LFT

PROGRAMMER CONTROLLER

IP 65 NEMA 4X

LFT

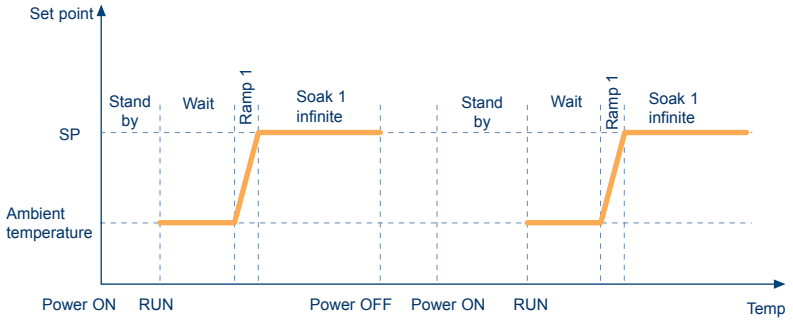
- SMART TUNE- PID CONTROL
- UNIVERSAL, 3 WIRE- TC, RTD AND LINEAR INPUT
- 5 SEGMENT PROGRAM PROFILE + PROGRAM REPETITIONS
- GUARANTEED SOAK & RAMP TRACKING FUNCTIONS
- PROCESS, BAND, DEVIATION AND CONTROL FAULT ALARMS
- 3 RELAY/ SSR OUTPUTS
- LOGIC INPUT
- DIN RAIL MOUNTING VERSION
- IP 65 AND NEMA 4X FRONT PROTECTION

EROELECTRONIC

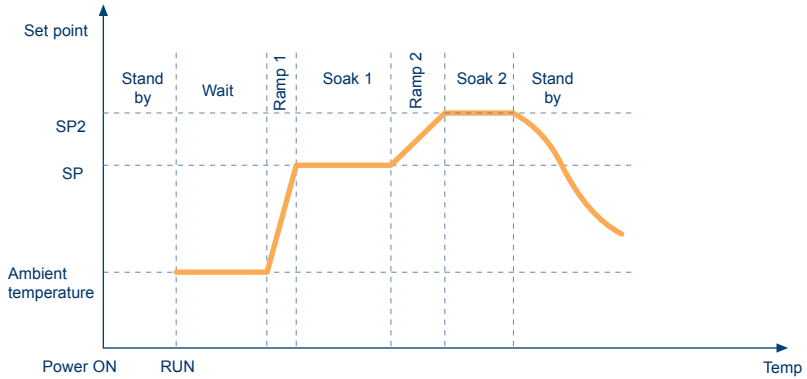
The LFS 1/16 DIN Controller/ Programmer provides fully configurable ramp/soak capability in a PID controller with autotuning in which multiple setpoints, soak duration and controlled ramps are required. Programming features include logic input (SP1 or SP2) and front panel start program execution, guaranteed soak, ramp tracking, manual mode selection, end-of-cycle indication, and configurable number of repeats and soak times. The LFS is ideal for applications such as environmental chamber and oven control.
A NEMA 4X IP65 faceplate enables its use in dust or washdown conditions.

OPERATIVE MODES

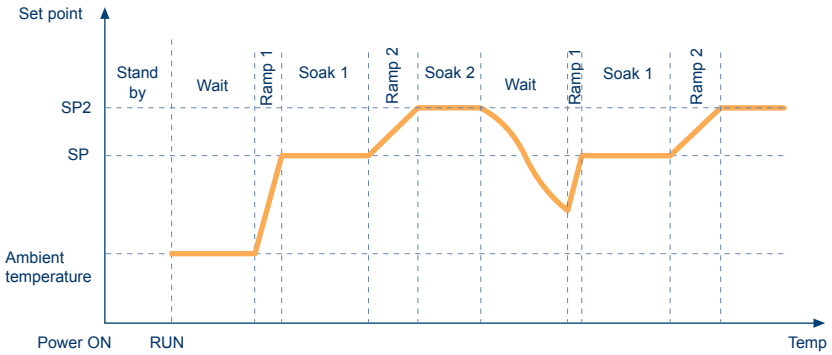
Mode A.
After the 2 initial segments (stand-by and wait) the instrument will operate as a controller with a programmable ramp to reach the set point value.



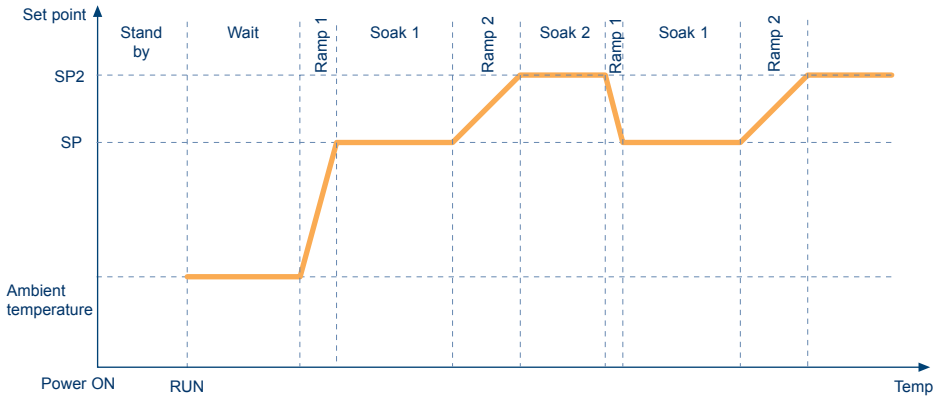
Mode B.
The instrument will operate as a controller/programmer without program repetition.



Mode C.
The instrument will operate as a controller/programmer with more than one repetition of the complete program.

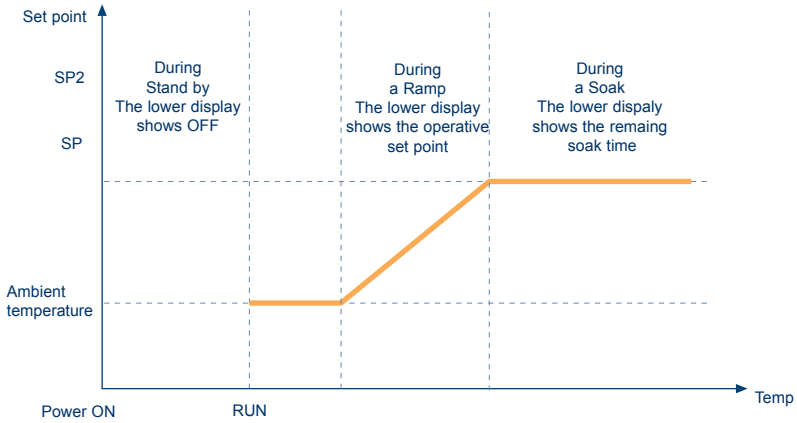


Mode D.
The instrument will operate as a controller/programmer with more than one repetition, but the wait region will be executed only at the begining of the first cycle.



PROGRAMMER OPERATION

A single 4 segment program is availiable which can be repeated from 1 to 100 times. Separate delay segments can be defined for the first step and all "wait" steps after a repeat.



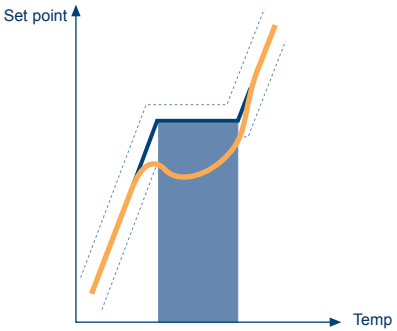
PROCESS PROTECTION ALARMS

Process (high or low limit), Band and Deviation alarm outputs are available with the additional flexibility of latching and masking functions until the process variable reaches the alarm threshold. Band and Deviation alarms are also masked after a set point change until the process variable reaches the alarm threshold. The alarm latching function holds the alarm on until it is acknowledged.

SMART TUNING

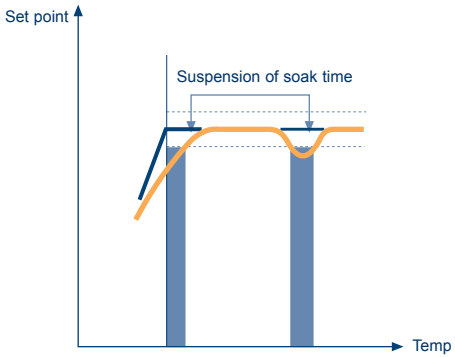
Automatically adjusts the PID parameters according to the process dynamics.
An important characteristic of the ERO Electronic continuous self tuning algorithm is its ability to optimise control parameters without injecting any artificial disturbances into the system.

SPECIAL FUNCTIONS



RAMP TRACKING

If the process is interrupted during a ramp, the controller will continue the ramp after the process stablizes at the target set point valve.



GUARANTEED SOAK

Guaranteed Soak assures the product receives the desired process time at all program segments.

PRODUCT SPECIFICATION

Case:	polycarbonate grey case.
Self extinguishing degree:	V-0 according to UL746C.
Front protection:	designed and tested for IP 65 and NEMA 4X for indoor locations (when panel gasket is installed). tests were performed in accordance with IEC 529, CEI 70-1 and NEMA 250-1991 STD.
Rear terminal:	rear safety cover - IP20 protection
Dimensions:	48 x 48mm (according to DIN 43700); depth 122mm.
Weight:	450g max
Power supply:	- 100 to 240V AC 50/60Hz (-15% to +10% of the nominal value). - 24V DC/AC (±10% of the nominal value).
Power consumption:	8VA.
Insulation resistance:	> 100MΩ according to IEC 348.
Isolation voltage:	1500V r.m.s. according to IEC 348.
Common mode rejection ratio:	120dB @ 50/60Hz.
Normal mode rejection ratio:	60dB @ 50/60Hz.
EMC/Safety:	this instrument is marked CE. It conforms to council directive 89/336/EEC (reference harmonized standard EN-50081-2 and EN-50082-2). 73/23/EEC and 93/68/EEC (reference harmonized standard EN 61010-1).
Installation:	panel mounting by means of brackets.
Sampling time:	for TC or RTD inputs = 500mSec.
Accuracy:	±0.2% f.s.v. @ 25°C and nominal power supply voltage.
Operative temperature:	from 0 to +50°C.
Storage temperature:	from -20 to +70°C.
Humidity:	from 20% to 85% RH not condensing.
D/A conversion:	dual slope integration. for linear input = 250mSec
Protections:	1. WATCH DOG for automatic reset. 2. DIP SWITCHES for configuration and calibration parameter protection.

MEASURING INPUTS

All inputs are factory calibrated and selectable by the front keyboard.

Thermocouple

Type: J, K, L, N, R, S and T keyboard programmable.
Engineering unit: °C and °F keyboard programmable.
Line resistance compensation error: max. ±0.1% of the input span with input impedance ≤100Ω.
Sensor braek: detection of the open input circuit (wires or sensor) with underrange or overrange selectable indication.
Cold junction compensation error: 0.1°C/°C.
Input impedance: >100KΩ.
Calibration: according to IEC 584-1.
note: for TC inputs it is possible to select a measuring range, within the standard input range, with a minimum span of 300°C or 600°F. In this way it is possible to increase the sensitivity of the control parameters.

Standard range table

TC type	°C	°F
L	0/400	0/1650
	0/900	
J	0/400	0/1830
	0/1000	
K	0/400	0/2190
	0/1200	
N	0/1400	0/2550
R	0/1760	0/3200
S	0/1760	0/3200
T	0/400,0	0/750

RTD input

Type: Pt 100 3-wire connection.
Calibration: according to DIN 43760.
Line resistance: max 20Ω/wire with no measurable error.
Engineering unit: °C and °F keyboard programmable.
Sensor break: detection of the sensor open circuit and of one or more wires in open circuit. Detection of the sensor short circuit.
note: for RTD inputs it is possible to select a measuring range, within the standard input range, with a minimum span of 100°C or 200°F. In this way it is possible to increase the sensitivity of the control parameters.

Standard range table

Input	°C	°F
RTD Pt 100	-199,9/400	-199,9/400,0
RTD Pt 100	-200/800	-330/1470

mA and V input

mA input (standard): 0-20mA and 4-20mA keyboard programmable.
input impedance: 3Ω.
V input: 0-5V and 1-5V programmable. Input impedance: >90kΩ.
0-10V and 2-10V programmable. Input impedance: >180kΩ.
0-60mV and 12-60mV programmable. Input impedance: >1MΩ.
Read-out: keyboard programmable from -1999 to 4000.
Decimal point: programmable in any position.

Standard range table

Input range	Impedance
0-20 mA	3 Ω
4-20 mA	3 Ω
0-60 mV	> 1 MΩ
12-60 mV	> 1 MΩ
0-5 V	> 90 kΩ
1-5 V	> 90 kΩ
0-10 V	> 180 kΩ
2-10 V	> 180 kΩ

LOGIC INPUT

The LFT is equipped with a logic input used to start the program execution.

SET POINT PATTERN

Segment description

1. "STAND-BY": The device operates as an indicator. The power output is OFF and alarms are not active.
Range: from 0 to 99h 59'.

2. "Wait": In this segment the power out is OFF and alarms are not active. The time duration of this segment is programmed by a "WAIT TIME" parameter. The upper display shows the process variable while the lower display flashes the time to reach the end of this segment.
Range: from 0 to 99h 59'.

3. "Ramp to SPx": At the begining of this segment the instrument aligns the operative setpoint to the actual measured value and then starts ramping towards SPx (SP1 or SP2).
The upper display shows the process variable while the lower display shows the actual set point.
The gradient of this ramp is programmable. During ramp execution the tracking function may be activated.
Range: from 1 to 500 dgt/min. or step transfer.

4. "Soak to SPx": In this segment the guaranteed soak feature may be activated. The upper display shows the process variable while the lower display shows the time to reach the end of this region.
Range: from 0 to 99h 59'.

Manual Mode: When the instrument is in MANUAL mode the lower display shows "n." followed by OUT1 power output value (from 0 to 100%).
The power output can be modified by using ∧ and ∨ pushbuttons.
note: if a shutdown occurs when the instrument is in MANUAL mode, at instrument power up it will restart in manual mode with the same power output assigned to the instrument before the power shutdown.

CONTROL ACTION

Algorithm:	PID + SMART or ON/OFF.
Type:	one control output.
Proportional band:	programmable from 1.0% to 100.0% of the selected input span. Setting a value equal to 0, the control action becomes ON/OFF.
Hysteresis:	(for ON/OFF control) programmable from 0.1 to 10% of the selected input span.
Integral time:	programmable from 20 seconds to 20 minutes or excluded.
Derivative time:	programmable from 1 second to 10 minutes or excluded.
Integral preload:	programmable from 0 to 100% of the output range.
Stand-by/manual mode:	selectable by front pushbutton.
Program repetition:	programmable from 0 (only one cycle) to 99 repetitions (100 program cycle).
Set point limiters:	set point low limit and set point high limit are programmable.

CONTROL OUTPUT

Type:	time proportioning.
Updating time:	250mSec
Direct/reverse action:	keyboard programmable.
Out 1 cycle time:	for relay output: from 1 second to 200 seconds. for SSR output: from 0.1 to 20.0 seconds.
Output level indication:	in percent on the lower display.
Output status indication:	one indicator (OUT 1) lit when the output is in ON condition.
Output level limiter:	from 0 to 100%.
Output Relay:	SPDT contact with rated current 3A at 250V AC on resistive load.
Logic voltage for SSR driver:	Logic level 0: < 0.5V DC Logic level 1: 14V < 20mA

ALARMS

This instrument is equipped with 3 independent outputs.
The first one is used as a control output while the other 2 outputs can be programmed as:
- alarm 1 + alarm 2
- "break event" + alarm 2
- alarm 1 + "end-of-cycle"
- "break event" + "end-of-cycle"

Output action:	direct or reverse function programmable.
Alarm functions:	each alarm can be configured as a process alarm, band alarm or deviation alarm.
Alarm reset:	automatic or manual reset programmable on each alarm.
Alarm masking:	each alarm can be configured as a masked alarm or standard alarm.
Alarm indications:	2 indicators lit when the respective alarm is ON.
Alarm outputs:	2 relay SPST. Contact rated at 2A, 250V AC on resistive load.

Process alarm

Operative mode:	minimum or maximum programmable.
Threshold:	programmable in engineering units within the whole range.
Hysteresis:	programmable from 0.1% to 10.0% of the input span.

Band alarm

Operative mode:	inside or outside programmable
Threshold:	programmable from 0 to 500 units.
Hysteresis:	programmable from 0.1% to 10.0% of the input span.

Deviation alarm

Operative mode:	high or low programmable.
Threshold:	programmable from -500 to +500 units.
Hysteresis:	programmable from 0.1% to 10.0% of the input span.

Break event
When the OUT 2 is used as "break event" output, it will assume, during program execution, the status (ON or OFF) programmed for the region actually in execution.

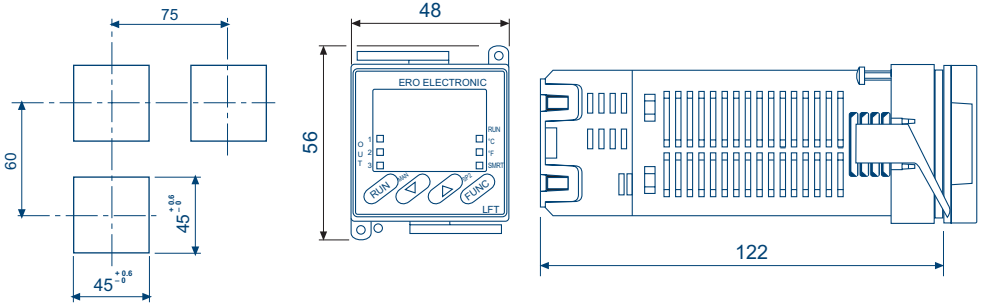
End-of-cycle indication
When the OUT 3 is used as "End-of-cycle" indicator, at the end of every program repetition cycle it will be forced to the ON state for a programmable time (from 0 to 60 seconds). At the end of the last programmed cycle it will be forced to the ON state for a time programmable from 10 to 60 seconds or infinite (up to the next program start).

LFT

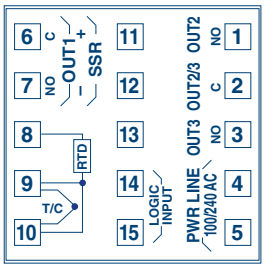
HOW TO ORDER

MODEL	INPUT	CONTROL ACTION	MAIN OUTPUT	OUTPUT 2	OUTPUT 3	POWER SUPPLY	CUSTOMI-SATION
LFT Dual 4 digit display	9 TC, RTD, 20 mA, 60 mV, 5 V, 10 V	3 PID + SMART	1 Relay 6 SSR	1 Relay	1 Alarm	3 100/240V AC 5 24V AC or DC	000 Std ERO Label N00 Neutral version
LFT	**9**	**3**		**1**	**1**		

DIMENSIONS AND PANEL CUT - OUT



REAR TERMINAL BLOCK



DIN RAIL MOUNTING KIT AVAILABLE FOR REAR OF PANEL/DIN RAIL MOUNTING **ALFREBOX00000**

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