LFT

MAIN FEATURES:

- Programmable pattern (5 regions).
- Ramp tracking function to assure a correct ramp execution.
- Guaranteed soak function to assure an exact soak time.
- Dimensions 1/16 DIN (48 x 48 x 122).
- IP 65 and NEMA 4X front protection.
- **SMART** function for the self-tuning of control parameters.
- Dual 4 digits LED display.
- **Universal input (7 TC type, RTD, mV, mA, 5V and 10V).**
- **2 independent outputs** programmable as "Break event" output, "End-of-cycle" indicator or alarms.
- The alarms can be programmed as process, band or deviation alarm with automatic or manual reset.
- Masking of the alarms.
- Manual control mode, output can be set in % of the power.
- Logic input for program "start".
- Switching power supply (100 to 240 V AC or 24 V AC/DC).
- Readout programmable from -1999 to 3999 (for linear inputs only).

LFT

SELF-TUNING FUNCTION

These instruments are equipped with a proprietary self-tuning algorithm called SMART.
During regulation, monitoring continuously the process variable, it is able to adjust automatically the PID parameters according to the shape of process variable itself.
The peculiarity of the continuous self-tuning algorithm is the ability to operate without injecting any artificial change into the system.

During regulation
The SMART implements the self tuning function updating, if necessary, the control parameters according to the shape of response due only to a set point change or to a load change.
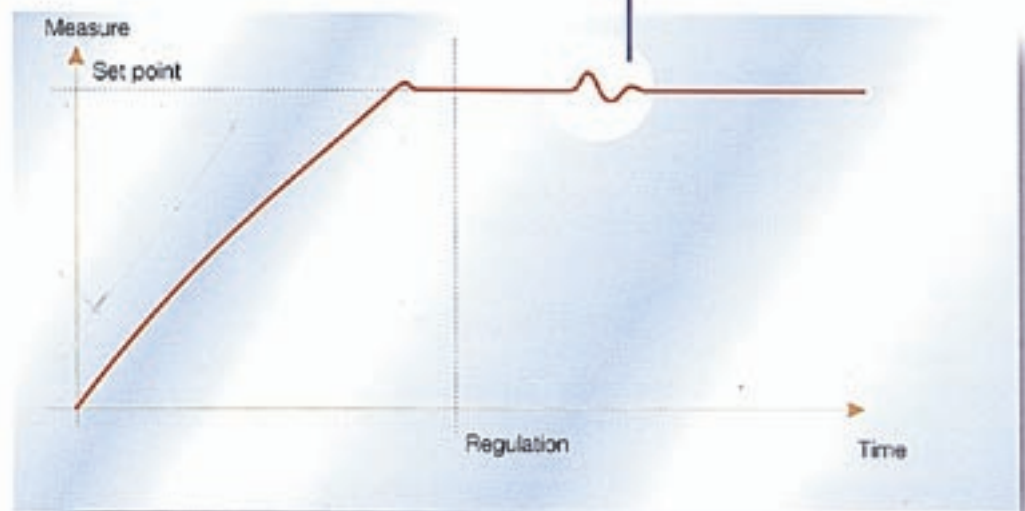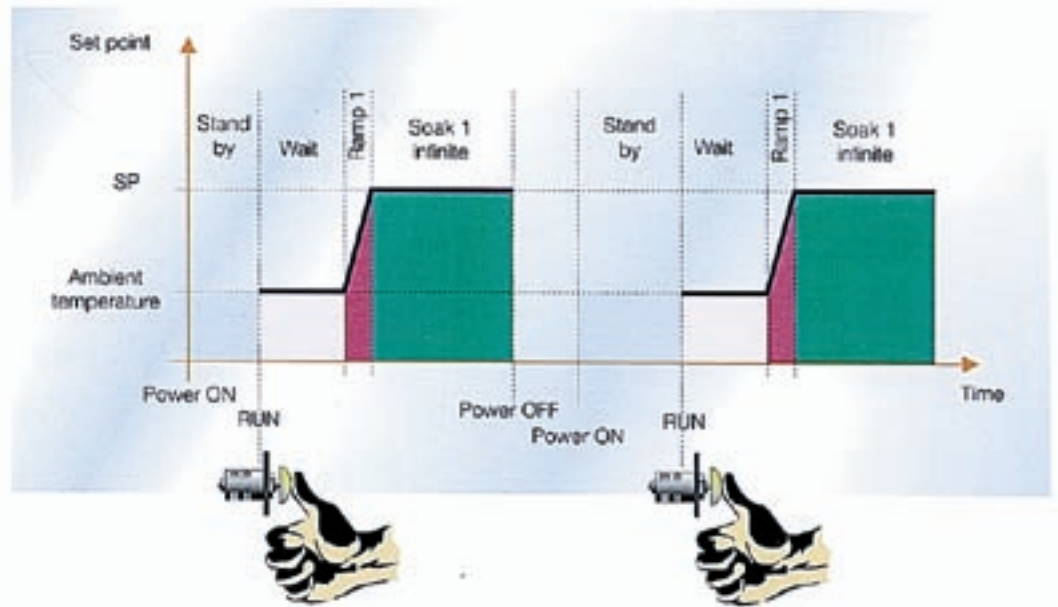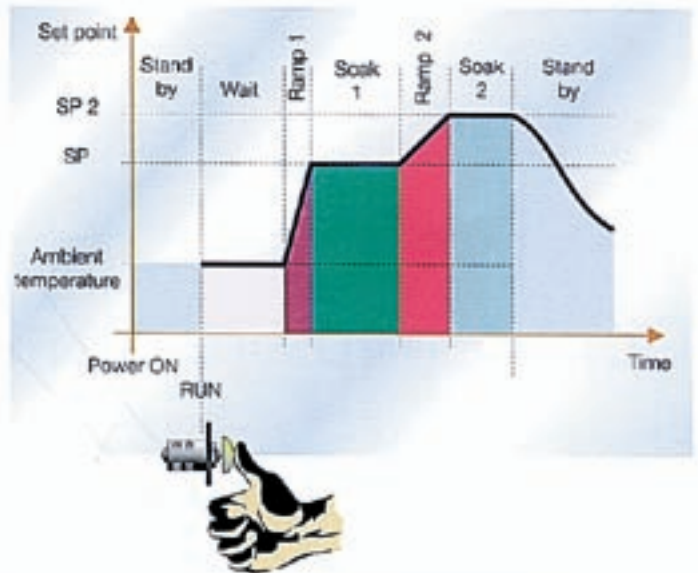
OPERATIVE MODES

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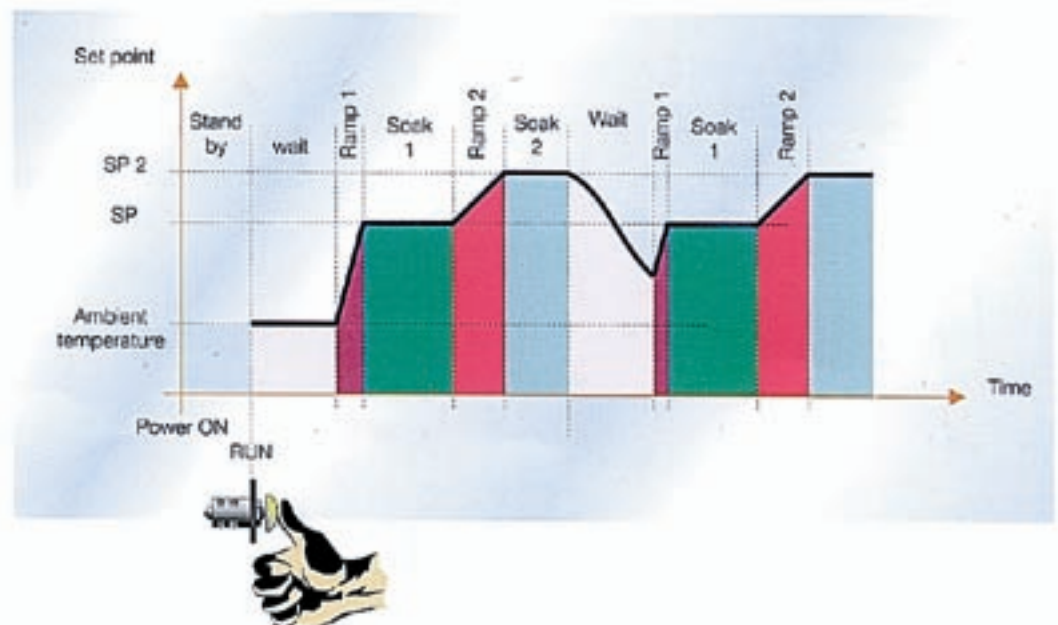

MODE B
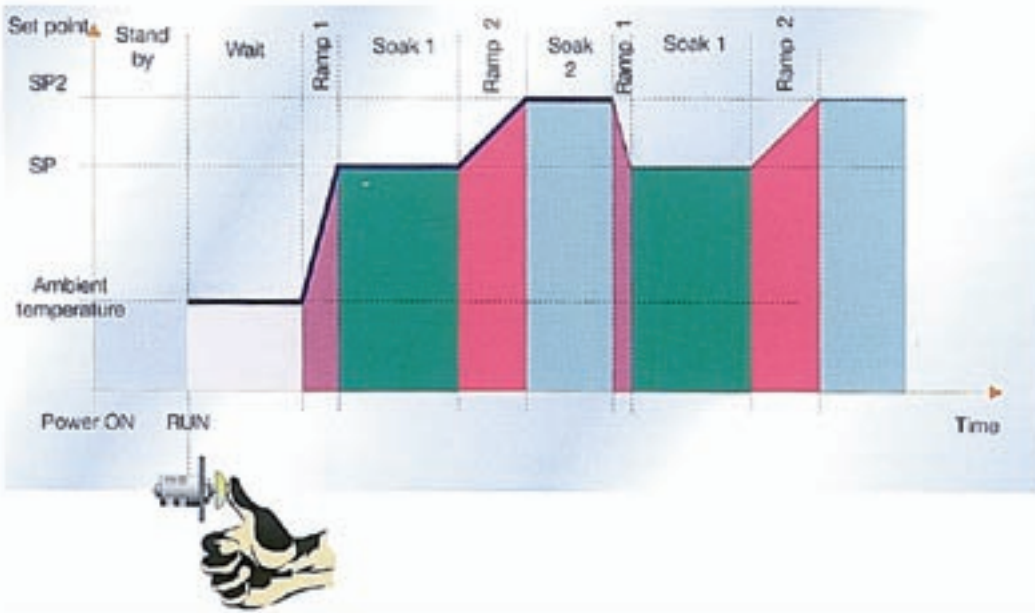*The instrument will operate as controller/programmer without program repetitions.*

MODE C
The instrument will operate as controller/programmer with more than one repetitions of the complete program (wait also).

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

SPECIAL FUNCTION
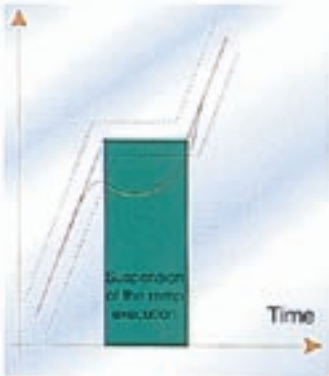
Ramp traking
to assure a correct ramp execution.
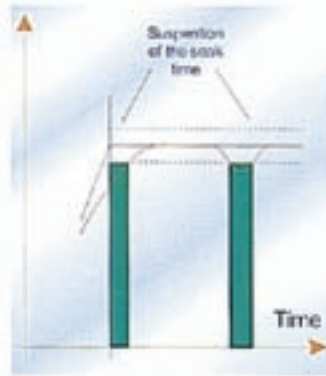
Guaranteed soak
to assure an exact soak time.

DISPLAY MANAGEMENT

During Stand by
the lower display shows "OFF"

During a Ramp
the lower display show the operative set point

During a Soak
the lower display shows the remaing soak time
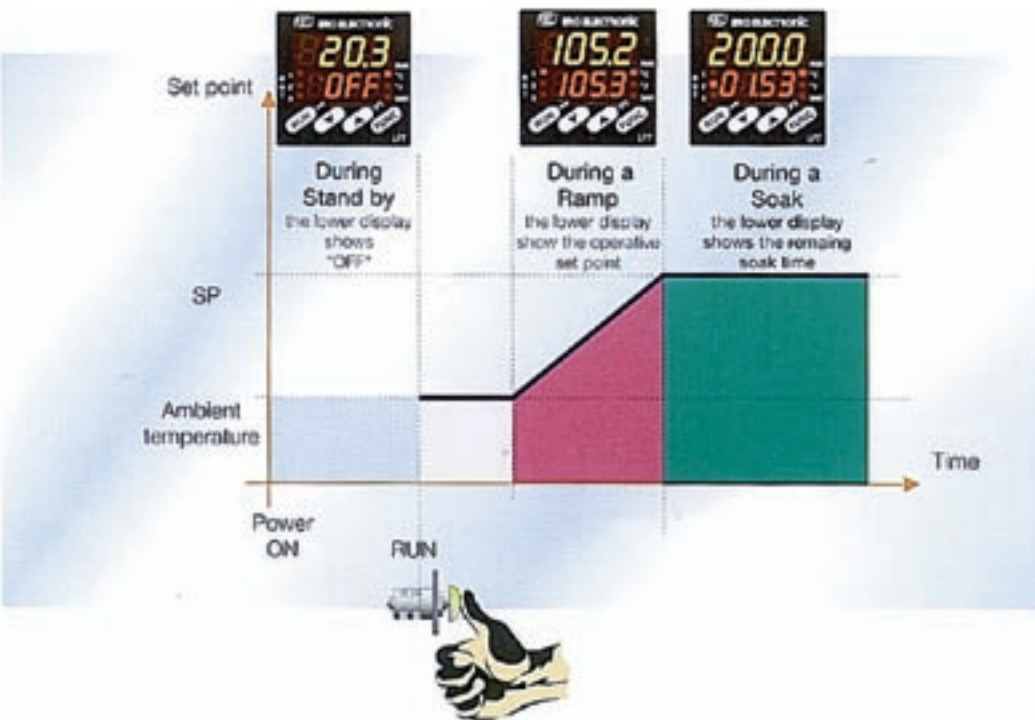
The display functions allow to know immediately the program step and point actually executed.

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GENERAL SPECIFICATIONS

Case:	polycarbonate grey case.
Self extinguishing degree:	V-0 according to UL.
Front protection:	designed and tested for IP 65 (*) and NEMA 4X (*) for indoor locations (when panel gasket is installed). (*) Test were performed in accordance with IEC 529, CEI 70-1 and NEMA 250-1991 STD.
Installation:	panel mounting by means of brackets. Instrument removable from case by safety screw.
Rear terminal board:	with screw terminals, connection diagram and safety rear cover.
Dimensions:	48 x 48 mm (according to DIN 43700); depth 122 mm.
Weight:	450 g max. (1 lb).
Power supply:	(switching mode) from 100 to 240 V A.C. 50/60 Hz (+10% to -15% of the nominal value) or 24 V DC/AC (±10% of the nominal value).
Power consumption:	8 VA.
Insulation resistance:	> 100 MΩ according to IEC 348.
Isolation voltage:	1500 V r.m.s. according to IEC 348.
Common mode rejection ratio:	120 dB @ 50/60 Hz.
Normal mode rejection ratio:	60 dB @ 50/60 Hz.
Electromagnetic compatibility:	this instrument is marked CE. Therefore, it is conforming to council directive 89/336/EEC (reference harmonized standard EN-50081-2 and EN-50082-2).
Safety requirements:	this instrument is marked CE. Therefore, it is conforming to council directives 73/23/EEC and 93/68/EEC (reference harmonized standard EN 61010-1).
D/A conversion:	dual slope integration.
Sampling time:	for linear input = 250 ms for TC or RTD inputs = 500 ms.
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.
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 front keyboard.

Thermocouple input

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.
Burn out:	detection of the open input circuit (wires or sensor) with underrange or overrange selectable indication.
Cold junction:	automatic compensation for an ambient temperature between 0 and 50°C.
Cold junction compensation error:	0.1 °C/°C.
Input impedance:	> 100 kΩ.
Calibration:	according to IEC 584-1.

STANDARD RANGES TABLE

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

Note: for TC inputs 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 sensibility of the control parameters.

RTD input

	RTD type:	Pt 100 3-wire connection.
	Calibration:	according to DIN 43760.
	Line resistance:	max 20 Ω/wire with no measurable error.
	Engineering unit:	°C and °F keyboard programmable.
	Burn out:	detection of the sensor open circuit and of one or more wires open circuit. Detection of the sensor short circuit.

STANDARD RANGE TABLE

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

Note: for RTD inputs 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 sensibility of the control parameters.

mA and V input

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

STANDARD RANGES TABLE

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

LOGIC INPUT

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

SET POINT PATTERN
Regions description

	1. "Stand-by" REGION	The device operates as indicator. The power output is OFF and alarms are in no alarm status.
	Range:	from 0 to 99 h 59'.
	2. "WAIT" REGION	In this region the power out is OFF and alarms are in no alarm status. The time duration of this region is programmed by "WAIT TIME" parameter. The upper display shows the process variable while the lower display shows, flashing the time to reach the end of this region.
	Range:	from 0 to 99 h 59'.
	3. "RAMP TO SPx" REGIONS	At the begining of this regions the instrument aligns the operative setpoint to the actual measured value and then it will start 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" REGIONS	In this regions 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 99 h 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 occures 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 outputs.
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 OUTPUTS

Type:	time proportioning.
Updating time:	250 ms
Direct/reverse action:	keyboard programmable.
Out 1 cycle time:	for relay output: from 1 to 200 s. for SSR output: from 0.1 to 20.0 s.
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 250 V AC on resistive load.

Logic voltage for SSR driver

Logic level 0:	Vout < 0.5 V DC
Logic level 1:	14 V < Vout < 24 V DC Maximum current = 20 mA.

ALARMS

This instrument is equipped with 3 independent outputs.
The first one is used as 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 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 masked alarm or standard alarm.
Alarm indications:	2 indicators lit when the respective alarm is ON.
Alarm outputs:	2 relay SPST. Contact rated at 2 A, 250 V AC on resistive load.

Process alarm

Operative mode:	minimum or maximum programmable.
Threshold:	programmable in engineering unit 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 in ON status for a programmable time (from 0 to 60 s). At the end of the last programmed cycle it will be forced in ON status for a time programmable from 10 to 60 s or infinite (up to the next program start).

UPPER DISPLAY
It shows the actual measured value or the selected parameter value.

OUT 1
Lit when OUT 1 is ON.

OUT 2
Lit when OUT 2 (used as break event output) is ON or alarm 1 is in alarm condition

OUT 3
Lit when the alarm 2 is in alarm condition or the OUT 3 is used as logic output ("End-of-cycle") and it is showing the end of a cycle.

MAN
Flash when the instrument is in MANUAL mode.

LOWER DISPLAY
It shows:
- In Stand-by mode it shows "OFF".
- In manual mode it shows the output level.
- During parameter modifications it shows the abbreviated name of the selected parameter.
- in RUN mode it shows:
  - the operative set point when the instrument is performing a ramp.
  - the remaining soake time when the instrument is performing a soak.

RUN
Lit when the program is running. Flash when program execution is stopped by traking or guaranteed soak functions.

°C
Lit when the process variable is shown in Celsius degree.

°F
Lit when the process variable is shown in Fahrenheit degree.

SMRT
Lit when the SMART algorithm is active.

SP2
Lit when SP2 is operative.

DIMENSIONS AND PANEL CUT-OUT

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