

TEMPERATURE AND PROCESS CONTROL INSTRUMENTS

LFE Single Loop P μ P Controllers 2000 Series

Microprocessor Power

Unique alphanumeric VF display shows key words to prompt and inform the operator

Front keypad programming. No internal switches, pots or jumpers to set or adjust.

Color-coded display includes ALARM, OUTPUT and STATUS indicators.

Self-diagnostics with displayed messages.

Keypad security for tuning and calibration.



Introduction

LFE innovative microprocessor-based single loop PID controllers provide accurate and reliable process and machine control. While originally designed for temperature control applications, these powerful controllers have found ready use in flow, pressure, level, cascade, relative humidity, pH, position and other important process and machine control applications.

All calibration, tuning, operating values and control commands are entered through the 6 or 8 key front keypad. There are no internal pots, switches or jumpers to set or adjust. All special function programming such as profile control and multi-setpoint are also entered through the front keypad.

The unique vacuum-fluorescent display shows key words to prompt and inform the operator for recalibration, tuning, programming and operation. By scrolling through programmed sequences of displays, the controller assures the operator that all necessary parameters have been set prior to operation. Color-coded alarm, output and mode words built into the display permit instant status review at all times.

An extensive selection of input, control and alarm configurations give these controllers the flexibility that both users and OEM's appreciate. Many in the field reconfigurations are possible allowing the user to adapt to changing conditions with minimum time and expense.

For the OEM

Reconfiguration capability by keypad input make these controllers quickly adaptable to many different applications. Changing the thermocouple type, input span, display units, control and alarm action and more are all quickly accomplished without hardware modifications. One model from stock can be configured for many different operating conditions. For custom features and special control functions contact LFE.

For the User

The alphanumeric display with its key word display and color-coded status indicators mean better operator information. For example, the sequential prompting displays for tuning ensure that no parameters are forgotten. At END OF TUNE you can be sure that all necessary tuning steps have been examined. A security protected calibration sequence also prompts to ensure correct recalibration when required.

Standard Features

- Internal linearization of T/C and RTD inputs.
 - Internal scaling of process signal inputs.
 - Independent digital PID Tuning of primary and optional secondary outputs.
 - Display includes engineering units.
 - Setpoint limiting for process protection.
 - Memory protected by 10 year lithium battery.
 - Heavy duty plastic case fits 1/4 DIN cutout.
- All plug-in electronic assembly.

Input Selection

Thermocouple: Any thermocouple listed with internal linearization. For other thermocouples contact LFE.

RTD Sensor: 100 ohm, 3850 PPM, Platinum. Select 1° or 0.1°

DC Voltage: Any DC voltage including process voltage signals.

DC Current: Any DC current including process current signals.

Control Selection

ON/OFF control with selectable deadband and solid-state relay output(s).

3 Mode Time proportional control with fully selectable cycle time and PID parameters and solid-state relay output(s).

3 Mode Analog control output(s) with fully selectable PID parameters.

Primary and Secondary outputs have independent digitally tuned PID parameters.

Front key AUTO/MANUAL, STOP/START, START/RESET and PAUSE/RESUME control functions available on selected models.

Alarm Selection

Process, Deviation and Deviation Band, HI or LO acting alarms. Process alarms are independently set.

Deviation and Deviation Band alarms are slaved to the primary setpoint.

Timed alarms can be set Hour:Minute or Minute:Second.

Event alarms can be set for any segment within a profile.

Display

High visibility custom vacuum-fluorescent color-coded, alphanumeric display with output, alarm and status indicators. Two rows of eight alphanumeric blue characters display numerical values and units plus key words to prompt the operator. A blue "OUT" and indicator light(s) illuminated when either output 1 or 2 or both are on. A red "ALM" and indicator light(s) illuminate when either alarm, timer/event 1 or 2 or both are on. Four yellow status indicators show controller operating status at all times.

TUN: for tuning mode

CAL: for calibration mode

REM: for remote input or communication option

MAN: for outputs off and for manual control

Operator Keypad

A 6 or 8 key touch panel is the operator interface. All tuning and programming are input through the keyboard. Internal programs prompt the operator step by step through all procedures. Security key codes prevent unauthorized changes. Keypad lockout is available in most models.

Memory Protection

- Internal lithium battery protects memory during power OFF and power loss conditions.

Housing

Flame retardant UL rated ABS plastic case fits 1/4 DIN cutout with mounting bracket. Polycarbonate flame retardant bezel. Screw terminals at rear. Slide-out assembly with plug-in circuit boards.

LFE 2000 Series General Specifications All Models

The PART NUMBER specifies which input, outputs and alarm relays are included in a specific instrument.

PERFORMANCE

Accuracy: $\pm 0.2\%$ of T/C range shown below
Repeatability: $\pm 0.5^\circ\text{F}$
Temperature Stability: $3\mu\text{V}/^\circ\text{C}$ including compensation
Temperature Rating:
 Operating: 5°C to 55°C (40°F to 130°F)
 Storage: -40°C to 75°C (-40°F to 167°F)

Noise Rejection:

Common Mode: 140db typ 120db min. @ 60 Hz
 Normal Mode: 65db typ 60db min. @ 60 Hz
Setpoint Resolution: 1° for thermocouple, 1 or 0.1° for RTD
RFI: Less than 0.5% of setpoint at 3m from 5 watt source.

INPUTS

User can select desired operating span.
 Analog input scaling to ± 3200 counts.
Input Impedance: 10 megohm minimum (T/C input)
Thermocouples: Maximum ranges shown.

J	-300 / +1400F	-185 / +760C
K	-340 / +2480F	-207 / +1360C
R	+200 / +3200F	+90 / +1760C
S	+32 / +3180F	0 / +1750C
T	-380 / +740F	-230 / +390C
N	-200 / +2300F	-130 / +1260C
E	-180 / +1610F	-115 / +870C
B	+600 / +3260F	+310 / +1790C
Platinum II	-140 / +2500F	-95 / +1375C
Ni / Ni 18% Maty	0 / +2390F	-15 / +1310C
W5 Re / W26 Re	+32 / +3260F	0 / +2315C
W3 Re / W25 Re	+32 / +3260F	0 / +2370C
W / W26 Re	+200 / +3260F	+94 / +2315C

RTD: 100 ohm, 3850 PPM Platinum with 3 wire connection.

-300 / +1500F, -180 / +800C at 1° resolution
 -1450 / +9999F, -100.0 / +540.0C at 0.1° resolution

Current: 1 to 5 and 4.20mA full scale or up to 200mA

Voltage: 0 to 10mV up to 200 VDC.

Sensor Break Protection: Display indicates "INPUT OPEN"

If T/C or RTD input opens, outputs go OFF and alarm relays go ON

Input Power: 8 watts typ @ 117VAC, 135 watts max., 50/60 Hz ± 2 Hz
 220 VAC and 240 VAC input also available

Memory Protection: 10 yr typical life lithium battery, board mounted

CONTROL

ON/OFF Output Deadband: Settable at 0.25, 0.50 or 100% of span

Cycle Time: 1 to 60 seconds settable with 1 second resolution

Proportional Band: 1.200% settable in 1% increments

Reset (Integral): 01 to 20 R/M settable in .01 R/M increments

Reset can be turned off by setting Reset to 0.

Anti-Reset Windup: Standard, inhibits automatic reset when the process input is outside of the proportional band

Rate (Derivative): 01 to 5 min. settable in .01 min. increments

Rate can be turned off by setting Rate to 0

Drive Unit Deadband: Settable 0.00 to 25.50% of span (Model 2014/15)

AUTO/MANUAL: Bumpless transfer

DISPLAY

Sealed vacuum fluorescent color-coded display containing:

Two rows of 8 each 14 segment blue alphanumeric characters

Two red Alarm relay indicators: ALM 1 and ALM 2

Two blue Output indicators: OUT 1 and OUT 2

Four yellow status indicators: TUN, CAL, REM and MAN

OUTPUT

Independent outputs: primary and (optional) secondary

Select from current, voltage and solid-state relay output

Current Output: 4 to 20mA into 1K ohm maximum load

Other currents available, contact LFE

Voltage Output: 0 to 5 VDC into 1K ohm minimum load

Other voltages available, contact LFE

Internal Solid-State Relay: Optically isolated Form "A" Contacts

0.03 to 1.0 amp @ 240 VAC Resistive

Optional 0.1 to 50mA available.

Up to two independent electromechanical Alarm/Timer/Event relays.

Form "C" contacts rated 1.0 Amp @ 240 VAC resistive load

Process and deviation alarms settable to 1 digit.

Timer alarms can be ON or OFF acting to 1000 hours

Event alarms can be ON and OFF acting and are set by segment number.

Non-Part Number Options

In addition to the large number of programmable and hardware options included in the part number selection table for each model there are additional options listed below that are available with selected models. Contact LFE for details and availability of these options for your controller.

Isolated Thermocouple Input	50mA SSR
Self-powered 4-20mA DC Input	DC Trigger Output
Isolated Transducer power supply	Open Collector Output
Remote STOP/START	Isolated 4-20mA DC Output
220 VAC or 240 VAC Input power	

Other special features can also be provided. Contact LFE to discuss your specific requirements. Typical special features include:

- Display offset
- Setpoint offset
- Rate of setpoint change limit
- Manual reset
- Output limit
- Retransmission

Self Diagnostics

All 2000 Series Controllers contain self-diagnostic routines that automatically detect certain modes of failure. If a failure occurs the controller will activate the alarm relay(s), turn OFF the outputs(s), and display a failure message.

**INPUT
OPEN**

This display will appear if a thermocouple or RTD input fails as an open circuit.

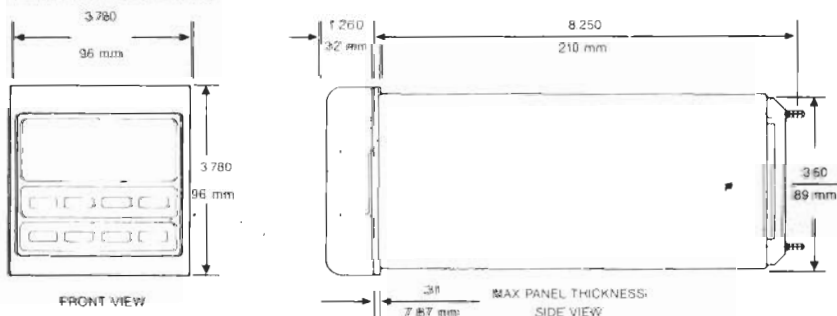
Self-diagnostics protects your machine and process if a failure occurs in the control loop. In systems with digital communications any detected failure is communicated to the computer as part of the status word at the next communication.

Special function controller include dedicated displays such as UNDER or OVER RANGE, SLIDEWIRE OPEN and OUT OF RANGE that are appropriate to the application. Other special displays can be provided. Contact LFE for details.

Accessories (Contact LFE for details)

- Splash cover for front bezel.
- Solid cover for front bezel.
- Rear terminal cover guard.
- Triac switching power pack, 20AAC, zero crossing.

Dimensions



PANEL CUTOUT: 3.620×3.620 $\begin{matrix} +.000 \\ -.039 \end{matrix}$ (92x92mm)

Terminals

A — ALM (2) NO	1 — ALM (1) NC
B — ALM (2) C	2 — ALM (1) C
C — ALM (2) NC	3 — ALM (1) NO
D — OUT (2) HI	4 — OUT (1) HI
E — OUT (2) LO	5 — OUT (1) LO
F — INPUT	6 — AC SUPPLY
G — +COLD JUNCTION	7 — AC SUPPLY
H — +INPUT	8 — GND

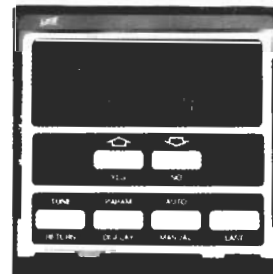
TERMINAL DESIGNATIONS MAY VARY FOR CERTAIN MODELS

LFE Single Loop P μ P Controllers Models 2000-2005



LFE Model 2000/2001 and Model 2002 Controllers are single-loop PID instruments with features and performance specifications as described on page 2. These general purpose controllers offer the OEM and user exceptional flexibility and versatility in operation with solid-state reliability. A 6 key front panel keypad is the operator interface.

Model 2003 and Model 2004 controllers are similar to the above controllers plus they include a special program for SELF TUNE of the primary heat output. The SELF TUNE program is explained in detail below. The part number table shown below lists all of the input, control, output and alarm selections.



Start/Stop Key Function

Model 2000/2001 and Model 2003 Controllers include a START/STOP key on the front panel. Pressing this key turns the output(s) ON or OFF while keeping the controller in a power-up condition. This feature is most useful in machine control applications.

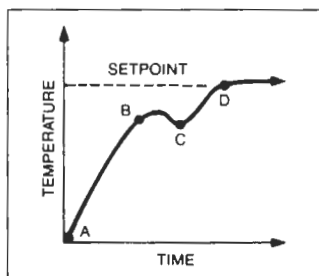
LFE Model 2003 and Model 2004 SELF TUNE Controllers are single-loop PID instruments with features and performance specifications as described on page 2 plus a special SELF TUNE program for primary heat control output.

The self tune controller applies intelligent tuning rules to calculate the PID constants. Overpowered and underpowered heaters, large time delays and slow or fast systems can all be compensated for with this controller. The user has a choice of closed loop response: SLOW RESPONSE where overshoot is eliminated due to slower risetime and FAST RESPONSE where time to setpoint is reduced. The comprehensive self tune algorithm includes a unique calculation that adjusts the RESET/RATE ratio based on system dynamics for superior tuning.

The controller will compute new PID constants at anytime the self tune routine is initiated. This can be on start-up or during normal operation. Prior to initiating self tune the operator selects SLOW or FAST RESPONSE, depending on whether he desires the controller to tend toward over- or underdamped operation.

Auto/Manual Key Function

Model 2002 and Model 2004 Controllers include an AUTO/MANUAL key on the front panel. In MANUAL mode the operator can control the output(s) using the UP and DOWN arrow keys. Bumpless transfer is standard with AUTO/MANUAL control.

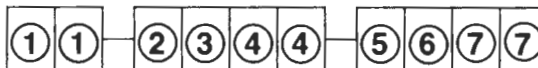


Starting from a cold start "A," the controller provides 100% output power until the temperature reaches "B" where the output power is cut off. The controller then measures the system response "B" to "C" and calculates the appropriate PID constants for HEAT control. At point "C" the output is restored to bring the system to the desired setpoint "D" with minimum delay.

Upon completion of the self tune routine the controller automatically stores and displays the PID constants and starts using them in the control program. The operator can manually enter PID constants if he chooses not to use the self tune feature.

Model 2000 Model 2003
Model 2001 Model 2004
Model 2002 Model 2005

PART
NUMBER



① Model	① Model	② Primary Output*	④ Input	⑤ Alarm/Timer 1	⑦ Options
E0 2000 No communications	EA 2003 No communications	0 NO PRIMARY	00 J thermocouple	0 no alarm	00 No options
E1 2000 Remote Analog Setpoint	EB 2003 Remote Analog Setpoint	1 PRI. HEAT SSR ON/OFF	01 K thermocouple	1 HI process	XX Any special. Factory assigns final numbers.
E2 2001 RS232C non-isolated	EC 2003 RS232C non-isolated	2 PRI. COOL SSR ON/OFF	02 R thermocouple	2 LO process	
E3 2001 RS232C isolated	ED 2003 RS232C isolated	3 PRI. HEAT SSR PROP	03 S thermocouple	3 HI deviation	
E4 2001 RS422 non-isolated	EE 2003 RS422 non-isolated	4 PRI. COOL SSR PROP	04 T thermocouple	4 LO deviation	
E5 2001 RS422 isolated	EF 2003 RS422 isolated	5 PRI. HEAT 4-20 mA DC	05 N thermocouple	5 ON Timer	
E6 2001 20 mA Current (isolated)	EG 2003 20 mA Current (isolated)	6 PRI. COOL 4-20 mA DC	06 E thermocouple	6 OFF Timer	
E7 2005 Zone Controller	EH 2005 Zone Controller	7 PRI. HEAT 0-5 V DC	07 B thermocouple	7 Dev. band	
Z0 2002 No communications	ZA 2004 No communications	8 PRI. COOL 0-5 V DC	08 PLATINEL II T/C		
Z1 2002 Remote Analog Setpoint	ZB 2004 Remote Analog Setpoint		09 Ni/Ni 18% Moly T/C		
Z2 2002 RS232C non-isolated	ZC 2004 RS232C non-isolated	③ Secondary Output*	10 W5 Re/W26 Re T/C	⑥ Alarm/Timer 2	
Z3 2002 RS232C isolated	ZD 2004 RS232C isolated	0 NO SECONDARY	11 W3 Re/W25 Re T/C	0 no alarm	
Z4 2002 RS422 non-isolated	ZE 2004 RS422 non-isolated	1 SEC. HEAT SSR ON/OFF	12 W/W26 Re T/C	1 HI process	
Z5 2002 RS422 isolated	ZF 2004 RS422 isolated	2 SEC. COOL SSR ON/OFF	20 1" RTD 100Ω PT	2 LO process	
Z6 2002 20 mA Current (isolated)	ZG 2004 20 mA Current (isolated)	4 SEC. COOL SSR PROP	21 0.1" RTD 100Ω PT	3 HI deviation	
Z7 2005 Zone Controller	ZH 2005 Zone Controller	6 SEC. COOL 4-20 mA DC	40 0-5 volts DC	4 LO deviation	
		7 SEC. COOL 0-5 V DC	60 4-20 mA DC	5 ON Timer	
				6 OFF Timer	
				7 Dev. band	

LFE Full Feature PμP Controllers Model 2010/2011



LFE Model 2010 Controllers provide all of the features and performance specifications as described on page 2. These full feature instruments have 8 key front panel keypads and include both the STOP/START and AUTO/MANUAL control functions. Keypad lockout feature provides extra operating security. LFE Model 2011 Controllers are identical to the Model 2010 plus they include the digital communications option.

These full feature controllers offer the OEM and user maximum flexibility in set-up and control. The unique alphanumeric scrolling display prompts and informs the user during all phases of operation including tuning and recalibration. In addition to the full selection of input, control, output and alarm functions listed in the part number table shown below, these controllers also include a choice of single setpoint control, Ramp & Soak profile control and Multisetpoint menu as standard.

When HEAT/COOL dual outputs are provided, each output has its own PID tuning constants. The secondary setpoint is slaved to the primary at a selectable preset value less than, equal to or greater than the primary setpoint.

Stop/Start

A dedicated front panel key allows the operator to START or STOP the control output(s). AC power remains on and all operator displays continue to function during STOP. STOP automatically occurs any time the calibration loop is accessed and when the Ramp & Soak program is completed. Tuning parameters can be adjusted in either STOP or START mode. The display indicator "MAN" will flash during STOP mode.

Heat/Cool

An optional second control output is available for HEAT/COOL and other dual output applications. A HEAT output corresponds to a reverse acting output and a COOL output corresponds to a direct acting output. When dual outputs are provided the controller generates separate tuning displays for all necessary tuning parameters. Each output has its own independent tuning constants. The secondary setpoint is slaved to the primary at a settable value less than, equal to or greater than the primary setpoint.

Auto/Manual

A dedicated front panel key allows the operator to assume manual control of the output(s). Special displays indicate output percent power, 0-100%, for each output. Automatic bumpless transfer assures a smooth transition from manual to automatic control.

Ramp and Soak

This operator programmable feature accepts up to 8 segments of Ramp & Soak. Each segment can be up to 99 hours and 59 minutes set to 1 minute resolution or 99 minutes and 59 seconds set to 1 second resolution. The operator need set only the segment time and the end of segment temperature. The controller will automatically calculate the rate of ramp in either direction.

The Ramp & Soak profile can be automatically repeated up to 254 cycles or repeated continuously. In addition ASSURED SOAK when enabled guarantees that the temperature at the end of each segment will be within a specified tolerance before the profile control will continue.

With Ramp & Soak control special displays show the operator the segment in process, the time remaining and the cycles remaining on demand.

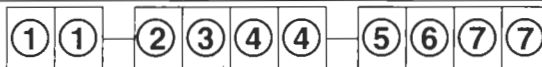
Multisetpoint

This operator programmable menu stores up to 9 setpoints identified as SP0 thru SP8. The operator can call up any stored setpoint by number eliminating the tedious chore of continually entering new setpoints as required by production orders. Multisetpoint is most useful in batch operations where each batch may have a separate setpoint.

With Multisetpoint a special display shows the setpoint number as well as the measurement and setpoint value.

Model 2010 Model 2011

PART
NUMBER



① Model	② Primary Output*	④ Input	⑤ Alarm/Timer 1	⑥ Alarm/Timer 2	⑦ Options
D0 2010 No communications	0 NO PRIMARY	00 J thermocouple	0 no alarm	0 no alarm	00 No options
D1 2010 Remote Analog Setpoint	1 PRI. HEAT SSR ON/OFF	01 K thermocouple	1 HI process	1 HI process	XX Any special. Factory
D2 2011 RS232C non-isolated	2 PRI. COOL SSR ON/OFF	02 R thermocouple	2 LO process	2 LO process	assigns final numbers.
D3 2011 RS232C isolated	3 PRI. HEAT SSR PROP.	03 S thermocouple	3 HI deviation	3 HI deviation	
D4 2011 RS422 non-isolated	4 PRI. COOL SSR PROP.	04 T thermocouple	4 LO deviation	4 LO deviation	
D5 2011 RS422 isolated	5 PRI. HEAT 4-20 mA DC	05 N thermocouple	5 ON Timer	5 ON Timer	
D6 2011 20 mA Current (isolated)	6 PRI. COOL 4-20 mA DC	06 E thermocouple	6 OFF Timer	6 OFF Timer	
	7 PRI. HEAT 0-5 V DC	07 B thermocouple			
	8 PRI. COOL 0-5 V DC	08 PLATINEL II T/C			
		09 Ni/Ni 18% Moly			
		10 W5 Re/W26 Re			
		11 W3 Re/W25 Re			
		12 W/W26 Re			
		20 1" RTD 100Ω PT			
		21 0.1" RTD 100Ω PT			
		40 0-5 volts DC			
		60 4-20 mA DC			
	③ Secondary Output*				
	0 NO SECONDARY				
	1 SEC. HEAT SSR ON/OFF				
	2 SEC. COOL SSR ON/OFF				
	4 SEC. COOL SSR PROP.				
	6 SEC. COOL 4-20 mA DC				
	7 SEC. COOL 0-5 V DC				

*For non-Temperature applications HEAT corresponds to Reverse acting and COOL to Direct acting output

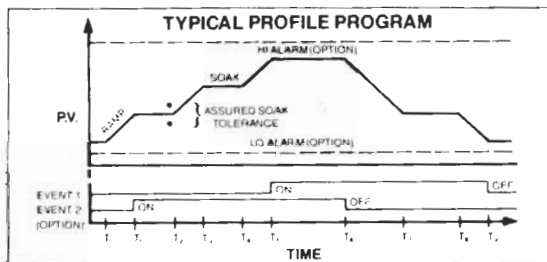


Single and Dual Loop Profile μ P Controllers Model 2012/2013



LFE Model 2012 and Model 2013 Controllers provide exceptional profile control. All that is required from the operator is the time for each segment and the ending setpoint for each segment. The controller automatically determines the rate of ramp.

These 8 key profile controllers provide all the features and performance specifications as described on page 2 plus the special programming for profile control and front panel key functions unique for profile control.



The Model 2012 is a single-loop profile controller with up to two independently tuned control outputs and two alarm/event relay outputs.

The Model 2013 is a two-loop profile controller. Each loop has its own input and output. There is one alarm/event relay that can be programmed for either loop. The stored profiles are available to both loops. Contact LFE for additional details on the Model 2013.

Select the single or two loop controller and the profile arrangement best suited to your application.

- Single or Two Loop with 2 Profiles of 99 Segments each
- Single or Two Loop with 4 Profiles of 64 Segments each
- Single or Two Loop with 8 Profiles of 32 Segments each
- Single or Two Loop with 16 Profiles of 16 Segments each

Special Features

Assured Soak

Guarantee ON-SPEC profiles with ASSURED SOAK. When enabled, this selectable feature holds the start of any segment until the process variable is within a user specified tolerance. The allowable tolerance is set through the front keypad as part of the programming procedure.

Repeat Cycle

Any profile can automatically repeat up to 254 times or can repeat continuously. A special display shows cycles remaining.

On-Line Changes

Front panel keys give the operator instant control.

The PAUSE/RESUME key allows the operator to PAUSE the controller at any time during a profile and to RESUME profile control at the same point. Control is maintained at the then active setpoint during the PAUSE interval. The display indicates when PAUSE is in use.

The START/RESET key allows the operator to RESET the controller at any time during a profile. The operator can shift to any other segment in the profile or even shift to another profile before starting again. Pushing the START key begins control again at whatever profile and segment the operator has selected.

The operator can also assume MANUAL control of the output(s) while in the TUNE mode. Manual control is particularly useful for start-up and tuning but can be used at any time.

System Security

Security keypad codes are used to protect the tuning and profile programs from unauthorized data entry and tampering. A KEYBOARD LOCKOUT feature is also included in the controller that disables the UP or DOWN arrow keys. The operator can still read all operating information, but cannot change setpoints in the operator mode when this feature is enabled.

Alarm/Event Relays

Up to two independent alarm relay outputs are programmable in each profile. Alarms can be process or deviation with HI or LO action or deviation band type. Latching relays hold until the RETURN key is pushed to acknowledge and unlatch the relay.

These relays can alternately be EVENT relays programmable to trigger at the end of any segment in a profile. Each profile has its own program for ALARM/EVENT selection and operation.

Model 2012 Model 2013

PART
NUMBER



1 Model and Profiles

- B1 B51 2012 One Loop 2 Profiles
- B2 B61 2012 One Loop 4 Profiles
- B3 B71 2012 One Loop 8 Profiles
- B4 B81 2012 One Loop 16 Profiles
- C1 C51 2013 Two Loop 2 Profiles
- C2 C61 2013 Two Loop 4 Profiles
- C3 C71 2013 Two Loop 8 Profiles
- C4 C81 2013 Two Loop 16 Profiles

2 First Output (Out 1)*

- 0 No Output
- 1 Pr Heat SSR On/Off
- 2 Pr Cool SSR On/Off
- 3 Pr Heat SSR Prop
- 4 Pr Cool SSR Prop
- 5 Pr Heat 4.20 mA DC
- 6 Pr Cool 4.20 mA DC
- 7 Pr Heat 0.5 VDC
- 8 Pr Cool 0.5 VDC

3 Second Output (Out 2)

- 0 No Output
- 1 Loop 1 Sec Heat SSR On/Off
- 2 Loop 1 Sec Cool SSR On/Off
- 3 Loop 1 Sec Cool SSR Prop
- 4 Loop 1 Sec Cool 4.20 mA DC
- 5 Loop 1 Sec Cool 0.5 VDC
- A Loop 1 Event Relay
- B Loop 1 Retransmit PV 1
- C Loop 1 Retransmit SP 1
- D Loop 2 Pr Heat SSR On/Off
- E Loop 2 Pr Cool SSR On/Off
- F Loop 2 Pr Heat SSR Prop
- G Loop 2 Pr Cool SSR Prop
- H Loop 2 Pr Heat 4.20 mA DC
- I Loop 2 Pr Cool 4.20 mA DC
- K Loop 2 Pr Heat 0.5 VDC
- L Loop 2 Pr Cool 0.5 VDC
- N Loop 2 Event Relay
- P Loop 2 Retransmit PV 2
- Q Loop 2 Retransmit SP 2

4 First Input

- 0 J thermocouple
- 1 K thermocouple
- 2 R thermocouple
- 3 S thermocouple
- 4 T thermocouple
- 5 N thermocouple
- 6 E thermocouple
- 7 B thermocouple
- 8 Platinum II
- 9 Ni / Ni 1B% Alloy
- A W5 Re / W26 Re
- B W3 Re / W25 Re
- C W / W26 Re
- K 100 ohm Pt RTD
- L 3850 PPM (1")
- IL 100 ohm Pt RTD
- LL 3850 PPM (0.1")
- RR 0.5 VDC
- S 10 VDC
- T 0 100 mVDC
- W 4.20 mA DC
- Z No Input
- 5 Second Input**
- Z No Input 2

6 Alarm/Event Relay 1

- 0 No Alarm/Event/Relay 1
- 1 Loop 1 Non-Latching; Hi Process
- 2 Loop 1 Non-Latching; Lo Process
- 3 Loop 1 Non-Latching; Hi Deviation
- 4 Loop 1 Non-Latching; Lo Deviation
- 5 Loop 1 Non-Latching; Event Relay
- 7 Loop 1 Non-Latching; Deviation Band
- 9 Latching; Power Failure
- A Loop 1 Latching; Hi Process
- B Loop 1 Latching; Lo Process
- C Loop 1 Latching; Hi Deviation
- D Loop 1 Latching; Lo Deviation
- E Loop 1 Latching; Deviation Band
- G Loop 2 Non-Latching; Hi Process
- H Loop 2 Non-Latching; Lo Process
- I Loop 2 Non-Latching; Hi Deviation
- K Loop 2 Non-Latching; Lo Deviation
- L Loop 2 Non-Latching; Event Relay
- M Loop 2 Non-Latching; Deviation Band
- P Loop 2 Non-Latching; Second Output Heat
- Q Loop 2 Non-Latching; Second Output Cool
- R Loop 2 Latching; Hi Process
- S Loop 2 Latching; Lo Process
- T Loop 2 Latching; Hi Deviation
- U Loop 2 Latching; No Deviation
- W Loop 2 Latching; Deviation Band

7 Alarm/Event Relay 2 (Model 2012)

- 0 No Alarm/Event/Relay 2
- 1 Loop 1 Non-Latching; Hi Process
- 2 Loop 1 Non-Latching; Lo Process
- 3 Loop 1 Non-Latching; Hi Deviation
- 4 Loop 1 Non-Latching; Lo Deviation
- 5 Loop 1 Non-Latching; Event Display
- 7 Loop 1 Non-Latching; Deviation Band
- 9 Loop 1 Latching; Error Alarm
- A Loop 1 Latching; Hi Process
- B Loop 1 Latching; Lo Process
- C Loop 1 Latching; Hi Deviation
- D Loop 1 Latching; Lo Deviation
- E Loop 1 Latching; Deviation Band

8 Options

- 00 Standard
- XX Any special Factory assigns final numbers

*For non Temperature applications HEAT corresponds to Reverse acting and COOL to Direct acting output

**For second input contact I FE. Some limitations apply.

*P/N for digital communications option. Specify type of interface required.

LFE Position P μ P Controllers Model 2014/2015



LFE Model 2014 and Model 2015 Controllers provide accurate and reliable temperature and process control in systems with bi-directional AC electric motor driven operators. These position controllers provide all the features and performance specifications as described on page 2 plus the special program for position control incorporating slidewire feedback (option) and front panel key functions unique to position control. One LFE position controller replaces both the controller and position logic device previously required.

Solid-state relays provide the INCREASE (upscale) and DECREASE (downscale) control logic and power to the drive unit. Control action is full three mode digitally tuned PID. MANUAL and JOG control functions give the operator full control at all times.

Position Control with Slidewire Feedback

The user can calibrate the optional drive unit slidewire from the controller keypad using either a manual or automatic procedure when limit switches are included with the drive unit. Operating control span need not be the same as drive unit full span. Included in the calibration is a deadband selection to prevent unwarranted response to slidewire jitter. The automatic slidewire calibration routine cycles the drive unit to both end points without the need for a person at the drive unit location.

Position Control without Slidewire

For position control applications in systems where there is no slidewire feedback, the controller relies on measurement input as the feedback. A second alarm is available with this configuration.

Ramp and Soak Control (Model 2015)

A special user programmable option in the Model 2015 provides up to eight steps of RAMP & SOAK profile control. All programming is done through the front keypad. Assured Soak and Repeat Cycles are also available. Special displays show TIME LEFT and CYCLES LEFT when this option is in use.

Multisetpoint (Model 2015)

A special option in the Model 2015 allows the user to store up to nine setpoints for quick recall. The display indicates the setpoint number in use.

Special Features

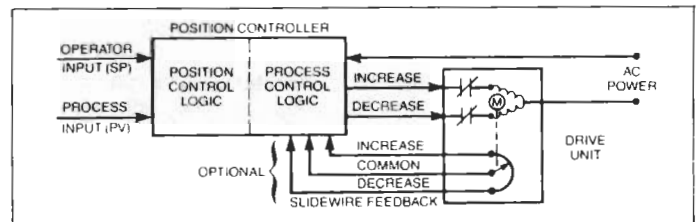
Normal Operation

In normal operation the user or host computer (option) sets the setpoint. The controller will automatically position the drive unit to hold the process at setpoint within one displayed digit. The user can read the process variable together with either the setpoint or the percent drive unit position.

Manual Control

At any time during operation, the user can push the MANUAL key to assume manual control of the position logic. In this mode of operation, the UP and DOWN arrow keys control the position logic to drive the drive unit to any position. Maximum INCREASE (upscale) and DECREASE (downscale) settings are included for automatic travel to full open or closed position.

At any time the operator can push the STOP key to shut OFF both outputs. The display will indicate JOG XX%. The operator can then directly control the INCREASE and DECREASE solid-state relay outputs to jog the drive unit bypassing all automatic control functions.



Loss of PV Input

If the measurement input is lost due to an open circuit, an alarm relay and alarm display indicator will come ON. The display will show INPUT OPEN. The user can assume manual control of the outputs for an orderly shutdown or continuing control at any drive unit position.

Loss of Slidewire Feedback

If the slidewire feedback signal is lost due to an open circuit, an alarm display indicator will come ON. The display will show SLIDEWIRE OPEN. The user can assume control of the outputs for an orderly shutdown or can continue operation using an internally calculated drive unit position in place of the slidewire feedback.

Model 2014
Model 2015

PART NUMBER J ① — ② 0 ③ ③ — ④ ⑤ ⑥ ⑥

① Model	② Control Output*	③ Input	④ Alarm/Timer 1	⑥ Options
1 2014 No communications	WITH SLIDEWIRE FEEDBACK	00 J Thermocouple	0 no alarm	00 No options
2 2014 RS232C non-isolated		01 K Thermocouple	1 HI process	XX Any special Factory assigns final numbers
3 2014 RS232C isolated	1 Heat SSR prop	02 R Thermocouple	2 LO process	
4 2014 RS422 non-isolated	2 Cool SSR prop	03 S Thermocouple	3 HI deviation	
5 2014 RS422 isolated		04 T Thermocouple	4 LO deviation	
6 2014 20mA Current isolated	WITHOUT SLIDEWIRE FEEDBACK	05 N Thermocouple	5 ON Timer	
A 2015 No communications		06 E Thermocouple	6 OFF Timer	
B 2015 RS232C non-isolated	A Heat SSR prop	07 μ Thermocouple		
C 2015 RS232C isolated	B Cool SSR prop	08 Platinum II T/C	⑤ Alarm/Timer 2**	
D 2015 RS422 non-isolated		09 Ni/Ni 18% Mo T/C	0 No alarm	
E 2015 RS422 isolated		10 W5 Re/W26 Re T/C	1 HI process	
F 2015 20mA Current isolated		11 W3 Re/W25 Re T/C	2 LO process	
		12 W/W26 Re T/C	3 HI Deviation	
		20 1 RTD 100 Ω PT	4 LO Deviation	
		21 0.1 $^{\circ}$ RTD 100 Ω PT	5 ON Timer	
		40 0.5 volts DC	6 OFF Timer	
		60 4.20 mA DC		

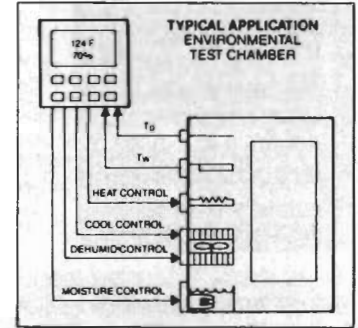
*For non-Temperature applications HEAT corresponds to Reverse acting and COOL to Direct acting output

**NOTE Alarm/Timer 2 is not available when slidewire feedback is used

LFE Relative Humidity PμP Controllers Model 2016



Relative humidity control has achieved a new level of performance with the LFE Model 2016 Relative Humidity Controller. In conjunction with field proven wet bulb and dry bulb RTD Sensors this controller can quickly be integrated into existing and new relative humidity control applications. Included in this controller is a user selectable profile control program for ramp and soak control of both relative humidity and dry bulb temperature. The unique vacuum-fluorescent display actually shows key words to prompt the operator during programming, tuning and operation eliminating the guess work of flashing lights. Color-coded alarm, output and mode words built into the display permit instant status review at all times.

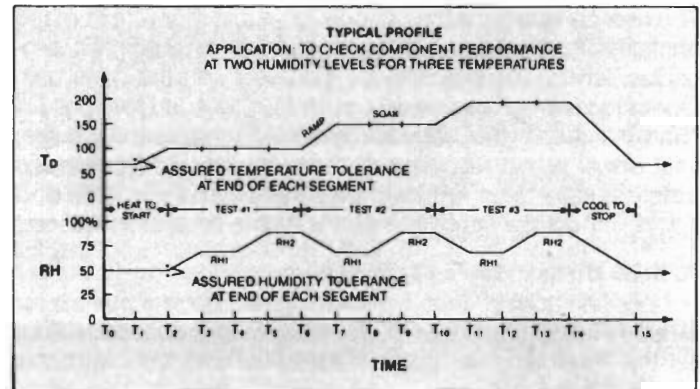


Calculated Relative Humidity

The LFE Model 2016 microprocessor-based Relative Humidity Controller internally calculates relative humidity from wet bulb and dry bulb sensor inputs. The controller automatically compensates for non-linear and temperature effects to display actual relative humidity as a percent. The independent temperature and relative humidity control loops each have dual Heat/Cool control outputs. Each primary output can be PID tuned time proportional solid-state relay or analog output. Each secondary output is an electromechanical relay with SPNO contacts. The secondary output(s) can alternately be used as alarm relays with SPNC contacts.

Profile Control

As shown in the profile diagram, both relative humidity and dry bulb temperature can be profiled concurrently. All programming is accomplished through the front keypad in a fixed sequence prompted by the alphanumeric display. Each profile program can automatically repeat and an Assured Setpoint feature ensures on-spec profile when selected. Store up to 8 profiles of 16 segments each or a single profile with up to 99 segments.



Relative Humidity Sensor Input

For applications employing a relative humidity sensor the sensor output can be used directly by any of the other 2000 Series Controllers. Both steady-state and profile control are available with relative humidity sensor input.

Specifications (For complete specifications see page 2)

- Accuracy:** Over Dry Bulb range of 5 to 85°C.
At 25°C Amb: ± 0.2°F ± 0.1°C ± 2% R.H.
5-50°C Amb: ± 0.3°F ± 0.2°C ± 3% R.H.
- Resolution:** 0.1° for Temperature and 1% for Relative Humidity.
- Inputs:** Two 100 ohm Pt RTD, 3850 ppm (0.1°)
One wet bulb and one dry bulb temperature input.

Outputs: Two Temperature and two Relative Humidity control outputs. Primary outputs for Temperature and Relative Humidity can be 1A optically isolated solid-state relay, 4-20mA DC into 1K ohm maximum load or 0-5VDC into 1K ohm minimum load outputs. Secondary outputs are 1A electromechanical relays, 120 VAC non-inductive, for Temperature and Relative Humidity control or for alarm outputs.

Model 2016

PART NUMBER



① Profiles — Segments

- Without Digital Communications
 - 0 1 Profile 99 Segments each
 - 1 2 Profiles 64 Segments each
 - 2 4 Profiles 32 Segments each
 - 3 8 Profiles 16 Segments each
- With Digital Communications
 - A 1 Profile 99 Segments each
 - B 2 Profiles 64 Segments each
 - C 4 Profiles 32 Segments each
 - D 8 Profiles 16 Segments each

⑤ Options

- CO Standard
- XX Any special Factory assigns final numbers

② Primary Output Temperature

- 0 No Output
- 1 Heat SSR On/Off
- 2 Cool SSR On/Off
- 3 Heat SSR Prop
- 4 Cool SSR Prop
- 5 Heat 4-20 mA DC
- 6 Cool 4-20 mA DC
- 7 Heat 0-5 VDC
- 8 Cool 0-5 VDC

③ Primary Output Relative Humidity

- 0 No Output
- 1 Humid SSR On/Off
- 2 Dehumid SSR On/Off
- 3 Humid SSR Prop
- 4 Dehumid SSR Prop
- 5 Humid 4-20 mA DC
- 6 Dehumid 4-20 mA DC
- 7 Humid 0-5 VDC
- 8 Dehumid 0-5 VDC

④ Secondary Temp. Output or Alarm 1 Output

- 0 None
- 1 High process alarm
- 2 Low process alarm
- 3 High deviation alarm
- 4 Low deviation alarm
- 5 Deviation band alarm
- 6 Aux. heat control output
- 7 Aux. cool control output
- 9 High process alarm
- A Low process alarm
- B High deviation alarm
- C Low deviation alarm
- D Deviation band alarm
- F Power failure — latching
- H High process alarm
- J Low process alarm
- K High deviation alarm
- L Low deviation alarm
- M Deviation band alarm
- R High process alarm
- S Low process alarm
- T High deviation alarm
- U Low deviation alarm
- V Deviation band alarm

⑤ Secondary R.H. Output or Alarm 2 Output

- 0 None
- 1 High process alarm
- 2 Low process alarm
- 3 High deviation alarm
- 4 Low deviation alarm
- 5 Deviation band alarm
- 9 High process alarm
- A Low process alarm
- B High deviation alarm
- C Low deviation alarm
- D Deviation band alarm
- F Error alarm — latching
- H High process alarm
- J Low process alarm
- K High deviation
- L Low deviation alarm
- M Deviation band alarm
- N Aux. humid control output
- P Aux. dehumid control output
- R High process alarm
- S Low process alarm
- T High deviation alarm
- U Low deviation alarm
- V Deviation band alarm

LFE Multi-Zone P μ P Setpoint Programmer Model 2017



The LFE Model 2017 microprocessor-based Setpoint Programmer provides a precise setpoint signal for one or more standard PID controllers. Store in permanent memory up to 16 menus with 255 total segments of ramp or soak control. In addition four alarm/event relay outputs are included that are programmable at the end of each segment.

All profile programming is accomplished through the front keypad. The unique color-coded alphanumeric display shows key words to prompt and inform the operator during all programming and operation. There are no internal pots, switches or jumpers to set or adjust. A unique output calibration procedure is also accomplished through the front keypad.

Profile Control

Programming for profile control has never been easier. The controller display prompts the operator step by step through all necessary keypad inputs. The operator can review the active profile at any time and changes can be made on-line.

- Profiles:**
- 1 Profile with 255 Segments
 - 2 Profiles of 127 Segments each
 - 4 Profiles of 63 Segments each
 - 8 Profiles of 31 Segments each
 - 16 Profiles of 15 Segments each

Ramp by Time or Rate

12:34 H:M
A 012

OR

10/HR
A 012

For each segment of ramp, select either a time for the ramp or a rate of setpoint change for the ramp. The rate of ramp can be set in units per hour or units per minute and functions with both increasing and decreasing setpoints. Rate of ramp can be set up to 1350 units/unit time.

Alarm/Event Relays

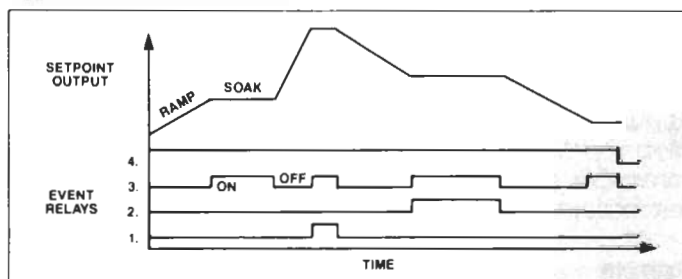
RLY 1234
A12 0101

At the end of each segment, the desired ON or OFF state for each of the four relay outputs can be set as part of the programming sequence in the Tune loop. Relay outputs used for other alarm functions are blanked on this display to prevent operator error. "0" is OFF and "1" is ON for relays 1, 2, 3 and 4 as shown on the display.

Specifications (For complete specifications see page 2)

Setpoint Output: One analog 0-5VDC output into 1K ohm minimum load or one 4-20mA DC or 0-20mA DC output into 750 ohm maximum load. Drive 30 or more LFE Model 2005 Zone Controllers. 11 bit output resolution.

Typical Control Profile



Features

Start: The START key starts the control output at the beginning of the profile shown on the display.

Pause: The PAUSE key holds the control output at the then active setpoint. REMOTE PAUSE is activated by the Zone Controllers.

Reset: The RESET key holds the control output at the preset level. The operator can reset (change) the profile and/or segment shown on the display if desired.

Resume: The RESUME key resumes normal control action. After a PAUSE command, RESUME starts at the point of PAUSE. After a RESET command, RESUME starts from the beginning of the displayed segment.

Repeat: Any profile can be automatically repeated up to 254 times or can repeat continuously.

Security: The arrow keys can be locked out to prevent unauthorized setpoint changes. The display continues to provide all data.

Relays: Four event relays can provide ON/OFF switch action at each segment. Alternative function alarm relays are available.

Calibration: The setpoint output is calibrated from the keypad with no internal pots to set or adjust.

Model 2017

PART NUMBER



① Profiles

- 5 1 Profile — 255 Segments
- 6 2 Profiles — 127 Segments
- 7 4 Profiles — 63 Segments
- 8 8 Profiles — 31 Segments
- 9 16 Profiles — 15 Segments

③ Setpoint Output

- 0 4-20 mA DC
- A 0-5VDC
- B 0-10VDC
- C 0-20mA DC

LEGEND

- (I) = isolated
- (NI-I) = non-isolated

② Communications

- 0 No communications
- 1 RS232C (NI-I)
- 2 RS232C (I)
- 3 RS422 (NI-I)
- 4 RS422 (I)
- 5 20 mA Current (I)
- A Remote pause but no comm
- B Remote pause & RS232C (NI-I)
- C Remote pause & RS232C (I)
- D Remote pause & RS422 (NI-I)
- E Remote pause & RS422 (I)
- F Remote pause & 20 mA Current (I)

EVENT RELAYS

④ Relay 1 (ALARM 1)

- 0 None
- 1 OFF Event Relay (NC)
- 2 ON Event Relay (NO)
- 3 Power Fail Latch
- 4 STOP ALARM
- 5 PAUSE ALARM
- 6 PAUSE/STOP ALARM

⑤ Relay 2 (ALARM 2)

- 0 None
- 1 OFF Event Relay (NC)
- 2 ON Event Relay (NO)
- 3 Power Fail Latch
- 4 STOP ALARM
- 5 PAUSE ALARM
- 6 PAUSE/STOP ALARM

⑥ Relay 3 (OUT 1)

- 0 None
- 1 OFF Event Relay (NC)
- 2 ON Event Relay (NO)
- 3 Power Fail Latch
- 4 STOP ALARM
- 5 PAUSE ALARM
- 6 PAUSE/STOP ALARM

⑦ Relay 4 (OUT 2)

- 0 None
- 1 OFF Event Relay (NC)
- 2 ON Event Relay (NO)
- 3 Power Fail Latch
- 4 STOP ALARM
- 5 PAUSE ALARM
- 6 PAUSE/STOP ALARM

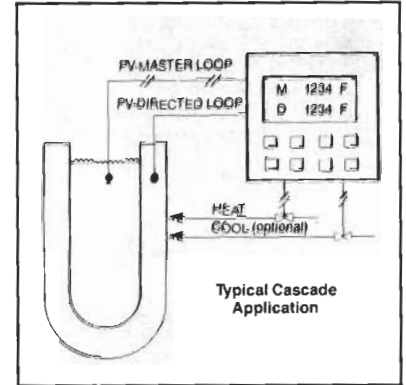
⑧ Special

- 00 Standard
- XX Any special. Factory assigns final numbers.

LFE Cascade P μ P Controllers Model 2019



This innovative 1/4 DIN microprocessor-based instrument provides accurate and reliable control in applications where the process variable (Master) can best be controlled through control of an intermediate (Directed) medium i.e. cascade control. Temperature, pressure, flow and level cascade systems can all benefit from this operator friendly, intelligent controller. English language display prompts ensure correct set-up and operation. More operator information is available than with any other comparable controller. Individual PID tuning, full auto/manual control, and profile control are standard.



Inputs

Select from 13 thermocouple types, RTD or process inputs. Programmable span and units display. Controller can accept thermocouple-process and RTD-process input combinations.

Outputs

Select single or dual (Heat/Cool) output. Output(s) can be solid state relay (SSR) or analog type. Outputs are independently tuned.

Alarms

Select up to two electromechanical alarm/event SPST relay outputs, NC or NO. Alarms can be process, deviation or deviation band with HI or LO action. Event relays are programmable to turn on or off at the end of each profile segment.

Profile Control

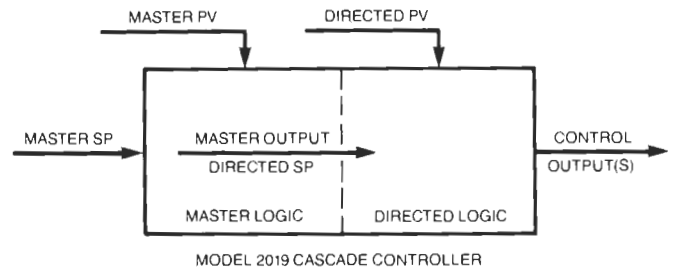
In addition to single setpoint control the controller can store in permanent memory up to 16 control profiles with a total of 256 segments. All profile programming is accomplished through the front keypad in a structured prompting display sequence. ASSURED SOAK and REPEAT CYCLES are standard.

Manual Setpoint

By key press the operator can manually set the setpoint for the Directed loop for start-up, tuning and system testing. The setpoint can be set as a percent (%) of span or as an absolute value.

Independent Scaling

Master and Directed loops can have independent scaling and engineering units.



Manual Outputs

By key press the operator can take direct control of the output(s) of the controller. Special displays show the process variable and the percent (%) output power.

Model 2019

PART NUMBER



1 Communications

- J None
- L RS232 Non-Isol
- M RS232 Isolated
- N RS422 Non-Isol
- P RS422 Isolated
- C 20 mA Current
- R RS485 Isolated

2 Output 1

- 1 On/Off SSR/Heat
- 2 On/Off SSR/Cool
- 3 Tri/SSR/Heat
- 4 Tri/SSR/Cool
- 5 4-20 mA/Heat
- 6 4-20 mA/Cool
- 7 0/5 VDC/Heat
- 8 0/5 VDC/Cool

3 Output 2

- 0 None
- 1 On/Off SSR/Heat
- 2 On/Off SSR/Cool
- 4 Tri/SSR/Cool
- 6 4-20 mA/Cool
- 8 0/5 VDC/Cool

4 Master Input

- 0 J Thermocouple
- 1 K Thermocouple
- 2 R Thermocouple
- 3 S Thermocouple
- 4 T Thermocouple
- 5 IN Thermocouple
- 6 IE Thermocouple
- 7 B Thermocouple
- 8 Platinum II
- 9 Ni/Ni 10% Mo/ly

5 Directed Input

- A W3% Re/W25% Re
- B W2% Re/W25% Re
- C W/W 25% Re
- K RTD 100 Ohm
- L RTD 100 Ohm
- R 0/5 VDC
- S 0/5 VDC
- T 0/5 VDC
- W 4-20 mA/DC

6 Alarm/Event 1

- 0 No Alarm
- 1 HI Process
- 2 LO Process
- 3 HI Dev
- 4 LO Dev
- 5 Dev Band
- 7 Event Relay
- A HI Process
- B LO Process
- C HI Dev
- D LO Dev
- E Dev Band

7 Alarm/Event 2

- J HI Process
- K LO Process
- L HI Dev
- M LO Dev
- N Dev Band
- R HI Process
- S LO Process
- T HI Dev
- U LO Dev
- V Dev Band

8 Options

- CO No Options
- XX Any Special Factory assignments final number!

LFE Hi/Lo Limit P μ P Controllers, Model 2040/2041

Description

LFE Model 2040 Limit Controllers provide safe and reliable limit shut-off control as an adjunct to any machine or process control system. The bright blue, high visibility, VF display prompts the user with fixed sequences of displays to ensure proper calibration, configuration and operation.

Input

Select from type J, K, R, S, T, E, or B thermocouple, 100 ohm Platinum RTD, 0/5 VDC, 1/5 VDC and 4/20 mA DC input. See specifications for the maximum range for each input type.

Output

5 Amp @ 240 VAC non-inductive electromechanical relay with both NC and NO contacts.

Analog Backup

An independent analog backup setpoint circuit constantly monitors the measurement and will trip the LIMIT relay when its setpoint is exceeded. The backup setpoint is set at a value outside the primary setpoint to provide redundant limit operation.

Digital Watchdog

A special digital circuit continually monitors the microprocessor operation to ensure consistent, reliable operation of the primary digital limit circuitry.

Self-Diagnostics

The controller automatically self-checks its operation and will trip the limit relay and display an error message in the event of loss of input or other failure.

Min/Max Memory

The controller stores the minimum (LO) or maximum (HI) process value since the last reset for recall by the operator. The memory can be cleared by a key press.

Keypad Security

A special program permits locking out the arrow keys function to prevent unauthorized change of the digital setpoint.

Limit Duration

The controller times all "out-of-limit" excursions and will display the time that the process was out-of-limit on demand. The time memory can be cleared by a key press.

Configuration

A security-coded configuration program allows an OEM or user to change some thermocouple types, F or C units and operating span from the front keypad.

Installation

Mount in standard 1/4 DIN cut-out with self-adjusting brackets. Screw terminals at rear of ventilated case.



- 5 AMP Electromechanical Relay
- Bright 4 Digit Blue VF Display
- Independent Analog Backup
- Digital Watchdog Protection
- Min/Max Temperature Memory
- Out-Of-Limit Time Record
- Key Code Security/Lockout
- Self-Diagnostics with Display

Performance

Accuracy: 1% of Full Span or 10° F (Digital)

Repeatability: $\pm 1^\circ$ F

Temperature Stability: Offset $\pm 0.01\%$ FS/ $^\circ$ C. Gain ± 100 ppm/ $^\circ$ C

Input

User can select desired span.

Analog input scaled to ± 9999 counts.

Input impedance: 22 megohm min. (T/C input)

THERMOCOUPLES: Maximum span shown.

J	-300/+1400° F	-185/+760° C
K	-340/+2480° F	-207/+1360° C
R	+200/+3200° F	+90/+1760° C
S	+32/+3180° F	0/+1750° C
T	-380/+740° F	-230/+390° C
E	-180/+1610° F	-115/+870° C
B	+600/+3260° F	+310/+1790° C

RTD:

100 ohm, 3850 ppm/ $^\circ$ C Platinum, 3 wire
-300/+1500 F -180/+800 C

Current: 4-20 mA DC

Voltage: 0-5VDC, 1-5 VDC

Temperature Rating:

Operating 5 to 55° C (41 to 131° F)
Storage -20 to 71° C (-4 to 160° F)

Noise Rejection:

Common Mode 120 db min, 140 db Typ @ 60 Hz
Normal Mode 60 db min, 65 db Typ @ 60 Hz

Output: SPDT form C electromechanical relay
rated 5 amps at 250 VAC, 50/60 Hz

Control Action: HI or LO Limit

Alarm Function: Select HI or LO process alarm settable up to the full input span.

Humidity: 0 to 90% RH non-condensing

Sensor Break Protection: Display indicates error message and relay trips on thermocouple and Hi Limit RTD input units

Input Power: 10 watts Typical @ 117 VAC, 13.5 watts maximum
50/60 Hz ± 2 Hz, 220 or 240 VAC available

Self Diagnostics: Display indicates error message and relay trips.

Display: Sealed vacuum-fluorescent with 4 blue seven-segment characters.

Function Selection

Model 2040

Standard Unit

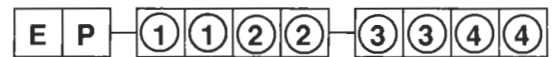
Part Number



Model 2041

FM Approved Unit

Part Number



① Output

- 10 5 AMP EMR
- HI Limit
- 20 5 AMP EMR
- LO Limit

② Input

- 00 Type J Thermocouple
- 01 Type K Thermocouple
- 02 Type R Thermocouple
- 03 Type S Thermocouple
- 04 Type T Thermocouple
- 05 Type E Thermocouple
- 06 Type B Thermocouple

- 20 100 Ω Pt RTD
- 40 0-5 VDC*
- 41 1-5 VDC*
- 60 4-20mA DC*

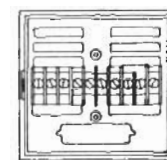
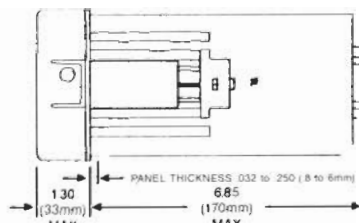
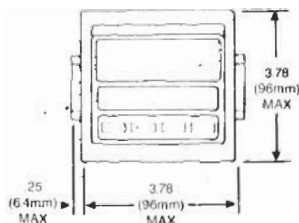
*Model 2040 only

③ Display Range

- 00 Not Ranged
- XX The factory will assign a unique part number for each range ordered

④ Special

- 00 Standard
- XX The factory will assign a unique part number for each special ordered.



REAR VIEW

- 1 AC HI
 - 2 AC LO
 - 3 GND
 - 4 NO
 - 5 C
 - 6 NC
 - 7 SPARE
 - 8
 - 9
 - 10
- } Output
} Input



Display and Control Instrumentation



Analog Panel Meters

- | | |
|-------------|----------------|
| Rectangular | Ruggedized |
| Round | Dials & Scales |
| Edgewise | Sensors |

Meter Relay Controllers

- | | |
|-------------|------------------|
| Optical | Magnetic |
| Solid State | Locking Coil |
| Modular | High Sensitivity |



Digital Panel Meters

- 3 1/2 - 4 1/2 Digit LED Display
- 3 1/2 - 4 1/2 Digit "µP" VF Display
- 3 - 3 1/2 - 4 1/2 Digit Gas Discharge Display
- 3 1/2 - 4 1/2 Digit Loop Powered Indicators

Digital Control Meters

- 3 1/2 - 4 1/2 Digit "µP" Control Meters
- 3 1/2 Digit Analog Setpoint Control Meters



Temperature/Process Controllers

- | | |
|-------------|---------------------|
| Single Loop | Setpoint Programmer |
| Profile | Zone Controllers |
| Position | Relative Humidity |
| Cascade | pH Controllers |
| HI/LO Limit | Custom Programmed |

Control Accessories

- Digital Communications



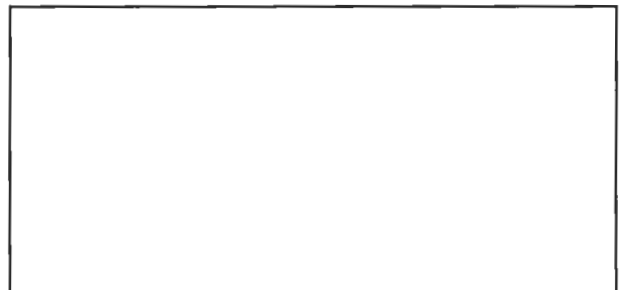
Hi-Speed Counting Controllers

- 6 and 8 Digit Totalizing
- Rate Indication and Control
- Single and Multiple Batch Setpoints
- Tachometer Indication and Control
- Difference and Ratio Indication

Count Transducers

- Encoders, Photo Electric Sensors
- Proximity Pick-ups, Pulse Generators

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