■ LDE.LME

COMPACT THERMAL CONTROLLER/TIMER

CE c(UL)us IP 65 NEMA 4X

- SMART TUNE- PID CONTROL
- UNIVERSAL INPUT, 3 WIRE- TC, RTD
- 3 RELAY/ SSR OUTPUTS
- LOGIC INPUT OPTION
- MULTI-FUNCTION RAMP- DWELL PROCESS TIMER
- PROCESS, BAND, DEVIATION AND CONTROL FAULT ALARMS
- SOFT START- POWER LIMITER
- PC CONFIGURATION PORT
- OPC BASED GRAPHICAL CONFIGURATION SOFTWARE
- IP 65 AND NEMA 4X FRONT PROTECTION

OVERVIEW

Designed to offer outstanding performance in an economic 1/ 16 DIN package providing a comprehensive solution for a wide variety of applications such as food processing, plastic manufacturing, heat sealing and laboratory heating equipment requiring heat/cool control process protection alarms and integrated timer functions.

Universal- thermocouple or RTD input coupled with a responsive, SMART auto-tuning PID control algorithm that is equipped with special functions including, soft start and non linear cooling. User configurable process timer functions are also available to provide ramp-dwell control. A complete set of process protection alarm functions, high and low limit, band and deviation are included.

The 2 models offer a choice of display formats; LDE single 4 digit, LME dual 3 digit LED display with output and status beacons. Logic or Relay outputs are user configurable as either control, timer status or alarm functions. An optional logic input may be used to select timer mode or operating set-point

A built in Configuration interface port allows direct connection to a PC for parameter set-up.

IP65/ NEMA 4X panel sealing allows these units to be used in wash down or dusty applications.

SOFT START FUNCTION

The Soft-start feature provides temperature based output power limit protection. Limiting the heater power during startup reduces potential thermal stress on the heating elements. Both the Soft-start time and temperature threshold are configurable.

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.

During Start Up

Optimises the set point approach by implementing the auto-tuning function, calculating the value of the control parameters.

During Normal Regulation at Set-point

The Smart tuning function automatically updates the control parameters according to the characteristic of the process specific to set point change or load change. Test results for the temperature control of an extruder using an ERO Electronic smart tuning controller.

Set point 1 = 170°C
Load 1 = loadless machine
Load 2 = PVC
Set point 2 = 230°C
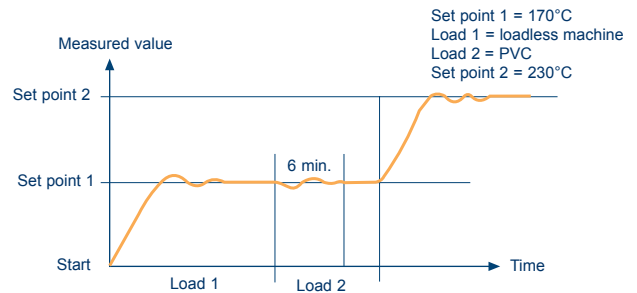
The machine was equipped with electric heating and oil cooling systems.

At start up the extruder was load-less and the first set point was 170°C.

1. In a load-less condition, the maximum deviation at the steady state equalled 0.3°C, machine loaded with PVC and production started.

2. After 6 minutes steady control state is reached. A new set point variation confirmed the results seen for load variation.

3. In all steady state control conditions a maximum deviation from set point was 0.3°C.

MULTI MODE PROCESS TIMER

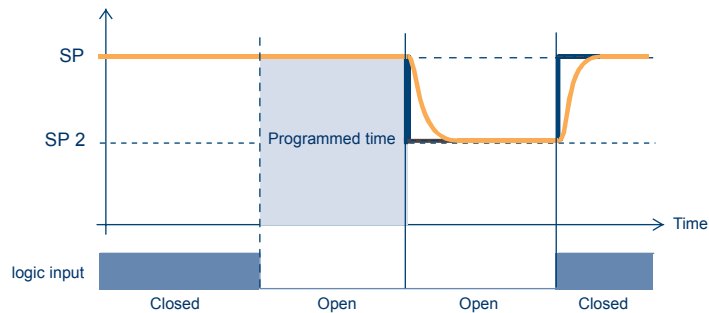The process dwell timer provides 4 user configurable operating modes:

1- Energy saving mode, on delay timer
2- Dwell timer with end of cycle relay contact
3- Dwell timer with timer run relay contact
4 -Dwell timer with no status output
Each of these timer modes may be switched between SP1 and SP2 or output off and SP1.

A logic input provides convenient control of the built in timer functions.
Alternatively the timer function can be disabled and the logic input used to select between 2 user defined set-points.

ENERGY SAVING MODE [1]

SP	
SP 2	Programmed time
	Time
logic input	
	Closed	Open	Open	Closed

DWELL TIMER MODE [2 - 3 - 4]

Timer operation using the guaranted soak function

Timer starts PV = SP

SP

The lower display shows the remaining time

Output Power OFF

Output Power OFF

MODE (2) no status indication

Programmed time

Time

logic input

Open   Closed   Open

MODE (3) OP2 end of cycle

MODE (4) OP2 timer running

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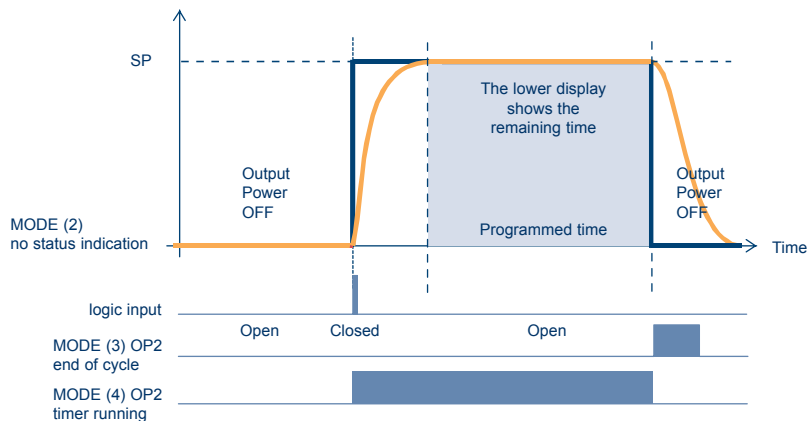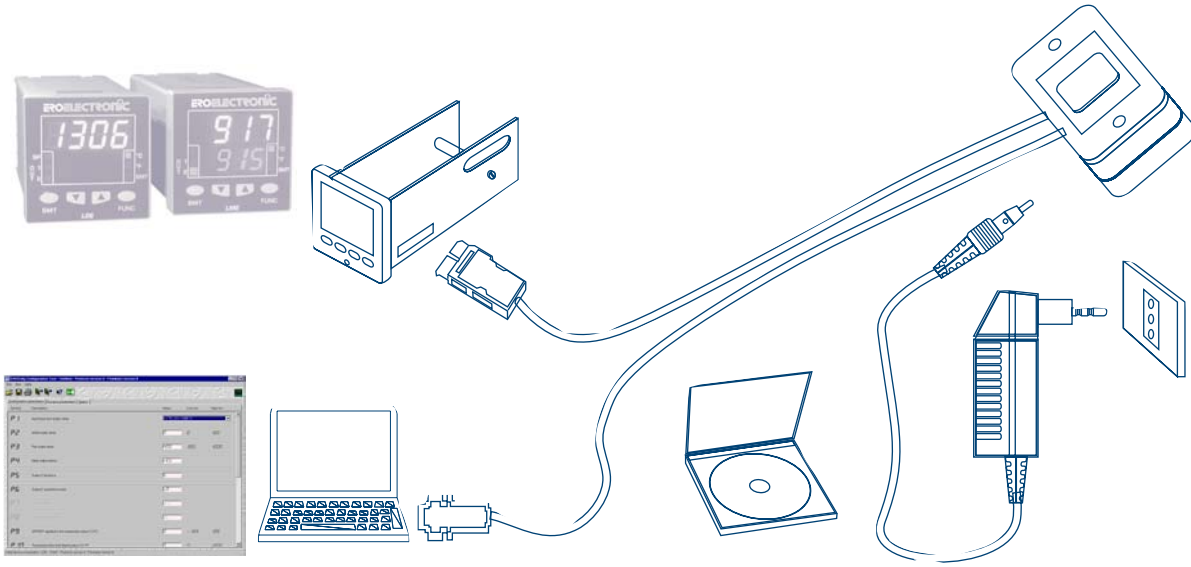
Direct communication between the controller and a PC is possible using the CPI allowing easy configuration between the instrument configuration port and the PC RS232 port (COM1/COM2).

PC based ERO Config software speeds and simplifies configuration by providing guided menus for complete instrument set-up and providing the facility to save and copy complete instrument configurations.

PRODUCT SPECIFICATION

Case:	ABS grey color (RAL 7043)
Self-extinguishing degree:	V-0 according to UL 749C.
Front protecion:	designed and tested for IP 65 (*) and NEMA 4X (*) for indoor locations (when panel gasket is installed). (*) Test were performed in accordance with CEI 70-1 and NEMA 250-1991 STD.
Installation:	panel mounting by means of mounting bracket. Instrument removable from case.
Rear terminal:	rear safety cover. IP 20 protection.
Dimensions:	48 x 48mm, depth 105mm (DIN 43700).
Weight:	250g max.
Power supply:	- 100V to 240V AC 50/60Hz (-15% to + 10% of the nominal value). - 24V AC/DC (±10% of the nominal value).
Power consumption:	6VA max.
Insulating voltage:	2300V RMS according to EN 61010-1.
Display updating time:	500mSec.
Sampling time:	500mSec.
Accuracy:	± 0,3% f.s.v. ±1 digit @ 25°C ambient.
Common mode rejection ratio:	120dB at 50/60Hz.
Normal mode rejection ratio:	60dB at 50/60Hz.
EMC/Safety :	this instrument is marked CE, it conforms to council directives 89/336/EEC (reference harmonized standard EN-50081-2 and EN-50082-2), 73/23/EEC and 93/68/EEC (reference harmonised standard EN61010-1).
Installation category:	II.
Temperature drift:	< 200 ppm/°C of the f.s.v. (RJ excluded). < 400 ppm/°C for RTD or TC type T.
Operative temperature:	from 0 to 50°C.
Storage temperature:	from -20 to +85°C.
Humidity:	from 20% to 85% RH, non condensing.

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MEASURING INPUTS

Thermocouples

Sensor Break: open input circuit detection (wires or sensor) with overrange or under range indication.

Cold junction: automatic compensation from 0 and 50°C ambient.

Cold junction compensation error: 0.1°C/°C.

Standard range table

TC type	°C		°F	
	LDE	LME	LDE	LME
L	0/900	0/900	0/1652	0/999
J	0/1000	0/999	0/1832	0/999
K	0/1370	0/999	0/2498	0/999
N	0/1400	0/999	0/2552	0/999
T	0/400	0/400	0/752	0/752

RTD

Type: Pt 100 3 wire connection.

Measure current: 135µA.

Line resistance: automatic compensation up to 20Ω/wire with:
- error <±0.1% of the input span for range -19.9 to 99.9°C.
- no measurable error for the other ranges.

Engineering unit: programmable °C or °F.

Sensor Break: open input circuit detection (wires or sensor) with overrange or under range indication. It shows the short circuit whenever the sensor resistance is lower than 15Ω.

Standard range table

RTD type	°C		°F	
	LDE	LME	LDE	LME
PT 100	-200/800	-199/800	-328/1472	-199/999
3 wire	-199.9/400.0	-19.9/99.9	/	/

CONTROL ACTION

Algorithm: PID + SMART.

Types:
- one control output (heating)
- two control outputs (heating and cooling).

Output types: relay or SSR.

Output action: time proportional.

Proportional band: from 1.0% (heating) or 1.5% (heating and cooling) to 100% of the input span. If PB = 0 the control algorithm becomes ON/OFF.

Hysteresis: (in ON/OFF control): from 0.1% to 10.0% of the input span.

Integral time: from 1 second to 20 minutes.

Derivative time: from 0 to 10 minutes.

Integral preload:
- for one control output, from 0 to 100% of the output range
- for two control outputs, from -100% to 100% of the output range.

Heating cycle: from 1 to 200 seconds.

Cooling cycle: from 1 to 200 seconds.

Relative cooling gain: from 0.20 to 1.00.

Overlap/dead band: from - 20% to 50%.

LOGIC INPUT

Type:	dry contact
	exititation 8V, 8mA
	sampling/ debounce period 300 mSec
Functions:	- Set Point section (SP/SP2)
	- Timer mode 1 - reset
	- Timer mode 2 - reset
	- Timer mode 3 - reset
	- Timer mode 4 - reset

OUTPUTS

Output 1 - relay

Relay type:	SPDT.
Contact rating:	3A @ 250V AC on resistive load.

Output 1 - SSR

Type:	non isolated.
	- Logic level 1: 14V DC @ 20 mA max. 24V DC @ 1mA.
	- Logic level 0: < 0.5V DC.

Output 2

Contact type:	SPST.
Contact rating:	2A @ 250V AC on resistive load.

Output 3

Type:	relay.
Contact type:	SPST.
Contact rating:	2A @ 250V AC on resistive load.

ALARMS

Action:	direct or reverse.
Function:	programmable as process, band or deviation alarm.
Reset:	programmable as automatic or manual reset.
Masking:	programmable as masked or standard alarm.
Hysteresis:	from 0.1% to 10.0% of the input span.

Process alarm

Operative mode:	"high" or "low", (programmable).
Threshold:	in engineering units within the input range.

Band alarm

Operative mode:	inside or outside band, (programmable).
Threshold:	from 0 to 500 units.

Deviation alarm

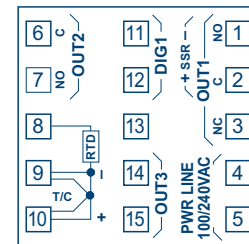|	
Operative mode:	"high" or "low", (programmable).
Threshold:	from -199 to +500 units.

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HOW TO ORDER

MODEL	INPUT	CONTROL ACTION	HEATING OUTPUT	COOLING/ ALARM OUTPUT	POWER SUPPLY	OPTIONS	CUSTOMISATION	CONFIGURATION CODE
LDE 4 digit temperature controller	4 TC, mV, mA,V, RTD	9 SMART o PID	1 Relay	0 not provided	3 100/240V AC	00 no option	00 Std ERO Label	00 European default
LME 3+3 digit temperature controller			6 SSR	1 relay	5 24V AC/DC	10 output 3 (alarm 2)	BO No Label, no number	DU American default
						20 logic input	ON neutral version	
	4	9						

DIMENSIONS AND PANEL CUT - OUT

75

60

45 $^{+0.8}_{-0}$

45 $^{+0.8}_{-0}$

⌀48

62.8

ERO ELECTRONIC

SP
OUT 1
OUT 2

°C
°F
SMT

SMT   LDE   FUNC

15 max

105

REAR TERMINAL BLOCK

6 C OUT2	11 DIG1	1 NO
7 NO	12	2 C OUT1 + SSR –
8	13	3 NC
9 I RTD	14 OUT3	4
10 + T/C	15 PWR LINE 100/240VAC	5
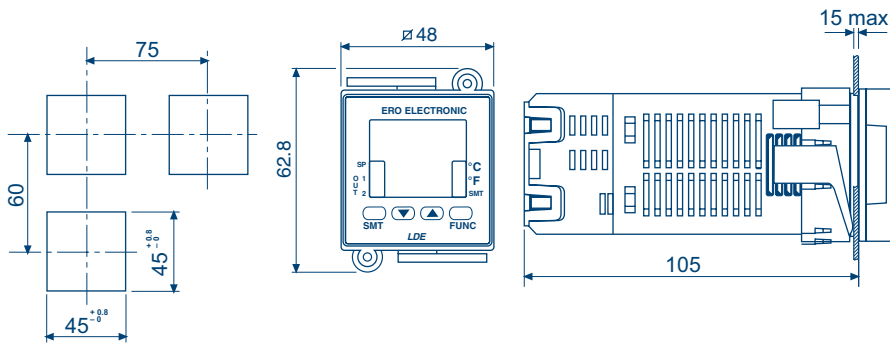
> **DIN RAIL MOUNTING KIT AVAILABLE FOR REAR OF PANEL/DIN RAIL MOUNTING**   **ALFREBOX00000**