

INSTRUCTIONS FOR INSTALLATION AND USE.



SMD90B35 (A-C) SMD34RU

We thank you for choosing an LAE controller. Before proceeding to the installation, please read this instructions sheet carefully; only in this way you will obtain maximum performances and safety.

1. INSTALLATION

1.1 The SMD90 must be secured to the panel by means of screws or rivets to be inserted into the appropriate slots. Protection is IP30, therefore please locate the unit in a position ensuring that no liquid infiltrates and damages the board.

1.2 Probes, power supply and outputs must be connected strictly according to the indications appearing on the board; the cables can pass through the hole on the unit side. For supply voltage and maximum switchable loads, please read the label on the enclosure.

The flat cable of the SMD34RU remote unit must be connected to the relevant connector, please make sure that the mechanical polarity is respected.

1.3 The front of the SMD34RU must be inserted into the panel and sandwiched with the backside cover, then finally firmly closed by means of the screws provided with the enclosure.

1.4 Probe T1 measures the air temperature and is used for the thermostat function. Probe T2 measures the evaporator temperature and must be secured to it in a place where the maximum frost growth occurs.

1.5 The unit works with an ambient temperature between -10°.. +50°C and 15%.. 80% relative humidity. To reduce the effects of electro-magnetic interference, place the probe and signal cables as away as possible from power lines.

Caution: where delicate or valuable products have to be maintained under strict conditions, please use a different controller for limit and alarm functions.

2. OPERATING LEVELS

For 3 seconds from the power-up the display illuminates a dash (self-check phase). The following indications depend on the operating status of the controller and from the menu level activated by the operator.

On table 1 you can see status, levels and indications relevant to them.

2.1 STANDBY: OFF permanently displayed to show the standby status. Setting the parameter **OFF**=YES enables the [0/I] button that allows to put the SMD90 on standby. If OFF=NO the button [0/I] is inhibited.

On standby, output controls and buttons are excluded with the exception of light command (manually or door controlled).

2.2 NORMAL: during the normal operation phases, the display shows the air temperature, however the following indications can come up: ERR probe T1 fault; ALR alarm status; DEF defrost in progress.

2.3 INFO MENU: pressing button enables the information selection menu. In this menu the instantaneous temperatures T1, T2 and the alarm status appear. It's also possible to start a defrost manually or set the setup access code. The selection of the data to be displayed can take place sequentially, by repeatedly pressing , or quickly via buttons and to scroll through the menu. You exit from the menu by pressing button or automatically after 5 seconds of no button activation.

2.4 SETUP: you have got access to the parameter menu by selecting 47 as passcode PC. To achieve this press buttons and or . The exit from the setup takes place by pressing button or after 30 seconds of no button activation.

STANDBY	NORMAL	INFO MENU	INFO DATA	SETUP MENU	PARAMETER VALUE
OFF →	-20 air temperature	DF →	DF- waiting for start sequence	ADR →	255 peripheral address
	DEF defrost on	AL →	A H high temperature	---	---
	ALR new alarm	T1 →	-18 shows air temperature	---	---
	ERR probe 1 failure	T2 →	-22 shows coil temperature	SPH →	-18 maximum setpoint
		PC →	47 pass code setting	SPL →	-25 minimum setpoint

Table 1

3. CONTROL PARAMETERS

The adaptation of the controller to the system that it controls is achieved through the parameters in the setup. The available parameters appear on table 2 hereinafter. You proceed from one parameter to the next/previous by pressing button or . To display the related value, press button , to change it press

button **⏏** and at the same time **⏏** or **⏏**. The exit from the setup takes place automatically after 30 seconds of no button activation or immediately by pressing button **⏏**.

The setpoint SP can be displayed and set also during the normal operation status with **⏏** and **⏏** or **⏏** buttons. The setting range however remains within the limits established with **SPL** and **SPH**.

SPL	-40.. SPH [°]	minimum temp. set	ATD	0.. 120 [min]	temperature alarm delay
SPH	SPL.. +250 [°]	maximum temp. set	ADD	0.. 120 [min]	door alarm delay
SP	SPL.. SPH [°]	actual temperature set	ACL	0.. 120 [weeks]	condenser clean interval
HYS	-30.. 0.. +30 [°]	thermostat hysteresis	CRT	0.. 30 [min]	compressor rest time
DFR	0.. 24	defrost frequency/24h	CDC	0.. 10	compressor duty cycle
DLI	0.. +70 [°]	defrost end temperature	OFF	YES/NO	standby key enable
DTO	1.. 120 [min]	defrost timeout	DS	YES/NO	door switch enable
DTY	OFF/ELE/GAS	defrost type	LDC	YES/NO	door switched light
DRN	0.. 30 [min]	drain down	T2	YES/NO	probe 2 enable
DDY	0.. 60 [min]	defrost display control	SCL	°C/°F	display scale
FRC	0.. 5	fan run control	OS1	-15.. +15 [°]	probe 1 offset
FDR	-40.. +70 [°]	fan re-start temperature	OS2	-15.. +15 [°]	probe 2 offset
ATL	-25.. 0 [°]	low alarm differential	SIM	0.. 100	display slowdown
ATH	0.. +25 [°]	high alarm differential	ADR	0.. 255	address

Table 2

4. DISPLAYS

The temperatures measured by probes T1 and T2 are treated by the microprocessor in such a way as to display them in the most meaningful way. To achieve this, the temperatures can then be corrected by the respective offsets **OS1** and **OS2** and displayed in degrees Celsius or Fahrenheit, depending on the value set to **SCL**.

Caution: if you change the readout scale you must then IMPERATIVELY re-configure the parameters relating to the absolute temperatures (SP, DLI, FDR ...) and to the differential temperatures (HYS, ATL, ATH ...).

The air temperature, offset by OS1, before being displayed is treated by a special algorithm allowing the simulation of a thermal mass directly proportional to the value set to **SIM**. The resulting effect is a hunting reduction on the displayed value.

By setting **DDY** to values greater than 0, during defrost, instead of the temperature, the display shows DEF, which will remain beyond defrost end for the number of programmed minutes.

5. THERMOSTAT FUNCTION

5.1 Temperature control is based upon the comparison between temperature T1, the setpoint **SP** and the hysteresis **HYS**. The thermostat operation is determined by the value set to HYS: if greater than 0 there will be COOLING control, if lower than 0 there will be HEATING control, if equal to 0, the thermostat will be excluded and the corresponding output will be switched off permanently.

Example 1: HYS 02, SP -20; relay Off with T1 -20° and On with T1 -18°.

Example 2: HYS -04, SP 70; relay Off with T1 +70° and On with T1 +66°.

The actual relay on switching is however only possible if since the off switching the minimum rest time **CRT** has elapsed.

The relay status is signalled by the relevant dot on the display.

5.2 In consequence to failure of probe T1, the display shows ERR and the output is controlled with a fixed time established by **CDC**. This determines the output running time within 10 minute cycles.

Example: CDC 06, 6 minutes On, 4 minutes Off.

6. DEFROST

6.1 Defrost automatically starts every time the built-in timer matches the time necessary to obtain the defrost frequency determined with **DFR**. For example, with DFR=4 there will be a defrost every 6 hours. With DFR set to 0, the timed defrost function is excluded.

Defrost can be started manually from the Info menu in the following way: select DF, press button **⏏** first then **⏏** simultaneously.

The built-in timer is set to zero every time the unit is switched on (power supply or standby) and every time defrost is started.

6.2 Once that defrost has been started, the outputs are controlled by the parameter **DTY** according to the following table:

DTY	DEFROST	COMPRESSOR	FANS
OFF	off	off	on
ELE	on	off	off
GAS	on	on	off

6.3 Defrost terminates either when time **DTO** elapses or, if the evaporator probe is active (**T2**=YES), when temperature **DLI** is measured.

Now, if **DRN** is greater than 0, before cooling starts, all the outputs remain off for the time set to DRN. This phase, called drain down, will allow a complete ice melting and the drain of the resulting water.

The defrost relay status is signalled by illuminating the relevant dot on the display.

7. EVAPORATOR FAN CONTROL

7.1 During temperature control, the fans are controlled by **FRC**. If **FRC**=0 the fans run continuously, if it's greater than 0, then the fans cycle according to the compressor. Both are switched on simultaneously but the fan run continues for a time proportionate to the compressor run and the **FRC** parameter. One unit of **FRC** corresponds to 20% of the compressor run. For instance, with **FRC**=2 compressor and fans start simultaneously and, if the compressor runs for 6 minutes, then the fans are on for 6+2 minutes and 24 seconds (40% of 6 minutes).

7.2 If the **SMD** is connected to a door switch, you must set the parameter **DS** to YES to obtain an evaporator fan control according to door opening. This control takes place during temperature control only.

7.3 After defrost, if probe T2 is active (T2=YES) temperature **FDR** provides fan re-start. In other words, the fans re-start when the evaporator has a temperature lower than **FDR**. If this condition is not met within 3 minutes following defrost termination, the fans will however re-start.

The relay status is signalled by the relevant dot on the display.

8. ALARMS

The **SMD90** allows a check on the correct operation of the thermostat, on the door being left open and on the periodic condenser clean warning, in addition to the functional alarms because of power failure and fault of probes T1 or T2. When an alarm takes place, the controller switches on the relevant relay and buzzer, shows the anomaly by flashing the relevant LED and ALR on the display. Hereinafter we report how the unit works according to the alarm sources.

8.1 **ATL** determines the alarm differential for temperatures lower than setpoint (cooling) or setpoint + hysteresis (heating) and **ATH** is the alarm differential for temperatures higher than setpoint (heating) or setpoint + hysteresis (cooling).

Example 1: SP= -20, HYS= 02, ATL= -05, ATH= 05;

the alarm thresholds are set to -25° and -13°.

Example 2: SP= 70, HYS= -04, ATL= -05, ATH= 05;

the alarm thresholds are set to +61° and +75°.



The temperature alarm warning can be immediate or delayed by the time **ATD** if it's greater than 0. By setting to 0 one or both differentials, the corresponding alarm is excluded.



During defrost, the high temperature alarm is excluded.

8.2 By enabling door switch control, **DS**=YES, the relevant door alarm function is also enabled. Therefore, as described in 7.2, when the door is opened the fans will be stopped immediately and, after the delay **ADD**, the compressor will be stopped too and the alarm will be signalled.


8.3 By setting parameter **ACL** to a value greater than 0 you enable the periodic condenser clean warning. This means that, when the timer counting the thermostat running time matches the weeks programmed with **ACL**, the display will show a condenser clean request.

Example: with ACL=16 you will obtain a warning every 16x7x24=2688 hours of compressor operation. In other words supposing that the compressor runs 5 minutes and rests for 5 minutes, there will be a warning after about 32 weeks.

To reset the timer, enter info menu and get to the display of the indication related to the condenser clean - A C – then press buttons  and  simultaneously.


8.4 In case of a new alarm, pressing button  removes the indication ALR permanently, mutes the buzzer and by pressing button  again shows the alarm cause. The indications on the display are:

A H high temperature; A L low temperature; A D opened door; A C condenser clean; A 1 probe T1 fault; A 2 probe T2 fault; A – no alarm.

By pressing button , the buzzer is muted, after that, if the alarm persists, it's periodically switched on for 20 seconds every hour until the alarm is over. This applies to all alarms with the exception of the condenser clean warning.

The alarm LED and relay, on the contrary, remain on as long as the alarm persists.

9. LIGHT SWITCH AND SERIAL COMMUNICATION

9.1 The relay controlling the lights can alternatively be controlled manually by means of button  or, if the switch is fitted, automatically when the door is opened. In this case the parameters **DS** and **LDC** must both be set to YES. As described at 2.1 the light function is independent from standby.

9.2 The **SMD90** can be fitted with RS485 serial port allowing the controller to exchange information with supervisory softwares like the TAB. The data base puts all measurement and control data of the controller on line. The identification of every single unit within the network is given by parameter **ADR**.

WARRANTY

LAE electronic Srl warrant that their products are free of any defects in workmanship and materials for a period of 1 (one) year from date of production shown on the enclosure. LAE electronic Srl shall only repair or replace those products of which defects are due to LAE electronic Srl and recognised by their technicians. LAE electronic Srl are not liable for damages resulting from malfunctions of the products.

Defects due to exceptional operating conditions, misapplication and/or tampering will void the warranty.

All transport charges for returning the product to the manufacturer, after prior authorisation by LAE electronic Srl, and for the return to the purchaser are always for the account of the purchaser.

SMD90B35E-C

TERMINAL	FUNCTION	RATINGS	TERMINAL	FUNCTION	RATINGS
L-N	Power supply	230 Vac; 50/60Hz	L3, L4	Auxiliary loads	8(3)A; 230 Vac
L1, L2	Compressor	20(6) A; 230 Vac	L9, L10	Defrost	8(3)A; 230 Vac
L5, L6	Evap. Fans	8(3)A; 230 Vac	A1-A2 A3	Alarm	8(3)A; 230 Vac
L7	Indoor lights	8(3)A; 230 Vac			

WIRING DIAGRAM

