INSTRUCTIONS FOR INSTALLATION AND USE.

SSD90Cxx (x-C)
SMD12RU
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 performance and safety.

1. INSTALLATION

1.1 The SSD90 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 remote unit must be connected making sure that the mechanical polarity is respected, finally secure the flat cable firmly by means of the suitable cable tie.

1.3 The SMD12RU remote unit is secured to the panel by means of the two springs at its box sides. The unit is mounted on the panel through a 29x71 mm opening, exert a moderate pressure so as to get the SMD12RU to adhere to the panel perfectly.
Differently, as to the SMD34RU model, remove the two side screws and open the enclosure. Mount the front of the remote unit through a 31x185 mm opening on the panel and then match it to the rear cover. Then finally close the box by means of the screws.

1.4 Probe T1 measures the air temperature and is used for the thermostat function. It must be located inside the room in a place that well reflects the temperature of the preserved product. Probe T2 measures the evaporator temperature and must be secured to it in the place where the maximum frost growth occurs. Probe T3 must be located between the fins of the condensing unit within 1/2 and 1/3 from the outlet.
The position of probe T3 must be carefully identified and the probe must also be secured firmly. Position and fixing of the probe are very important in the sake of a correct operation of the refrigerator. Make sure that probe T3 has got maximum contact surface with the fins and that it will not be accidentally removed during condenser cleaning.

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

***CAUTION**: • If the relays switch a large load frequently, we suggest you contact us to obtain information about the relay contact life. • Where delicate or valuable products have to be maintained under strict conditions, we suggest you use a second unit for limit and alarm purpose.*

2. OPERATING LEVELS

For three 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 find status, levels and relevant indications.

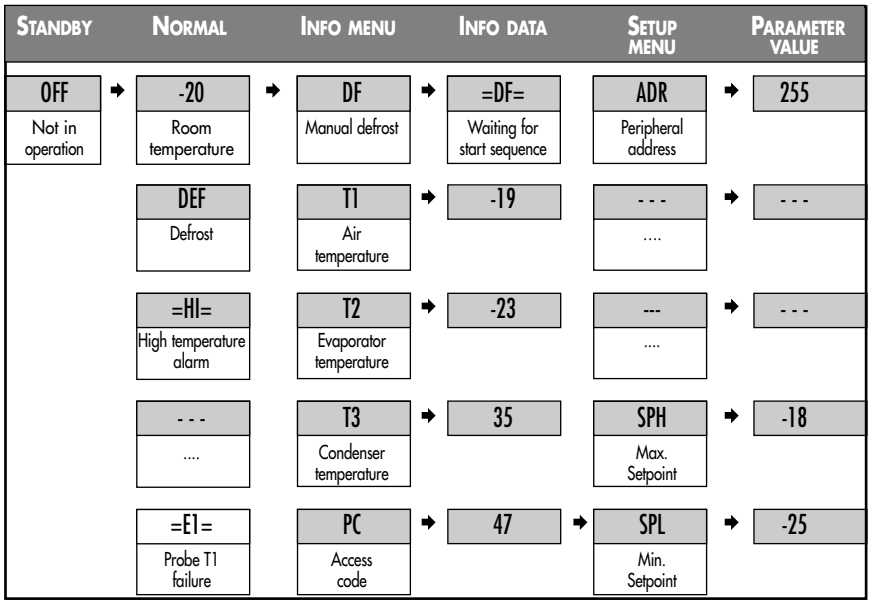


TABLE 1

2.1 **STANDBY**. Setting the parameter **OFF** to YES enables the ⏻ button that allows to put the SSD90 on standby, that is excluding output control and the buttons with the exception of the light command (manually or door controlled). With OFF=NO, the ⏻ button is inhibited.
A permanent indication on display [OFF] indicates that the outputs are off.

2.2 **NORMAL**. During normal operation the display shows the room temperature or, if the controller is being performing defrost and the parameter **DDY** is greater than 0, the indication [DEF]. In this latter case, the indication will remain beyond defrost end for the time programmed with DDY.

2.3 **ALARM**. An anomaly is reported on display through the flashing of an abbreviation indicating its cause: [HI]/[LO] high/low alarm temperature in the room; [DO] opened door; [CHI] high condenser temperature; [CLN] periodic condenser cleaning; [E1]/[E2]/[E3] failure of probe T1/T2/T3.

2.4 **INFO MENU**. By pressing button ⓘ you enter the information menu. In this menu it's possible to start a manual defrost, display the instantaneous T1, T2 and T3 temperatures

or set the setup access code. The selection of the data to be displayed can take place sequentially by pressing ⏻ repeatedly, or quickly by means of buttons ▲ and ▼ to scroll through the menu. You exit from the menu by pressing ⏻ or automatically after 5 seconds of no button activation.

2.5 **SETUP**. You have got access to the parameter menu by selecting **47** for the passcode PC . To achieve this press buttons ⏻ and ▲ or ▼. You exit from the setup by pressing button ⏻ or after 30 seconds of no button activation.

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 via button ▲ or ▼. To display the related value, press button ⏻, to modify it press ⏻ and simultaneously ▲ or ▼. You exit from the setup by pressing button ⏻ or automatically after 30 seconds of no button activation.
The setpoint **SP** can be displayed and programmed even during the normal operation with buttons ⏻ and ▲ or ▼. The setting range however remains within the limits **SPL** and **SPH**.

SPL	-40.. SPH [°]	minimum temp. set	***ACT***	0.. 250 [°]	condenser alarm temperature
SPH	SPL.. +250 [°]	maximum temp. set	***CSD***	0.. 30 [min]	compressor safety stop delay
SP	SPL.. SPH [°]	actual temperature set	***CFT***	-40.. +250 [°]	condenser fan temperature
HYS	-30.. 0.. +30 [°]	thermostat hysteresis	***CRT***	0.. 30 [min]	compressor rest time
DFR	0.. 24	defrost frequency/24h	***CDC***	0.. 10	cooling duty cycle for T1 fault
DLI	0.. +70 [°]	defrost end temperature	***OFF***	YES/NO	standby button enabling
DTO	1.. 120 [min]	defrost timeout	***DS***	YES/NO	door switch enabling
DTY	OFF/ELE/GAS	defrost type	***LDO***	YES/NO	door controlled lights
DRN	0.. 30 [min]	drain down	***T2***	YES/NO	probe T2 enabling
DDY	0.. 60 [min]	defrost display control	***T3***	YES/NO	probe T3 enabling
FPC	0.. 5	evap. fan proportional control	***SCL***	°C/°F	display scale
FDD	-40.. +70 [°]	fan re-start temperature	***OS1***	-15.. +15 [°]	probe T1 offset
ATL	-25.. 0 [°]	low alarm differential	***OS2***	-15.. +15 [°]	probe T2 offset
ATH	0.. +25 [°]	high alarm differential	***OS3***	-15.. +15 [°]	probe T3 offset
ATD	0.. 120 [min]	temperature alarm delay	***SIM***	0.. 100	display slowdown
ADO	0.. 120 [min]	door alarm delay	***ADR***	0.. 255	peripheral address
ACC	0.. 120 [weeks]	periodic condenser cleaning			

TABLE 2

4. DISPLAYS

The temperatures measured by the probes T1, T2 and T3 are treated by the microprocessor in such a way as to display them in the most meaningful way. To achieve this, they can be corrected by the respective offsets **OS1**, **OS2**, **OS3** and displayed in degrees Celsius or Fahrenheit, depending on the value set to **SCL**.
The air temperature, 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.
The status of the compressor, evaporator fans and defrost outputs is signalled by the relevant shining dots on the display.
CAUTION: if you change SCL you must then IMPERATIVELY re-configure the parameters relating to the absolute temperatures (SP, DLI, FDD ...) and to the differential temperatures (HYS, ATL, ATH ...).

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 programmed to HYS: if greater than 0 there will be COOLING control, if lower than 0 there will be HEATING control, if HYS=0 then the thermostat will be excluded 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 compressor cut-in is however only possible if since the off switching the minimum rest time **CRT** has elapsed. If you have to maintain a very small hysteresis HYS, we recommend to program a suitable value for CRT to ensure a long life to relay/contactor and compressor.
5.2 In consequence to a failure of probe T1, the display shows E1 and the output is controlled via 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=0 the timed defrost function is excluded.
Defrost can be started manually in the following way: from the "Info" menu 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 starts.
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 lasts as long as the time **DTO** but, if the evaporator probe is active (T2=YES) and temperature **DLI** is achieved before this time elapses, defrost will be terminated in advance.
Now, if **DRN** is greater than 0, before cooling starts all outputs will 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.

7. EVAPORATOR AND CONDENSER FANS

7.1 During temperature control the evaporator fans are controlled by the parameter **FPC**. If it's greater than 0, the fans follow the compressor cycle: they turn on simultaneously with the compressor, but fan run continues after the compressor has gone off for a time proportional to its run and the parameter FPC. One unit of FPC corresponds to 20% of compressor run, therefore, for example, with FPC=2 compressor and fans start at the same time and if the compressor runs for 6 minutes, then the evaporator fans will run for a total time of 6+2 minutes and 24 seconds (40% of 6 minutes).
With FPC=0 the fans are not stopped by the proportional control.
7.2 If the SSD90 is connected to a door switch and you set parameter **DS** to YES, when the door is opened the evaporator fans stop. This control only takes place during temperature control.
7.3 After defrost, if probe T2 is active (T2=YES), temperature **FDD** establishes evaporator fan re-start. In other words, the fans start again when the evaporator has got a temperature lower than FDD. If this condition is not met within 3 minutes following defrost termination, the fans will however re-start.
7.4 Condenser fan control avoids an excessive condensing pressure lowering if the refrigerator is working at a relatively low ambient temperature. Temperature control takes place by comparing the temperature of probe T3 with the **CFT** threshold, when temperature goes higher than this threshold the condenser fans cut in. Obviously this control is only active if the relevant probe has been enabled: **T3**=YES.
Given the criticality of this control, due to fast pressure changes within the refrigeration system and to the large condenser efficiency difference in absence of fans, it's a must that the probe T3 is placed on a suitable position. You must very carefully ensure enough width and quality of the contact surface between the probe and the condenser. A bad contact will result in a very slow response and therefore in a too large temperature hunting.

8. ALARMS

The SSD90 allows a check on the correct thermostat operation, the door being left open, condenser overheating and its periodic cleaning, in addition to the functional alarms because of power failure and probe fault. When an alarm takes place, the controller switches on the relevant relay and buzzer, flashes the alarm sources on display (see 2.3).
By pressing button ▣, the buzzer is silenced, after that if the alarm persists, it will periodically come on for 20 seconds every hour, until the alarm ends (however the display indications and the relay always remain on). The acoustic warning re-triggering applies to all alarms with the exception of the condenser cleaning. Hereinafter is a description of the operation of the various sections:
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 the setpoint (heating) or setpoint + hysteresis (cooling). By setting to 0 one or both differentials you exclude the corresponding alarm.
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 alarm signalling can be immediate or delayed by the time **ATD** if this is greater than 0.
During defrost, the high temperature alarm is excluded.
8.2 By enabling door switch control, DS=YES, you also enable the relevant alarm function. Therefore, as described in 7.2, when the door is opened, the fans will be stopped immediately and after the delay time **ADO**, the compressor will be stopped too and the alarm will be signalled.
8.3 By setting parameter **ACC** to a value greater than 0, you enable a periodic condenser clean warning. In other words, when the timer counting the compressor running time matches the weeks programmed with ACC, the display will show a condenser clean request.
Example: with ACC=16 you will obtain a warning every 16x7x24=2688 hours of ***compressor operation****. In other words, supposing that the compressor runs for 5 minutes and rests for 5 minutes, there will be a warning after about 32 weeks.*
You can only reset the timer when you have a CLN warning, in other words after the timer has achieved the programmed time. Therefore proceed as follows: 1) press button ▣ and put the controller on a standby; 2) clean the condenser; 3) press button ▣ and button ▽ simultaneously. If the standby function has not been enabled, go to point 2 directly.
8.4 If probe T3 has been enabled, it allows condenser temperature monitoring to detect abnormal or dangerous conditions deriving from an excessive refrigerant pressure. When condenser temperature goes higher than the threshold that you program with the parameter **ACT**, an overpressure alarm is signalled on display.
Associated to this function there's a safety and protection stop facility. By setting parameter **CSD** to a value greater than 0, if condenser temperature remains over the ACT threshold for longer than the time CSD, then the compressor will be stopped. The compressor automatically cuts in again at a temperature equal to ACT -10°. The flashing of the dot associated to the compressor signals this safety stop condition. With CSD=0 this function is inhibited.

9. LIGHT SWITCH AND SERIAL COMMUNICATION

9.1 The relay controlling the lights can alternatively be controlled manually by means of button ▲ (SMD34 only) or, if the switch is fitted, automatically when the door is opened. In this case, the parameters **DS** and **LDO** must both be set to YES. As described at 2.1 the light operation is independent from the standby.
9.2 The SSD90 can be fitted with RS485 serial port allowing the controller to exchange information with a supervisory software like the TAB. All the temperatures, status and control parameters are available for the *PC client*. 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.

SSD90Cxx(x-C): STANDARD SETUP

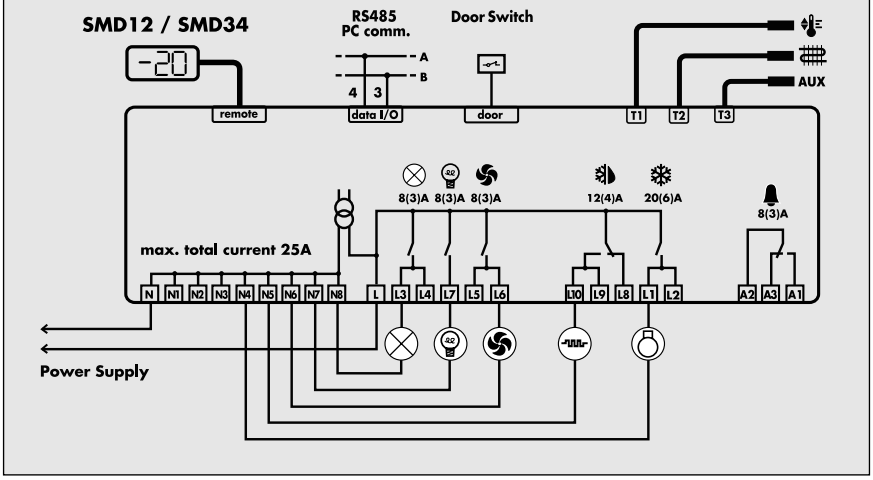
PARAMETER	RANGE	FACTORY SETTING	PARAMETER	RANGE	FACTORY SETTING
SPL	-40.. SPH [°]	-25	***ACT***	0.. 250 [°]	70
SPH	SPL.. +250 [°]	-18	***CSD***	0.. 30 [min]	00
SP	SPL.. SPH [°]	-20	***CFT***	-40.. +250 [°]	00
HYS	-30.. 0.. +30 [°]	03	***CRT***	0.. 30 [min]	03
DFR	0.. 24	04	***CDC***	0.. 10	07
DLI	0.. +70 [°]	10	***OFF***	YES/NO	YES
DTO	1.. 120 [min]	20	***DS***	YES/NO	NO
DTY	OFF/ELE/GAS	ELE	***LDO***	YES/NO	YES
DRN	0.. 30 [min]	03	***T2***	YES/NO	YES
DDY	0.. 60 [min]	15	***T3***	YES/NO	YES
FPC	0 ... 5	00	***SCL***	°C/°F	°C
FDD	-40.. +70 [°]	00	***OS1***	-15.. +15 [°]	00
ATL	-25.. 0 [°]	-03	***OS2***	-15.. +15 [°]	00
ATH	0.. +25 [°]	05	***OS3***	-15.. +15 [°]	00
ATD	0.. 120 [min]	30	***SIM***	0.. 100	03
ADO	0.. 120 [min]	05	***ADR***	0.. 255	01
ACC	0.. 120 [weeks/Wochen]	00			

FUNCTIONS		SSD90 Series			
		C30E-A	C35E-C	C63E-A	C65E-C
Inputs		●	●	●	●
		●	●	●	●
	AUX	●	●	●	●
Outputs		●	●	●	●
		●	●	●	●
		●	●	●	●
	AUX			●	●
			●		●
			●	●	●
			●		●
Options	door switch	●	●	●	●
	RS485		●		●

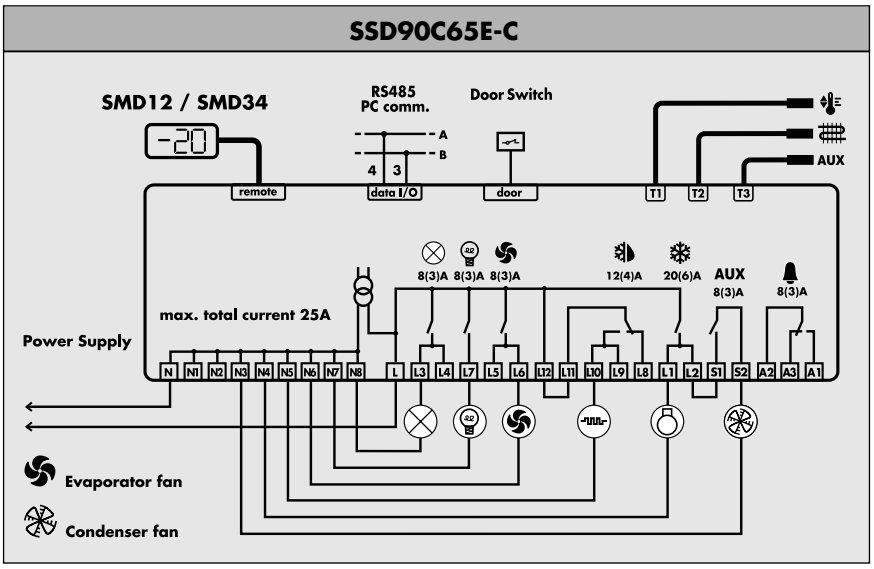
* In the models C63 and C65 the defrost relay is on voltage free contacts.

WIRING DIAGRAMS

SSD90C35E-C



SSD90C65E-C



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