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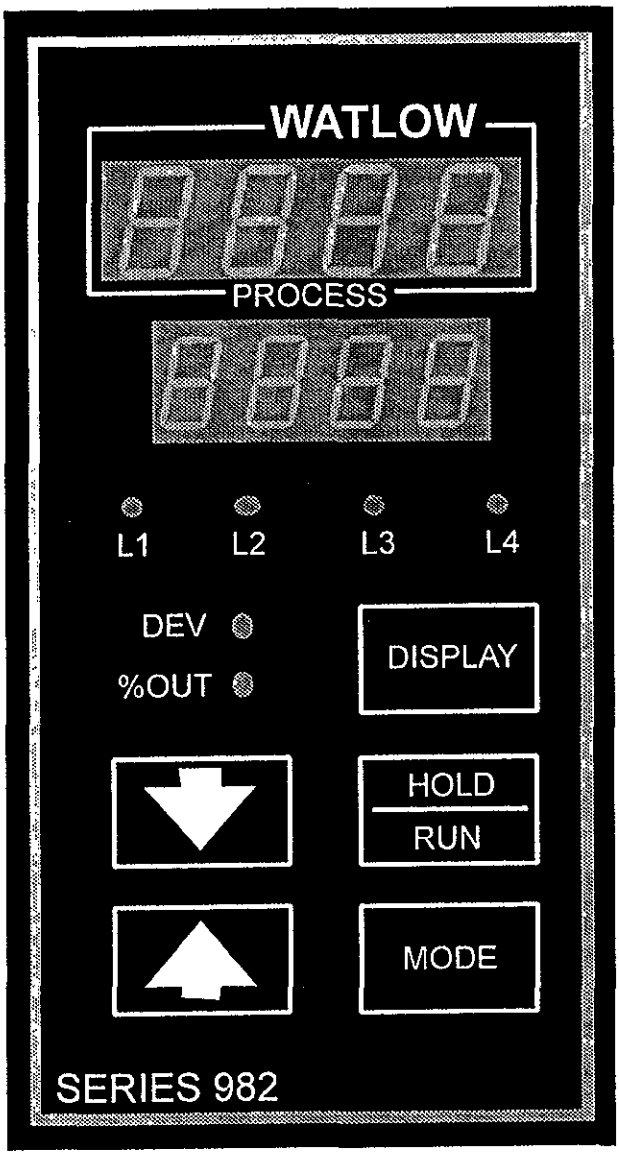
Instruction Manual for the Despatch/Watlow 982 Control



Notice

Users of this equipment must comply with operating procedures and training of operation personnel as required by the Occupational Safety and Health Act (OSHA) of 1970, Section 6 and relevant safety standards, as well as other safety rules and regulations of state and local governments. Refer to the relevant safety standards in OSHA and National Fire Protection Association (NFPA), section 86 of 1990.

Caution

Setup and maintenance of the equipment should be performed by qualified personnel who are experienced in handling all facets of this type of system. Improper setup and operation of this equipment could cause an explosion that may result in equipment damage, personal injury or possible death.

Dear Customer,

Thank you for choosing Despatch Industries. We appreciate the opportunity to work with you and to meet your heat processing needs. We believe that you have selected the finest equipment available in the heat processing industry.

At Despatch, our service does not end after the purchase and delivery of our equipment. For this reason we have created the Service Products Division within Despatch. The Service Products Division features our Response Center for customer service. The Response Center will direct and track your service call to ensure satisfaction.

Whenever you need service or replacement parts, contact the Response Center at 1-800-473-7373: FAX 612-781-5353.

Thank you for choosing Despatch.

Sincerely,

Despatch Industries

PREFACE

The INTRODUCTION section provides an overview of the control.

The THEORY OF OPERATION section details the function and operation of the control.

The INSTRUCTIONS section provides details on unpacking, installing, operating and maintaining the control.

The APPENDIX section contains Special Instructions for operating the control instrument and a Troubleshooting Table.

An efficient way to learn about the control would be to read the manual while working with the control. This will give you practical hands-on experience with information in the manual and the control.

While reading this manual, if a term or section of information is not fully understood, look up that item in the appropriate section. Then go back and reread that section. Information skipped, not understood or misunderstood could create the possibility of operating the equipment in an unsafe manner. This could cause damage to the oven or personnel or reduce the efficiency of the equipment.

NOTE:
Read the entire INTRODUCTION and THEORY OF OPERATION before installing the oven.

WARNING:
Failure to heed warnings in this instruction manual and on the oven could result in death, personal injury or property damage.

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INTRODUCTION

The Watlow manual has sample programs written for an imaginary unit and default parameter values that are different from those entered by Despatch. Do not use the Watlow sample program on this equipment.

NOTE:
Your control has already been configured at Despatch. Use this manual as a guide to typical settings.

This INTRODUCTION section provides an overview of the Watlow controller.

The microprocessor based single loop controller is capable of measuring, displaying and controlling temperature, flow and level from a variety of inputs.

The controller is easy to use. Control functions, alarm settings and other parameters are easily entered through the front keypad. All user's data can be protected from unauthorized changes with its SETUP mode security system. Battery back-up protects against data loss during AC power outages.

CAUTION:
Before making changes to your controller consult with Despatch Industries Service Products at 1-800-473-7373.

Parameter values have been entered at the factory. Do not change the Despatch parameter values until you determine by test that they need updating. Make a permanent copy of the Despatch tune and program configuration parameters before any changes are made.

Do not cold start your control as suggested in the Watlow manual. This will delete factory installed parameter values and the Despatch sample program.

In this application the controller has been factory configured to control temperature and humidity conditions in your Despatch chamber. Under normal conditions, you should not have to re-program this controller. We have, however, included re-programming instructions in this manual to help guide you through that process if it should become necessary.

INSTRUCTIONS

Functional Description

After 1 minute with no key activations, the control reverts to the display loop. The process value appears in the upper display and the set point is in the lower display.

Table 1 Keys and Display Description

Keys and Displays	Description
Upper Display	Indicates either actual process value, the operating prompt values, or error codes. When powering up, the process display will be blank for 3 seconds.
Dev LED	When lit, the deviation from the current set point is shown in the lower display.
% Out LED	When lit, the current percent output is shown in the lower display.
▲ Key	Increases the value of the displayed prompt. A light touch increases the value by one. Holding the key down increases the value at a rapid rate. New data is self entering in 5 seconds or once the **MODE** key or **DISPLAY** key is pressed.
▼ Key	Decreases the value of the displayed prompt. A light touch decreases the value by one. Holding the key down decreases the displayed value at a rapid rate. New data is self entering in 5 seconds or once the **MODE** key or **DISPLAY** key is pressed.
▲ key and ▼ key	When pressed simultaneously for 3 seconds, the setup (**SEt**) prompt appears. Continue to press the ▲ key and the ▼ key for another 3 seconds and the factory (**Fcty**) prompt appears.
MODE Key	Steps the control through the menus. New data is entered once the **MODE** key is pressed.
MODE and ▲ key	To move backwards through the menus, hold ▼ key and the **MODE** key, then press the ▲ key to scroll. The **MODE** key must be pressed first and held before the ▲ key will begin scrolling. Scrolling is disabled once the keys are released or you reach the top of the menu.
Lower Display	Indicates the set point, deviation, percent power temperature unit, menu prompts, or alarm codes.
L1, L2, L3, L4	When lit, these LEDs indicate when Output #1, #2, #3 or #4 are active, respectively. Outputs on are configured as: Ot1 - Heat Control, Ot2 - Heat Control, Ot3 - Event or Alarm, Ot4 - Communications Flashes on transmit and receive.
DISPLAY Key	Pressing this key enters the display loop. The **DISPLAY** key can be pressed at any time to return to this loop. For more information on the display loop, see the next page.
HOLD/RUN Key	Pressed once, it clears a latched alarm without altering the Hold/Run status.
HOLD/RUN LED	Lit when the control is running. When blinking, press the **HOLD/RUN** key again to begin running.

Operating Controller in Manual Mode

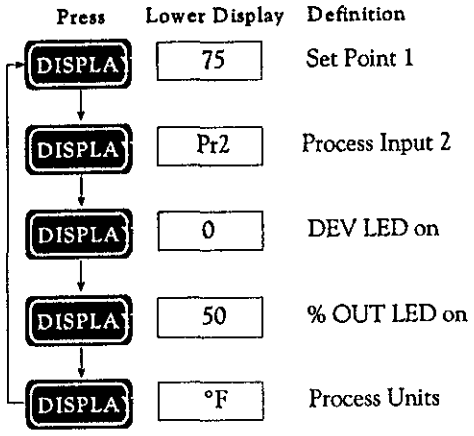

Figure 1 illustrates the display loop.

The W982 is easily used to control a constant setpoint.

1. Power up the controller. The W982 controls a constant setpoint. When the instrument first lights up, the lower display shows the current setpoint (a numeric value) and is in the display loop mode.

   (If the lower display is not numeric or does not respond to the ▲ or ▼ keys then press the **MODE** key followed by the **DISPLAY** key.

2. Press the ▲ key or ▼ key until the desired temperature setpoint is shown. The new setpoint will take effect after a few seconds.

Follow these instructions to turn events on and off while in the display mode.

1. Press the **MODE** key until the event appears in the lower display (ex. **Ent3**)

2. Use the ▼ key and the ▲ key to turn it off or on.

3. Press the **DISPLAY** key to return to the manual mode.

4. Press the **DISPLAY** key repeatedly to view the display loop.

Operating Controller as a Setpoint Profiler

To use your Watlow 982 as a setpoint profiler, first create your profile. Chapter 7 of the Watlow supplied manual explains how to enter your own profile. In addition, Despatch has entered a sample profile for your own use in self-training.

Remember, do not cold start your control. You will lose the set-up variables entered by the Despatch factory and the tuning variables which are good general values. The set-up and tuning variables entered at the Despatch factory are specifically for your unit and are not the same as the Watlow default settings.

Also remember that the sample program in the Watlow manual is for an imaginary piece of equipment and may not work on your chamber.

How to Start a W982 Profile

To run the entered profile (or your own):

1. First press the **HOLD/RUN** key. The lower display shows **FiLE.**

2. Use the ▲ or ▼ arrows to find the file you wish to begin profile with. Options are 1 to 4. Press **MODE** when the desired file is shown.

3. The lower display now indicates **StEP.** Press the ▲ or ▼ arrow key until the desired starting step is shown.

4. Press the **HOLD/RUN** key again when the desired step number is shown. The **RUN** LED will stay on without blinking.

How to Stop or Abort a Profile/File

1. Press the **HOLD/RUN** key to place the controller in the hold mode.

2. The **RUN** LED will turn off.

How to Stop or Abort a Profile/File (Cont.)

To resume the halted profile:

1. Press the **HOLD/RUN** key.
2. Press the **MODE** key until the **rESU** parameter is shown.
3. Press the **HOLD/RUN** key again.

Operating Controller in Program Mode

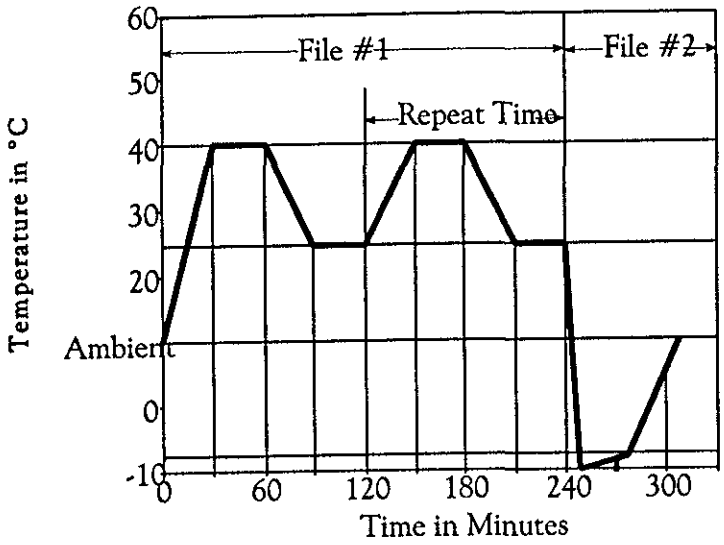

Figure 2 illustrates the program mode.

The program mode is used to create a profile/file. The series 982 is capable of storing 4 profiles of up to 6 steps each.

1. If the **RUN** LED is on, press the **HOLD/RUN** key to place the controller in the hold mode.

2. Press the **MODE** key until the **OPEr** is displayed in the lower display.

3. Press the ▲ or ▼ arrow keys until **Pro9** is shown in the upper display.

4. Press the **MODE** key. The lower display will show **File** and the upper display a number such as 1 through 4.

5. Press the ▲ or ▼ key to change to the number of the profile/file you wish to change.

6. Press the **MODE** key once you have the number assigned. **StEP** will be displayed in the lower display and 1 in the upper.

Programming (Cont.)

7. Press the **MODE** key.

8. Press the ▲ or ▼ arrow keys. One of the following step types will be displayed as you scroll through.

   - Setpoint (**StPt**)
   - Jump Loop (**JL**)
   - Soak (also Wait for) (**SoAH**)
   - End (**END**)
   - Link (**LfiL**)

9. Press **MODE** to select the step type you desire.

If you want more details on step types, refer to the Watlow manual (especially chapter 7). The following sample program shows how to use the typical program steps.

NOTE:
The jump loop is not active in step 1.

Sample Program

The sample program demonstrates the function of the unit. It is pre-programmed in the factory and available for you to run upon installation of your chamber. The sample program ramps from ambient to 40°C over a 30 minute period, holds 40 for 30 minutes, then ramps to 25°C over another 30 minute period. This is held for 30 minutes. The above process is repeated using a jump step. The chamber is then ramped as quickly as possible to -10°C. The **WPr** (wait for process stops the program until -8°C is reached. Then it is held for 30 minutes. Finally, the chamber is returned to ambient and ends.

Sample Step Chart

File# 1	Step Type	Set Point	Time			On Events Off	Values	
Step # 1	☒ StPt	SP 40.0	HOUr	Min 30	SEC	Ent1		
			rAtE					
	☐ SoAH		HOUr	Min	SEC	Ent1	WE	WPr
	☐ JL						JS	JC
	☐ LFiL						LFiL	
	☐ End						End	

Ramp to 40°C over 30 minutes.

File# 1	Step Type	Set Point	Time			On Events Off	Values	
Step # 2	☐ StPt	SP	HOUr	Min	SEC	Ent1		
			rAtE					
	☒ SoAH		HOUr	Min 30	SEC	Ent1	WE	WPr
	☐ JL						JS	JC
	☐ LFiL						LFiL	
	☐ End						End	

Hold at 40°C for 30 minutes.

File# 1	Step Type	Set Point	Time			On Events Off	Values	
Step # 3	☒ StPt	SP 25°	HOUr	Min 30	SEC	Ent1		
			rAtE					
	☐ SoAH		HOUr	Min	SEC	Ent1	WE	WPr
	☐ JL						JS	JC
	☐ LFiL						LFiL	
	☐ End						End	

Ramp back to 25°C over 30 minutes.

File# 1	Step Type	Set Point	Time			On Events Off	Values	
Step # 4	☐ StPt	SP	HOUr	Min	SEC	Ent1		
			rAtE					
	☒ SoAH		HOUr	Min 30	SEC	Ent1	WE	WPr
	☐ JL						JS	JC
	☐ LFiL						LFiL	
	☐ End						End	

Hold 25°C for 30 minutes.

File# 1	Step Type	Set Point	Time			On Events Off	Values	
Step # 5	☐ StPt	SP	HOUr	Min	SEC	Ent1		
			rAtE					
	☐ SoAH		HOUr	Min	SEC	Ent1	WE	WPr
	☒ JL						JS 1	JC 1
	☐ LFiL						LFiL	
	☐ End						End	

Jump to step one and repeat one time.

Sample Step Chart (Cont.)

File# 1	☒ Step Type Step	Set Point	Time			On Events Off	Values	
Step # 6	☐ StPt	SP	HOUr	Min	SEC	Ent1		
			rAtE					
	☐ SoAH		HOUr	Min	SEC	Ent1	WE	WPr
	☐ JL						JS	JC
	☒ LFiL						LFiL	2
	☐ End						End	
Link to file 2 to continue process.								

File# 2	☒ Step Type Step	Set Point	Time			On Events Off	Values	
Step # 7	☒ StPt	SP -10°C	HOUr	Min	SEC 1	Ent1		
			rAtE					
	☐ SoAH		HOUr	Min	SEC	Ent1	WE	WPr
	☐ JL						JS	JC
	☐ LFiL						LFiL	
	☐ End						End	
Step ramp (1 second) to -10°C.								

File# 2	☒ Step Type Step	Set Point	Time			On Events Off	Values	
Step # 8	☐ StPt	SP	HOUr	Min	SEC	Ent1		
			rAtE					
	☒ SoAH		HOUr	Min 30	SEC	Ent1	WE	WPr 0
	☐ JL						JS	JC
	☐ LFiL						LFiL	
	☐ End						End	
Wait for process of -8° then hold for ½ hour. You could have also used a guarantee soak.								

File# 2	☒ Step Type	Set Point	Time			On Events Off	Values	
Step # 9	☒ StPt	SP 25°C	HOUr	Min 10	SEC	Ent1		
			rAtE					
	☐ SoAH		HOUr	Min	SEC	Ent1	WE	WPr
	☐ JL						JS	JC
	☐ LFiL						LFiL	
	☐ End						End	
Bring the process back to normal before shutting down.								

File# 2	☒ Step Type	Set Point	Time			On Events Off	Values	
Step # 10	☐ StPt	SP	HOUr	Min	SEC	Ent1		
			rAtE					
	☐ SoAH		HOUr	Min	SEC	Ent1	WE	WPr
	☐ JL						JS	JC
	☐ LFiL						LFiL	
	☒ End						End	Hold
Use either hold to continue last setpoint or off to shut down heat and cooling at end or profile.								

Master Step Chart.

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File#	☒ Step Type Step	Set Point	Time			On Events Off	Values	
Step #	☐ StPt	SP	HOUr	Min	SEC	Ent1		
			rAtE					
	☐ SoAH		HOUr	Min	SEC	Ent1	WE	WPr
	☐ JL						JS	JC
	☐ LFiL						LFiL	
	☐ End						End	
Comments:								

File#	☒ Step Type Step	Set Point	Time			On Events Off	Values	
Step #	☐ StPt	SP	HOUr	Min	SEC	Ent1		
			rAtE					
	☐ SoAH		HOUr	Min	SEC	Ent1	WE	WPr
	☐ JL						JS	JC
	☐ LFiL						LFiL	
	☐ End						End	
Comments:								

File#	☒ Step Type Step	Set Point	Time			On Events Off	Values	
Step #	☐ StPt	SP	HOUr	Min	SEC	Ent1		
			rAtE					
	☐ SoAH		HOUr	Min	SEC	Ent1	WE	WPr
	☐ JL						JS	JC
	☐ LFiL						LFiL	
	☐ End						End	
Comments:								

File#	☒ Step Type Step	Set Point	Time			On Events Off	Values	
Step #	☐ StPt	SP	HOUr	Min	SEC	Ent1		
			rAtE					
	☐ SoAH		HOUr	Min	SEC	Ent1	WE	WPr
	☐ JL						JS	JC
	☐ LFiL						LFiL	
	☐ End						End	
Comments:								

File#	☒ Step Type Step	Set Point	Time			On Events Off	Values	
Step #	☐ StPt	SP	HOUr	Min	SEC	Ent1		
			rAtE					
	☐ SoAH		HOUr	Min	SEC	Ent1	WE	WPr
	☐ JL						JS	JC
	☐ LFiL						LFiL	
	☐ End						End	
Comments:								

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800-473-7373

APPENDIX

Troubleshooting

For your convenience, we have included a troubleshooting section in this manual. This section covers problems which may occur in the Despatch applications of the controller. The Watlow manual has more detailed information.

Error Codes/Alarms

Four dashes, "____", in the upper display indicates an error. Refer to the Watlow manual for definition of code.

Clearing an Error Code

An **Err=nLA** error code will clear when the alarm condition is corrected. To clear an **Err=LAt** error code:

1. Correct the alarm condition.
2. Disconnect power from the controller.
3. Power up the controller.

How to Clear an Alarm Code

A flashing LO and HI in the lower display indicates an alarm. Remove the alarm condition. A non-latching alarm automatically clears the alarm output. A latching alarm must be manually cleared by pressing the **HOLD/RUN** key.

Warm/Cold Start

A warm start will save all programmed information in the memory. A cold start is a clean startup condition. All memory is deleted and the controller will return to default settings.

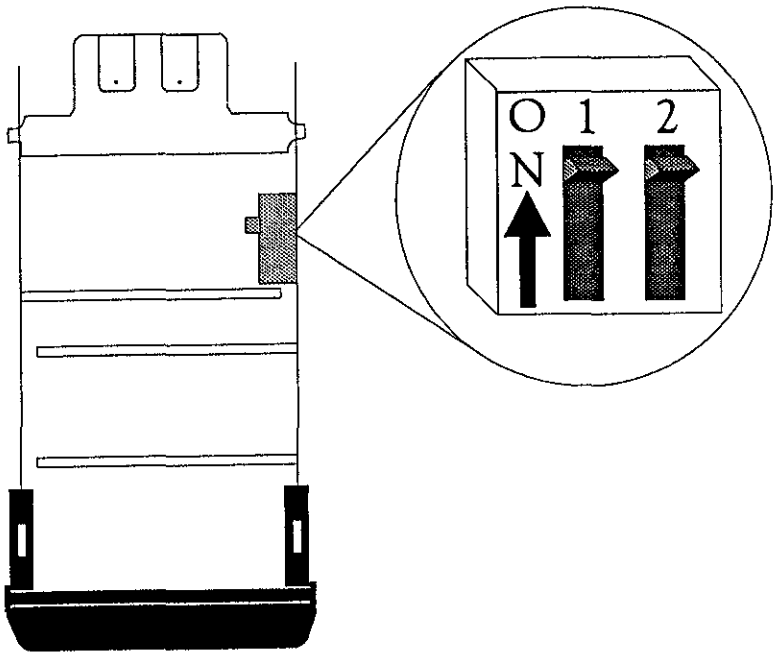

Figure 3 DIP Switch Location and Orientation

Table 2 DIP Switch Selection.

DIP Switch No.	Function ON	Function OFF	Normal Operating Position	Description
1	Battery backup is enabled.	Battery backup is disabled.	ON	Battery backup on is the same as warm a start.
2	**Set** prompt menus and the **Fcty** prompt menus cannot be viewed. Hardware lockout of **Set** and **Fcty**.	**Set** prompt menus and the **Fcty** prompt menus can be viewed.	ON	**Set** prompt menus are Input, Output, Global and Communications. **Fcty** prompt menus are Diagnostics and Calibration.

Changing the Position of a Switch

Whenever you change the position of a DIP switch, follow this procedure:

1. Remove power from the Watlow Control.

2. Remove the control chassis from the case.

3. Release the two tabs on one side of the bezel by pressing firmly on each until you hear the tab snap when released.

4. Release the two tables on the opposite side of the control. You may need to rock the bezel back and forth several times to release the chassis.

Special Instructions

System Menus

1. Press the **HOLD/RUN** key to place the controller in the hold mode.

2. Press the ▲ key and the ▼ key simultaneously for 3 seconds. The lower display will show the **SEt** parameter and the upper display will show **InPt.**

   There are four menus under the **SET** prompt.
   - Input menu - **InPt**
   - Output menu - **OtPt**
   - Global menu - **gLbL**
   - Communications menu - **COM**

3. Use the **MODE** key to select a menu.

4. Use the ▲ key and the ▼ key to select setup data.

If you want more details on display codes and settings, refer to the Watlow manual. The following tables shows typical codes.

Operation Menus

1. Press the **MODE** key to advance to the **OPEr** prompt.

   There are three menus under **OPEr.**
   - System (**SyS**)
   - PID (**PID**)
   - Program (**PROg**)

2. Press the ▲ key or the ▼ key to switch between menu options.

3. Press the **MODE** key to enter menu and cycle through various settings.

4. Press the **DISPLAY** key to exit.

Factory Menus

Refer to the Watlow manual for further instructions.

Menu Parameters and Descriptions

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Table 3 Input (**InPt**) Operation Menu Parameters and Descriptions

Operation Parameters	Value	Your Range	Factory Default	Typical Despatch Setting
In1		J, K (appears as H), t, n, c, r, S, b, Pt2, rtd, rt.d, 0-5, 0-10,4-201-5,0-20,0-50,0-100 Dependent on model number.	J or r	t
dEC1		0.,0.0, 0.00, 0.000	0	
rL1		Lowest limit to setpoint range. Sensor range Low to range Hi.	Input selection dependent	-75
rH1		Highest limit to setpoint range. Sensor range Low to range Hi.	Input selection dependent	180
CAL1		Calibration offset. ±999°/±555°/±999 Units	0	0
rtd1		JIS or din	din	din
Ftrl		Display filter. 0 to 60 seconds	0	1

Table 4 Output (**OtPt**) Operation Menu Parameters and Descriptions

Operation Parameters	Value	Your Range	Factory Default	Typical Despatch Setting
Ot1		Ht or CL	ht	ht
Prc1		0-5, 1-5, 0-10, 0-20, 4-20	4-20	
HYS1		0°-999°F, 0°-555°C, 0U-999U 0.0°-99.9°F, 0.0°-55.5°C, 0.0U-99.9U	3°F/2°C/3U	1
Ot2		Ht, CL or no	CL	CL
Prc2		0-5, 1-5, 0-10, 0-20, 4-20	4-20	
HYS2		0°-999°F, 0°-555°C, 0U-999U 0.0°-99.9°F, 0.0°-55.5°C, 0.0U-99.9U	3°F/2°C/3U	1
AL2		Pr1, dE1 or rAtE	Pr1	
LAt2		LAt or nLA	nLA	
SIL2		ON or OFF	OFF	
Ot3		AL3, AL3n, Ent3 or no	AL	Ent3
AL3		Pr1,dE1 or rAtE (if Ot3 is AL3 or AL3n)	Pr1	
LAt3		LAt or nLA, Dependent on AL3 = Pr or dE.	nLA	
HYS3		0°-999°F, 0°-555°C, 0U-999U 0.0°-99.9°F, 0.0°-55.5°C, 0.0U-99.9U	3°F/2°C/3U	1
LAt3		LAt or nLA, Dependent on AL3 = Pr or dE.	nLA	
SIL3		On or OFF	OFF	

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Menu Parameters and Descriptions (Cont.)

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Table 5 Global (**gLbL**) Operation Menu Parameters and Descriptions

Operation Parameters	Value	Your Range	Factory Default	Typical Despatch Setting
C_F		C or F; Will not appear if In = 0-5 or 4-20.	F	C
Err		LAt or nLA (error latching)	nLA	nLA
Ei1		LOC, ALr, Hold, FIL_, WE, OFF, no	no	WE
Ei2		LOC, ALr, hoLd, FIL1, FIL2, FIL3, FIL4, WE, OFF or no	no	
Anun		ON or OFF (flashes alarm messages)	On	On
LoP		-100% to HiP	-100	-100
HiP		LoP to 100%	100	100
AtSP		50% to 150%	90	90
PtYP		ti or rAtE	ti	ti
gSd		0-99°, 0-55°, 0-99U 0.0-9.9°, 0.0-5.5°, 0.0U-9.9U	0	0
POUt		Cont, HOLd or Abrt, IdSP(idle setpt)	Cont	Cont
IdSP		rL1 to rH1 (shows only if POUt selects)	75°F/25°C/75U	
PStr		(Profile starts at current) StPt or Proc	StPt	StPt
LOC		0 to 3 (locks 1=mode, 2=mode&run, 3=all)	0	1

Table 6 Communication (**COM**) Operation Menu Parameters and Description

Operation Parameters	Value	Your Range	Factory Default	Typical Despatch Setting
bAUd		300, 600, 1200, 2400, 4800, 9600	9600	9600
dAtA		7o = Odd parity, 7E = Even parity 8n = 8 data bits and no parity	7o	7o
Prot		FULL or On	FULL	On
Addr		0 to 31	0	0
intF		485/422	485	485

Menu Parameters and Descriptions (Cont.)

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Table 7 PID Operation Menu Parameters and Descriptions

Operation Parameters	Value	Your Range	Factory Default	Typical Despatch Setting
Pb1		If dFL = US: 0-999°F/0-555°C/0-999 units 0-99.9°F/0-55.5°C/0-99.9 Units If dFL = S1: 0 to 99.9% 0 = ON/OFF control. HYS1 - switch diff.	25°F/14°C/25U 3.0%	5
Pb2		Same as Pb1. Won't appear if Ot 2 - no.	0°	5
rE1/It1		If dFL = SI - Reset: 0.00 to 9.99 repeats/min. If dFL = US - Integral: 0 and 00.1 to 99.9 min./repeat 0.00 = no reset. Won't appear if Pb1 = 0.	0.00 repeats/min. rE1	0.02
rE2/It2		Same as rE1. Will not appear if Pb2 = 0.	0.00 repeats/min.	0.02
rA1/dE1		If dFL = SI - 0.00 to 9.99 min. If dFL = US - 0.00 = No Rate. Won't appear if Pb1 = 0.	0.00 min.	0.5
rA2/dE2		Same as rA1. Will not appear if Pb2 = 0.	0.00 min.	0.5
Ct1		1 to 60 seconds Won't appear if Pb1 - 0	5 seconds	2
Ct2		1 to 60 seconds Won't appear if Pb2 = 0 or Ot2 = no.	5 seconds	7
db		±0-999°F/±0-555°C/±0-999 Units ±0.0-9.9°F/±0.0-5.5°C/±0.0-9.9 Units Appears if ht/CL or CL/ht.	0	0