint change.

Configuration Check

Make sure you:

- enable SP RATE for either loop
- disable SP RAMP and SP PROG
- set an upscale or downscale rate value

ATTENTION
A value of 0 will imply an immediate change in setpoint; that is, NO RATE applies. See *Section 3.5* for details.

Operation

When a local setpoint change is made, the controller will ramp from the original setpoint to the new one at the rate specified. This changing (current) setpoint can be viewed as SPn on the lower display.

Press the LOWER DISPLAY key until you see SPn and the setpoint value in the lower display.

5.2 Single Setpoint Ramp

Introduction

When you have configured a single setpoint ramp, it will occur between the current local setpoint and a final local setpoint over a time interval of from 1 to 255 minutes. You can RUN or HOLD the ramp at any time.

Configuration Check

Make sure you:

- enable SP RAMP for either loop
- disable SP RATE and SP PROG
- set the ramp time in minutes
- set the final setpoint value

See *Section 3.5* for details.

Operation

Running a Setpoint Ramp includes enabling, starting, holding, viewing the ramp time, and ending the ramp.

Table 5-1 Procedure for Running a Setpoint Ramp

Step	Operation	Press	Action
1	Enable the Setpoint Ramp function	**SET UP**	until you see SET UP in the Upper Display and SP RAMP in the Lower Display.
		FUNCTION **LOOP 1/2**	You will see DISABL or ENABLE in the Upper Display and SP RAMP in the Lower Display
		▲	until you see ENABLE in the Upper Display.
2	Put the controller into Automatic mode	**MANUAL** **AUTO**	until "A" indicator is ON and you will see: H and the PV value in the Upper Display. SP and the present setpoint value in the Lower Display.
3	Set Start Setpoint	**▲ or ▼**	until the **start setpoint value** you desire is indicated in the lower display:
4	Start the Ramp	**RUN** **HOLD**	You will see R and the PV value in the Upper Display and SP and the changing setpoint value in the Lower Display.
5	Hold/Run the Ramp	**RUN** **HOLD**	This holds the ramp at the current setpoint value. (SP can then be changed by the ▲ and ▼ keys.)
			Press again to continue run.
			ATTENTION Any time the local setpoint is different from the final setpoint value and the RUN/HOLD key is pressed, the ramp will start again.
6	View the remaining ramp time	**LOWER DISPLAY**	until you see: R or H and the PV value in the Upper Display. RAMP time remaining in the Lower Display.
7	End the Ramp		When the final setpoint is reached, the "R" changes to "H" in the upper display and the controller operates at the new setpoint.
8	Return to normal operating mode		After the SP Ramp has completed, disable the SP RAMP function, then press the LOWER DISPLAY key.

5.3 Setpoint Ramp/Soak Programming Option

Introduction

Setpoint Ramp/Soak Programming lets you configure six ramp and six soak segments to be stored for use as one program or several small programs. You designate the beginning and end segments to determine where the program is to start and stop.

Review Program Data and Configuration

The procedure for programming is straightforward and aided by prompts. We suggest that you read Table 5-2 which lists the program contents with an explanation of each to aid in configuration. Then refer to *Section 3.5 – SP Ramp, SP Rate, or SP Programming Set Up Group* to enable and configure the setpoint program.

ATTENTION

SP RATE and SP RAMP must be disabled to enable SP PROG (Setpoint Programming).

Fill Out the Worksheet

Referring to the example in Figure 5-1, draw a Ramp/Soak Profile on the worksheet provided in Figure 5-2 and fill in the information for each segment. This will give you a record of how the program was developed.

Operation

See Table 5-3 to run/monitor the program.

Power Outage

ATTENTION

If power is lost during a program, upon power-up the controller will be in hold and the setpoint value will be the setpoint value prior to the beginning of the setpoint program. The program is placed in hold at the beginning of the first segment in the program. The mode will be as configured under PWR MODE in the Control function group. (This applies to both loops.)

Table 5-2 Program Contents

Contents	Definition
Ramp Segments	A ramp segment is the time it will take to change the setpoint to the next setpoint value in the program. • Ramps are odd number segments. • Ramps are configured in either Time or Engineering Units per Minute or Engineering Units per Hour (see Ramp Unit below.) NOTE: Entering "0" will imply an immediate step change in setpoint to the next soak.
Ramp Unit	The Ramp Unit selection determines the engineering data units for the ramp segments. The selections are: • TIME = Hours:Minute (XX:XX) (*Range:* 0-99 hrs:0-59 min.) • EU/MIN = Degrees/Minute ***or*** EU/HR = Degrees/Hour (*Range:*0 to 999)
Soak Segments	A Soak Segment is a combination of soak setpoint (value) and a soak duration (time). • Soaks are even number segments. • The soak setpoint range value must be within the setpoint high and low range limits in engineering units. • Soak time is the duration of the soak and is determined in: TIME – Hours.Minutes *Range:* 0-99hrs.59min.
Start Segment	This designates the number of the first segment (Odd number). *Range:* 1 to 11
End Segment	This designates the number of the last Soak segment (Even Number). *Range:* 2 to 12
Recycle Number	This number allows the program to recycle to a specified number of times from beginning to end. *Range:* 0 to 99
Guaranteed Soak	Each soak segment can have a deviation value of from 0 to ±99 which guarantees the value for that segment. The value is the number in engineering units, above or below the setpoint, out side of which the timer halts. *Range:* 0 to ±99 Soak deviation values >0 guarantee that the soak segment's process variable is within the ± deviation for the configured soak time. Whenever the ± deviation is exceeded, soak timing is frozen. The guaranteed soaks feature is disabled whenever the deviation value is configured to 0.
Program State	This selection determines whether the program is in the Hold state or Disabled after completion of the program.
Program Termination State	This function determines the status of the controller upon completion. The selections are: • LASTSP = controls to last setpoint and last control mode • F SAFE = manual mode, failsafe output

Contents	Definition
Hot Start	This function determines whether LSP1 or PV is used as the setpoint when the program is initially changed from HOLD to RUN. The selections are: • DISABL = present LSP1 is default setpoint • ENABL = present PV value is used as beginning setpoint value for the ramp segment
Reset Program to Beginning	When enabled, this selection allows you to reset the program to the beginning or rerun it from the keyboard.

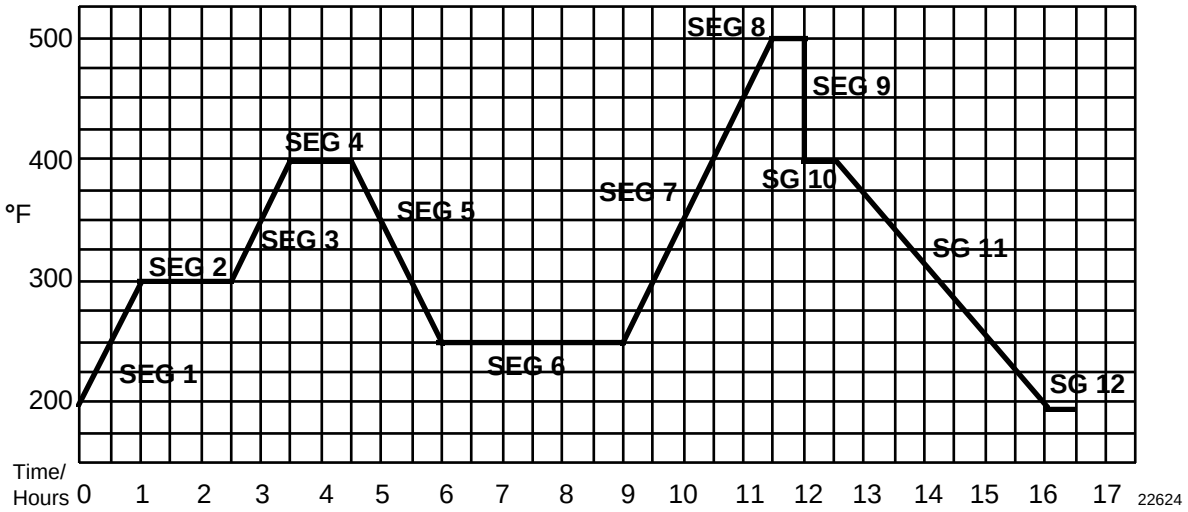


Figure 5-1 Ramp/Soak Profile Example

Prompt	Function	Segment	Value
STRT SEG	Start Seg.		1
END SEG	End Seg.		12
RAMP UNIT	Engr. Unit for Ramp		TIME
RECYCLES	Number of Recycles		2
SOAK DEV	Deviation Value		0
PROG END	Controller Status		LAST SP
STATE	Controller State at end		HOLD
KEYRESET	Reset SP Program		DISABL
HOTSTART	PV Hot Start Program Initialization or power up in SPP		DISABL
SEG1RAMP	Ramp Time	1	1 hr.
SEG2 SP	Soak SP	2	300
SEG2TIME	Soak Time	2	1hr.:30 min.
SEG3RAMP	Ramp Time	3	1hr.
SEG4 SP	Soak SP	4	400

Prompt	Function	Segment	Value
SEG4TIME	Soak Time	4	1 hr.
SEG5RAMP	Ramp Time	5	1hr.:30 min.
SEG6 SP	Soak SP	6	250
SEG6TIME	Soak Time	6	3hrs.:0min.
SEG7RAMP	Ramp Time	7	2hrs:30min.
SEG8 SP	Soak SP	8	500
SEG8TIME	Soak Time	8	0hr.:30 min.
SEG9RAMP	Ramp Time	9	0
SG10 SP	Soak SP	10	400
SG10 TIME	Soak Time	10	0hr.:30 min.
SG11RAMP	Ramp Time	11	3hrs:30min.
SG12 SP	Soak SP	12	200
SG12TIME	Soak Time	12	0hr.:30 min.

Program Record Sheet

Draw your ramp/soak profile on the record sheet shown in Figure 5-2 and fill in the associated information in the blocks provided. This will give you a permanent record your program and will assist you when entering the setpoint data.

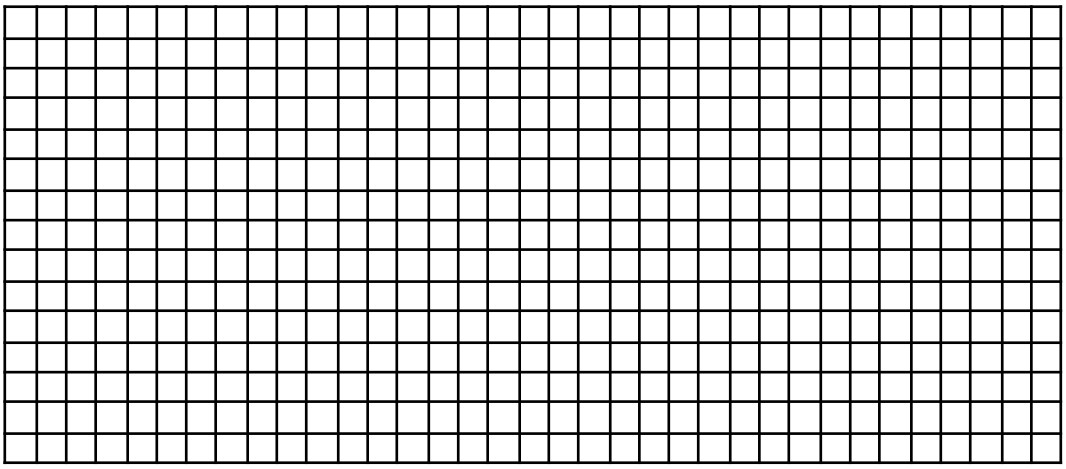


Figure 5-2 Program Record Sheet

Prompt	Function	Segment	Value
STRT SEG	Start Seg.		
END SEG	End Seg.		
RAMPUNIT	Engr. Unit for Ramp		
RECYCLES	Number of Recycles		
SOAK DEV	Deviation Value		
PROG END	Controller Status		
STATE	Controller State at end		
KEYRESET	Reset SP Program		
HOTSTART	PV Hot Start Program Initialization or power up in SPP		DISABL
SEG1RAMP	Ramp Time	1	
SEG2 SP	Soak SP	2	
SEG2TIME	Soak Time	2	
SEG3RAMP	Ramp Time	3	
SEG4 SP	Soak SP	4	

Prompt	Function	Segment	Value
SEG4TIME	Soak Time	4	
SEG5RAMP	Ramp Time	5	
SEG6 SP	Soak SP	6	
SEG6TIME	Soak Time	6	
SEG7RAMP	Ramp Time	7	
SEG8 SP	Soak SP	8	
SEG8TIME	Soak Time	8	
SEG9RAMP	Ramp Time	9	
SG10 SP	Soak SP	10	
SG10 TIME	Soak Time	10	
SG11RAMP	Ramp Time	11	
SG12 SP	Soak SP	12	
SG12TIME	Soak Time	12	

Run/Monitor Functions

Table 5-3 lists all the functions required to run and monitor the program.

Table 5-3 Run/Monitor Functions

Function	Press	Result
Set the Local Setpoint	**SETPOINT SELECT**	*Lower Display:* **SP**
	▲ or ▼	to set the Local Setpoint value to where you want the program to start out.
Run State	**RUN** **HOLD**	Initiates the setpoint program. An "**R**" appears in the upper display indicating that the program is running.
Hold State	**RUN** **HOLD**	Holds the setpoint program. An "**H**" appears in the upper display indicating that the program is in the HOLD state. The setpoint holds at the current setpoint.
External Hold DI = “To HOLD”		If Remote Switching (Digital Input option) is present on your controller, contact closure places the controller in the HOLD state, if the setpoint program is running. The "**H**" in the upper display will blink indicating external hold is in effect. Contact reopening runs program. NOTE: The keyboard takes priority over external switch for the RUN/HOLD function.
Changing a Segment While in Hold	▲ or ▼	These keys will operate and allow you to change the segment number while in HOLD. If a different segment is selected, it will be started at the beginning when placed in RUN. If the original segment is brought back, the program will continue from the point placed in HOLD. NOTE: Changing a segment number may affect the alarms/events.
External Program Reset “To BEGN”		If Remote Switching (Digital Input option) is present on your controller, contact closure resets the SP Program back to the start of the first segment. Program cycle number is not affected. Reopening the contact has no effect and places the program in HOLD mode. The setpoint is changed to what the setpoint was when the program was first started.
	RUN **HOLD**	restarts the Setpoint Program.

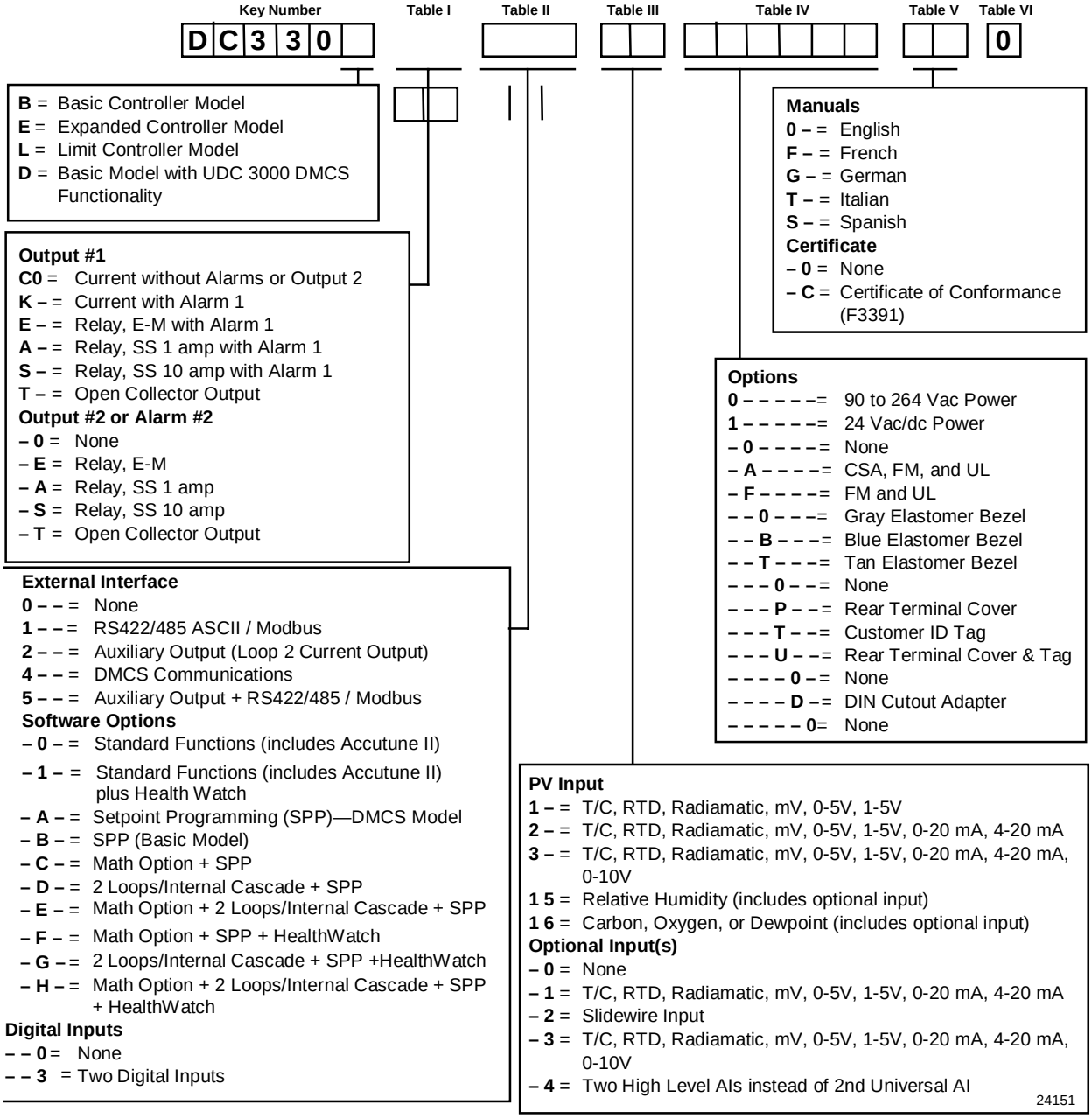
Function	Press	Result
Keyboard Reset	**LOWER DISPLAY**	until you see *Lower Display:* ToBEGN Press ▲ key to reset program to beginning at Hold state.
Viewing the Present Ramp or Soak Segment Number and Time	**LOWER DISPLAY**	until you see *Upper Display:* "R" and the PV value *Lower Display:* Ramp segments: # RA XX.XX Soak segments: # SK XX.XX # indicates the segment number (Ramp–odd only, Soak–even only) XX.XX Ramp Time – Hours.Minutes Ramp Rate – EU/MIN or EU/HR Soak Time – Hours.Minutes
Viewing the Number of Cycles Left in the Program	**LOWER DISPLAY**	until you see *Upper Display:* "R" and the PV value *Lower Display:* RECYC XX Number of cycles remaining in the setpoint program. XX = 0 to 99
End Program		When the final segment is completed, the "R" in the upper display either changes to "H" (if configured for HOLD state) or disappears (if configured for disable of setpoint programming). The controller operates at the last setpoint in the program in automatic or will be in manual mode at the failsafe output.
Disable Program		See *Section 3.5* for details.

6. Appendix A – Environmental and Operating Conditions

Parameter	Reference	Rated	Operative Limits	Transportation and Storage
Ambient Temperature	25 °C ± 3 °C 77 °F ± 5 °F	15 °C to 55 °C 58 °F to 131 °F	0 °C to 55 °C 32 °F to 131 °F	–40 °C to 66 °C –40 °F to 151 °F
Relative Humidity	10 to 55*	10 to 90*	5 to 90*	5 to 95*
Vibration				
Frequency (Hz)	0	0 to 70	0 to 200	0 to 200
Acceleration (g)	0	0.4	0.6	0.5
Mechanical Shock				
Acceleration (g)	0	1	5	20
Duration (ms))	0	30	30	30
Voltage (Vdc)	+24 ± 1	20 to 27	20 to 27	- -
Voltage (Vac)				
90 to 240 Vac	120 ± 1 240 ± 2	90 to 240	90 to 264	- - - -
24 Vac	24 ± 1	20 to 27	20 to 27	- -
Frequency (Hz)	50 ± 0.2	49 to 51	48 to 52	- -
(For Vac)	60 ± 0.2	59 to 61	58 to 62	- -
Power Consumption	18 VA maximum (90 to 264 Vac) 12 VA maximum (24 Vac/dc)			
Input Accuracy	± 0.20 % of span typical (± 1 digit for display) Field calibratable to ± 0.05 % of span typical 15-bit resolution typical			
CE Conformity Special Conditions (Europe)	Shielded twisted pair cables are required for all analog I/O, process variable, RTD, thermocouple, dc millivolt, low level signal, 4-20 mA, digital I/O, and computer interface circuits. *Refer to 51-52-05-01, How to Apply Digital Instrumentation in Severe Electrical Noise Environments, for additional information.*			

* The maximum rating only applies up to 40 °C (104 °F). For higher temperatures, the RH specification is derated to maintain constant moisture content.

7. Appendix B – Model Selection Guide



8. Appendix C – Configuration Record Sheet

Enter the value or selection for each prompt on this sheet so you will have a record of how your controller was configured.

Group Prompt	Function Prompt	Value or Selection	Factory Setting
TUNING	PROP BD	_____	—
	or		
	GAIN	_____	1.000
	or		
	GAINVALn	Read Only	—
	RATE MIN	_____	0.00
	RSET MIN	_____	1.00
	or		
	RSET RPM	_____	—
	MAN RSET	_____	0
	PROPBD2	_____	—
	or		
	GAIN 2	_____	1.000
	RATE2MIN	_____	0.00
	RSET2MIN	_____	1.00
	or		
	RSET2RPM	_____	—
	CYC SEC	_____	20
	or		
	CYC SX3	_____	20
	CYC2 SEC	_____	20
	or		
	CYC2 SX3	_____	20
	SECURITY	_____	0
	LOCKOUT	_____	CALIB
	AUTO MAN	_____	ENABLE
	SP SEL	_____	ENABLE
	RUN HOLD	_____	ENABLE
	PVEUVAL1	_____	0
	PVEUVAL2	_____	0
	PVEUVAL3	_____	0
	PVEUVAL4	_____	0
	PVEUVAL5	_____	0
	PVEUVAL6	_____	0
	PVEUVAL7	_____	0
	PVEUVAL8	_____	0
	GAINVAL1	_____	1.000
	GAINVAL2	_____	1.000
	GAINVAL3	_____	1.000
	GAINVAL4	_____	1.000
	GAINVAL5	_____	1.000
	GAINVAL6	_____	1.000
	GAINVAL7	_____	1.000
	GAINVAL8	_____	1.000

Group Prompt	Function Prompt	Value or Selection	Factory Setting
TUNING2	PROPBD3	_____	—
	or		
	GAIN 3	_____	1.000
	or		
	GAINVALn	Read Only	—
	RATE3MIN	_____	0.00
	RSET3MIN	_____	1.00
	or		
	RSET3RPM	_____	—
	MANRSET3	_____	0
	PROPBD4	_____	—
	or		
	GAIN 4	_____	1.000
	RATE4MIN	_____	0.00
	RSET4MIN	_____	1.00
	or		
	RSET4RPM	_____	—
	CYC3 SEC	_____	20
	or		
	CYC3 SX3	_____	20
	CYC4 SEC	_____	20
	or		
	CYC4 SX3	_____	20
	PVEUVAL1	_____	0
	PVEUVAL2	_____	0
	PVEUVAL3	_____	0
	PVEUVAL4	_____	0
	PVEUVAL5	_____	0
	PVEUVAL6	_____	0
	PVEUVAL7	_____	0
	PVEUVAL8	_____	0
	GAINVAL1	_____	1.000
	GAINVAL2	_____	1.000
	GAINVAL3	_____	1.000
	GAINVAL4	_____	1.000
	GAINVAL5	_____	1.000
	GAINVAL6	_____	1.000
	GAINVAL7	_____	1.000
	GAINVAL8	_____	1.000

Group Prompt	Function Prompt	Value or Selection	Factory Setting
SP RAMP	SP RAMP	_____	DISABL
	TIME MIN	_____	3
	FINAL SP	_____	1000
	PV		DISABL
	HOTSTART	_____	
	SP RATE	_____	DISABL
	EU/HR UP	_____	0
	EU/HR DN	_____	0
	EU/HRUP2	_____	0
	EU/HRDN2	_____	0
	SP PROG	_____	DISABL
ACCUTUNE	FUZZY	_____	DISABL
	ACCUTUNE	_____	DISABL
	ACCUTUN2	_____	DISABL
	SP CHANG	_____	10
	KPG	_____	1.00
	SP CHAN2	_____	10
	KPG 2	_____	1.00
	CRITERIA	_____	FAST
	CRITERA2	_____	FAST
	AT ERROR or AT ERR 2	Read Only	
ALGORTHM	CONT ALG	_____	PID A
	PIDLOOPS	_____	1 or 2
	CONT2ALG	_____	PID A
	OUT OVRD	_____	DISABL
	TIMER	_____	DISABL
	PERIOD	_____	0.01
	START	_____	KEY
	L DISP	_____	TI REM
	INP ALG1	_____	NONE
	MATH K	_____	—
	CALC HI	_____	—
	CALC LO	_____	—
	ALG1 INA	_____	—
	ALG1 INB	_____	—
	ALG1 INC	_____	—
	ALG1BIAS	_____	0.00
	PCO SEL	_____	DISABL
	PCT CO	_____	0.200
	ATM PRES	_____	760.0
	INP ALG2	_____	NONE
	MATH K2	_____	—
	CALC HI	_____	—
	CALC LO	_____	—
	ALG2 INA	_____	—
	ALG2 INB	_____	—
	ALG2 INC	_____	—
	ALG2BIAS	_____	0.00

Group Prompt	Function Prompt	Value or Selection	Factory Setting
	PCTH2	_____	1.0
	8SEG CH1	_____	DIASBL
	X0 VALUE	_____	0
	X1 VALUE	_____	0
	X2 VALUE	_____	0
	X3 VALUE	_____	0
	X4 VALUE	_____	0
	X5 VALUE	_____	0
	X6 VALUE	_____	0
	X7 VALUE	_____	0
	X8 VALUE	_____	0
	Y0 VALUE	_____	0
	Y1 VALUE	_____	0
	Y2 VALUE	_____	0
	Y3 VALUE	_____	0
	Y4 VALUE	_____	0
	Y5 VALUE	_____	0
	Y6 VALUE	_____	0
	Y7 VALUE	_____	0
	Y8 VALUE	_____	0
	PCT H2	_____	—
	8SEG CH2	_____	DISABL
	X0 VALU2	_____	0
	X1 VALU2	_____	0
	X2 VALU2	_____	0
	X3 VALU2	_____	0
	X4 VALU2	_____	0
	X5 VALU2	_____	0
	X6 VALU2	_____	0
	X7 VALU2	_____	0
	X8 VALU2	_____	0
	Y0 VALU2	_____	0
	Y1 VALU2	_____	0
	Y2 VALU2	_____	0
	Y3 VALU2	_____	0
	Y4 VALU2	_____	0
	Y5 VALU2	_____	0
	Y6 VALU2	_____	0
	Y7 VALU2	_____	0
	Y8 VALU2	_____	0
	TOTALIZE	_____	DISABL
	ΣXXXXXXX	_____	—
	TOT SCAL	_____	E0
	TOT SEC	_____	UNLOCK
	Σ RSET ?	_____	NO
	TOT RATE	_____	SECOND

Group Prompt	Function Prompt	Value or Selection	Factory Setting
OUT ALG	OUT ALG	_____	CURRNT
	4-20 RNG	_____	100PCT
	OUT2 ALG	_____	CURRNT
	RLYSTATE	_____	1OF2ON
	RLY TYPE	_____	MECHAN
INPUT 1	IN1 TYPE	_____	0-10mV
	XMITTER1	_____	LINEAR
	ANALYT	_____	NONE
	IN1 HI	_____	1000
	IN1 LO	_____	0
	RATIO 1	_____	1.00
	BIAS IN1	_____	0
	FILTER 1	_____	0
	BURNOUT1	_____	NONE
	EMISSIV1	_____	0.00
INPUT 2	IN2 TYPE	_____	0-10mV
	XMITTER2	_____	LINEAR
	ANALYT	_____	NONE
	IN2 HI	_____	1000
	IN2 LO	_____	0
	RATIO 2	_____	1.00
	BIAS IN2	_____	0
	FILTER 2	_____	0
	BURNOUT2	_____	NONE
	EMISSIV2	_____	0.00
INPUT 3	IN3 TYPE	_____	DISABL
	XMITTER3	_____	LINEAR
	IN3 HI	_____	1000
	IN3 LO	_____	0
	RATIO 3	_____	1.00
	BIAS 3	_____	0
	FILTER 3	_____	0
CONTROL	PV SOURC	_____	INP 1
	PID SETS	_____	1 ONLY
	SW VALUE	_____	0.00
	LSP'S	_____	1 ONLY
	RSP SRC	_____	NONE
	AUTOBIAS	_____	DISABL
	SP TRACK	_____	NONE
	PWR MODE	_____	MANUAL
	PWR OUT	_____	LAST
	SP HiLIM	_____	1000
	SP LoLIM	_____	0
	ACTION	_____	REVRSE
	OUT RATE	_____	DISABL
	PCT/M UP	_____	0
	PCT/M DN	_____	0
	OUTHiLIM	_____	100
	OUTLoLIM	_____	0
	I Hi LIM	_____	100.0
	I Lo LIM	_____	0.0
	DROPOFF	_____	0
	DEADBAND	_____	1.0
	OUT HYST	_____	0.5
	FAILMODE	_____	NO LAT
	FAILSAFE	_____	0.0
	MAN OUT	_____	—
	AUTO OUT	_____	—
	PBorGAIN	_____	GAIN
	MINorRPM	_____	MIN
CONTROL2	PV2 SRC	_____	INP 2
	FORCE MA	_____	DISABL
	PID SETS	_____	1 ONLY
	SW VALUE	_____	0.00
	LSP'S	_____	1 ONLY
	RSP SRC	_____	NONE
	AUTOBIAS	_____	DISABL
	SP TRACK	_____	NONE
	SP HiLIM	_____	1000
	SP LoLIM	_____	0
	ACTION	_____	REVRSE
	OUT RATE	_____	DISABL
	PCT/M UP	_____	0
	PCT/M DN	_____	0
	OUTHiLIM	_____	100
	OUTLoLIM	_____	0
	I Hi LIM	_____	100.0
	I Lo LIM	_____	0.0
	DROPOFF	_____	0
	DEADBAND	_____	1.0
	FAILMODE	_____	NO LAT
	FAILSAFE	_____	0.0
OPTIONS	AUX OUT	_____	DISABL
	or		
	CUR OUT2	_____	DISABL
	4mA VAL	_____	0.0
	20mA VAL	_____	0
	DIG IN 1	_____	NONE
	DIG1 COM	_____	DISABL
	DIG IN 2	_____	NONE
	DIG2 COM	_____	DISABL

Group Prompt	Function Prompt	Value or Selection	Factory Setting
COM	ComSTATE	_____	DISABL
	Com ADDR	_____	0
	ComADDR2	_____	0
	SHEDENAB	_____	DOSABL
	SHEDTIME	_____	0
	PARITY	_____	ODD
	BAUD	_____	2400
	DUPLEX	_____	HALF
	WS FLOAT	_____	FP b
	TX DELAY	_____	1
	SHEDMODE	_____	LAST
	SHED SP	_____	TO LSP
	UNITS	_____	PERCNT
	CSP RATO	_____	1.0
	CSP BIAS	_____	0
	CSP2RATO	_____	1.0
	CSP2BIAS	_____	0
	LOOPBACK	_____	DISABL
ALARMS	A1S1 VAL	_____	90
	A1S2 VAL	_____	10
	A2S1 VAL	_____	95
	A2S2 VAL	_____	5
	A1S1TYPE	_____	NONE
	A1S2TYPE	_____	NONE
	A2S1TYPE	_____	NONE
	A2S2TYPE	_____	NONE
	A1S1 H L	_____	HIGH
	A1S1 EV	_____	--
	A1S2 H L	_____	LOW
	A1S2 EV	_____	--
	A2S1 H L	_____	HIGH
	A2S1 EV	_____	--
	A2S2 H L	_____	LOW
	A2S2 EV	_____	--
	AL HYST	_____	0.1
	ALM OUT1	_____	NO LAT
	BLOCK	_____	DISABL
DISPLAY	DECIMAL	_____	XXXX
	DECIMAL2	_____	XXXX
	TEMPUNIT	_____	NONE
	PWR FREQ	_____	60 HZ
	RATIO 2	_____	DISABL
	LANGUAGE	_____	ENGLIS
MAINTEN	TIME 1	_____	DISABL
	TIME 2	_____	DISABL
	TIME 3	_____	DISABL
	COUNTER1	_____	DISABL
	COUNTER2	_____	DISABL
	COUNTER3	_____	DISABL
	PASSWORD	_____	0
	RESTYPE	_____	NONE

9. Appendix D – Position Proportional Calibration

9.1 Position Proportional Control Output Calibration

Introduction

When the UDC 3300 controller has a Position Proportional control output, calibrate the controller so that the increase and decrease relays operate properly with respect to the position of the external feedback slidewire.

Three Position Step Control Output Models **with** Motor Position Indication

(Model Numbers DC330X-EE-XXX-X2, DC330X-AA-XXX-02)

This model must have its output calibrated per the entire procedure to ensure the displayed output (slidewire position) agrees with the final control element position.

Three Position Step Control Output Models **without** Motor Position Indication

(Model Numbers DC330X-EE-XXX-X0, DC330X-AA-XXX-X0)

This model only requires that the “Motor Time” be entered as shown in the calibration procedure. FULL CALIBRATION IS NOT REQUIRED

Procedure

Apply power and allow the controller to warm up 30 minutes before you calibrate. Leave all field wiring connected to the rear terminals.

There are two ways in which to calibrate Position Proportional or 3 Position Step control: AUTO mode or MANUAL mode.

Rules for auto mode vs manual mode

The Auto-mode selection must be done at least once before the manual mode will operate properly. Failure to use the Auto-mode procedure will prevent the controller from going into automatic control mode.

During the Auto-mode calibration procedure, the values being displayed are used only to indicate if the motor is still traveling. To view the actual calibration value, use the manual mode after the Auto-mode is completed. These values can be changed for purposes of tweaking the calibration.

Make sure LOCKOUT in Tuning Set Up group is set to NONE.

For *Three Position Step Control Output models **without** Motor Position Indication,* do steps 1 and 2 only.

For *Position Proportional Output* and *Three Position Step Control Output models **with** Motor Position Indication,* follow the entire calibration procedure.

ATTENTION These prompts *only* appear when position OUT ALG is selected. If motor position for 3PSTEP is desired, first configure unit for “position.” After calibration the unit can be switched to 3PSTEP.

Table 9-1 Calibration Procedure

Step	Operation	Press	Action
1	Enter Calibration Mode	**SETUP**	until you see *Upper Display:* CALIB *Lower Display:* POS PROP
2	Set Motor Traverse Time	**FUNCTION LOOP 1/2**	Until you see *Upper Display:* (A value) *Lower Display:* MTR TIME NOTE: This is the time it takes the motor to travel from 0 to 100%.
3		**▲ or ▼**	until the proper motor stroke time is reached (see the motor specs or measure the time) Range of setting = 5 to 1800 Seconds
4	Select Automatic or Manual Calibration	**FUNCTION LOOP 1/2**	Until you see You can calibrate the controller output **manually** or let the controller calibrate the output **automatically**. If the slidewire has never been calibrated, you must use DO AUTO first. In the “Automatic Calibration Mode” (DO AUTO), the controller relays automatically move the motor in the proper direction. If desired, however, the motor may be manually positioned to 0% and 100% positions. Disconnect the relay wires. Use DO MAN. In the “Manual Calibration Mode” (DO MAN), the motor does not move. Instead, the existing 0% and 100% values may be changed with the ▲ or ▼ key.
5		**▲ or ▼**	to select automatic or manual calibration. *Upper Display:* DO AUTO or DO MAN *Lower Display:* POS PROP

If you select…	Then…
DO AUTO	go to Step 6
DO MAN	go to Step 8

ATTENTION When calibration is terminated, this selection reverts to DISABL.

Step	Operation	Press	Action
6	DO AUTO Set 0% value	**FUNCTION** **LOOP 1/2**	The decrement relay is turned on to move the motor to 0% position. *Upper Display:* (Counts of Feedback Slidewire-0 to 3000) *Lower Display:* ZERO VAL When the motor stops, the display should stop counting, then go to the next step.
7	DO AUTO Set 100% value	**FUNCTION** **LOOP 1/2**	The increment relay is turned on to move the motor to 100% position. *Upper Display:* (Counts of Feedback Slidewire-0 to 3000) *Lower Display:* SPAN VAL When the motor stops, the display should stop counting, then go to step 12.
8	DO MAN Set 0% value	**FUNCTION** **LOOP 1/2**	You will see: *Upper Display:* (The existing zero calibration value in counts) *Lower Display:* ZERO VAL
9		**▲ or ▼**	until the desired zero value is reached in the upper display. *Upper Display:* (The desired zero value) *Lower Display:* ZERO VAL
10	DO MAN Set 100% value	**FUNCTION** **LOOP 1/2**	The controller will store the 0% value and you will see: *Upper Display:* (The existing span calibration value in counts) *Lower Display:* SPAN VAL
11		**▲ or ▼**	until the desired span value is reached in the upper display. *Upper Display:* (The desired span value) *Lower Display:* SPAN VAL For manual calibration, the motor does not move from its position prior to the start of Position Proportional calibration.
12	Exit the Calibration Mode	**FUNCTION** **LOOP 1/2**	The controller will store the 100% value.
		LOWER DISPLAY or **SETUP**	To exit the calibration mode.

10. Appendix E – Input Ranges

PV Input	Range	
	°F	°C
Thermocouples (Per ITS-90)		
B	0 to 3300	–18 to 1816
E	–454 to 1832	–270 to 1000
E (low)	–200 to 1100	–129 to 593
J	0 to 1600	–18 to 871
J (low)	20 to 770	–7 to 410
K	0 to 2400	–18 to 1316
K (low)	–20 to 1000	–29 to 538
NiNiMoly (NNM68)	32 to 2500	0 to 1371
NiNiMoly (low)	32 to 1260	0 to 682
NiMo-NiCo (NNM90)	32 to 2500	0 to 1371
NiMo-NiCo (low)	32 to 1260	0 to 682
Nicrosil Nisil (NIC)	0 to 2372	–18 to 1300
R	0 to 3100	–18 to 1704
S	0 to 3100	–18 to 1704
T	–300 to 700	–184 to 371
T (low)	–200 to 500	–129 to 260
W5W26	0 to 4200	–18 to 2315
W5W26 (low)	0 to 2240	–18 to 1227
Honeywell Radiamatic		
Type RH	0 to 3400	–18 to 1871
Type RI	0 to 9999 max.*	–18 to 9999 max.*
RTD IEC Alpha = 0.00385		
100 ohms	–300 to 1200	–184 to 649
100 ohms (low)	–300 to 300	–184 to 149
200 ohms	–300 to 1200	–184 to 649
500 ohms	–300 to 1200	–184 to 649
Linear		
Milliamps	4 to 20 mA 0 to 20 mA	
Millivolts	0 to 10 mV 0 to 50 mV	
Volts	1 to 5 V 0 to 5 V 0 to 10 V	
Carbon	0 to 1250 mV	
Oxygen	–30 to510 mV	

*User enters the range manually per RI type and application.

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