

CD5 SERIES INSTRUCTIONS FOR USE

Thank you for having chosen an LAE Electronic product. Before installing the instrument, please read this instruction booklet carefully in order to ensure safe installation and optimum performance.

1. INSTALLATION

- Insert the controller through a hole measuring 71x29 mm.
- Make sure that electrical connections comply with the paragraph "wiring diagrams".
To reduce the effects of electromagnetic disturbance, keep the sensor and signal cables wellseparate from the power wires.
- Place the probe T1 inside the room in a point that truly represents the temperature of the stored product.
- Place the probe T2 on the evaporator where there is the maximum formation of frost.
- The function of probe T3 is determined by the parameter T3.

2. DISPLAY INFO

	Alarm	h_1	Room high temperature alarm
	Compressor output	L_0	Room low temperature alarm
	Fan output	h_c	Condenser high temperature
	Defrost output	RL_r	Digital input alarm
OFF	Controller in stand-by	$E1$	Probe T1 failure
dEF	Defrost in progress	$E2$	Probe T2 failure
dO	Door open alarm	$E3$	Probe T3 failure

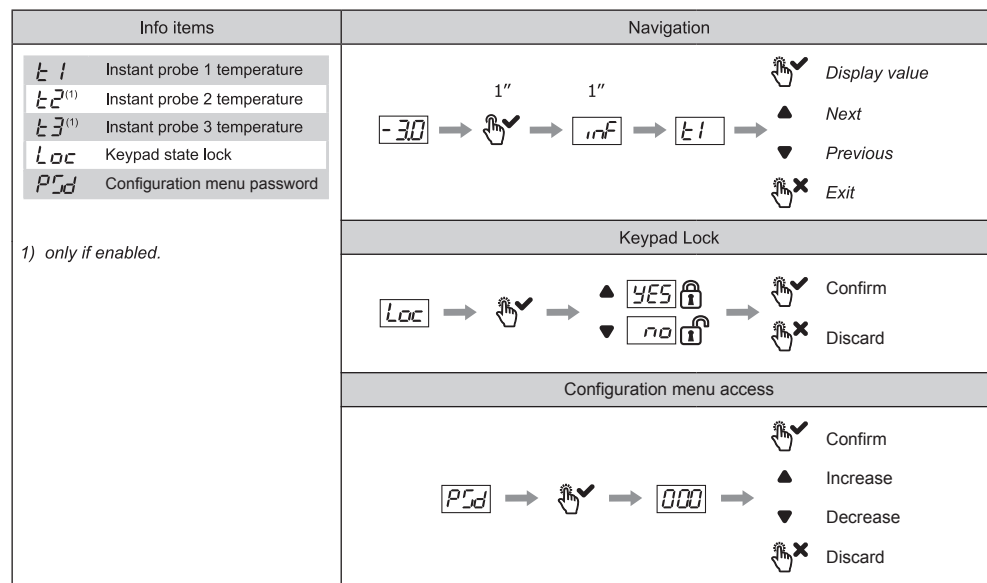
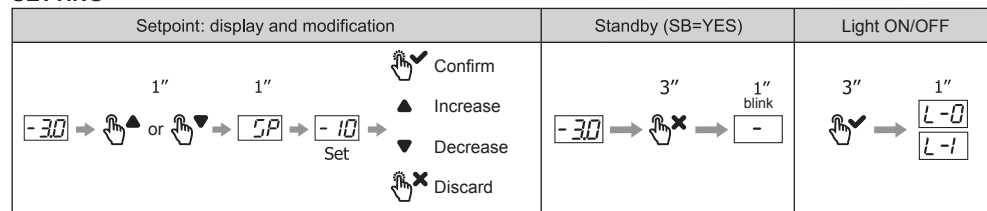
In case of alarm, press any key to mute the buzzer sound.



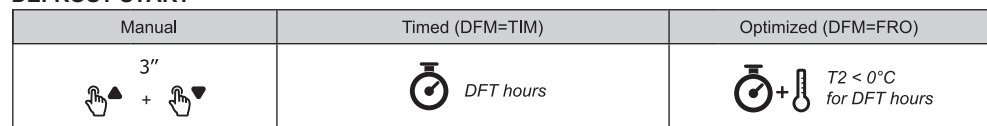
= Tap = Hold

3. OPERATION

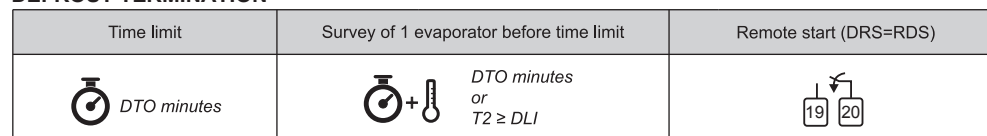
SETTING



DEFROST START



DEFROST TERMINATION



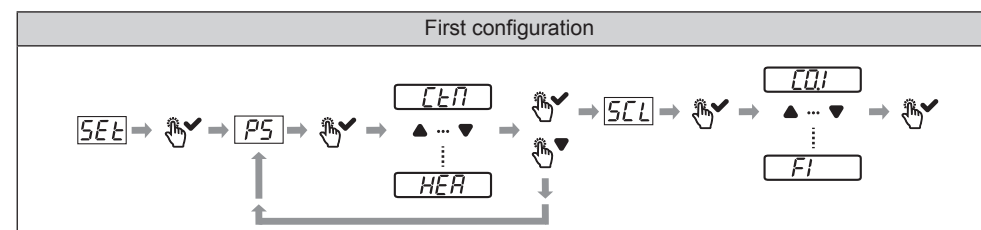
Resuming thermostatic cycle. When defrost is over, if DRN is greater than 0, all outputs will remain off for DRN minutes, in order for the ice to melt completely and the resulting water to drain. Then, after the FTO time has elapsed, the evaporator fans will restart. Differently, if T2=YES and this probe measures the FDD temperature before FTO elapses, then the fans re-start immediately.

Caution: if DFM=NON all defrost functions are inhibited; if DFT=0, automatic defrost functions are excluded. During defrost, high temperature alarm is bypassed.

4. CONFIGURATION PARAMETERS

4.1 FIRST CONFIGURATION

At the first power-up, "SEI" is displayed, to indicate that the controller needs a first configuration. Tap , PS will be displayed. Once again tap , then select the profile desired among the options available via or . After selecting the option of choice, tap again. The display will now show SCL (readout scale). If need be, by tapping , you return to the selection of the profile. Tap , then select the readout scale desired via or . In closing tap again. The controller is now ready to be used.



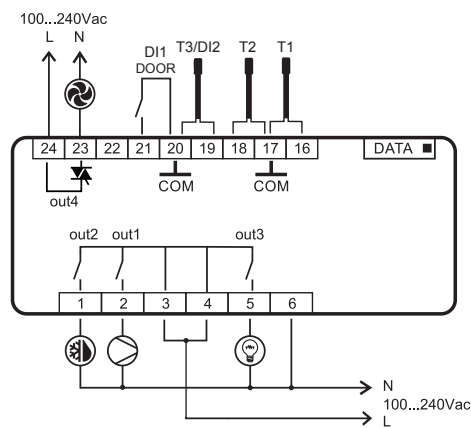
5. PARAMETER SETTING

To obtain a customised configuration of the parameters, get access to the SETUP menu from the INFO menu with password 123.

Parameters	Description	Profiles				Dim.
		Ctm	Ctp	Fr	HeA	
SCL	Readout scale	C0.1	C0.1	C1	C1	
SPL	Minimum temperature setpoint	2.0	2.0	-22.0	50.0	°C
SPH	Maximum temperature setpoint	12.0	12.0	-15.0	90.0	°C
SP	Setpoint	5.0	5.0	-18.0	70.0	°C
CH0	Thermostat OFF -> ON (ref. to SP)	2.0	2.0	2.0	3.0	°K
CH1	Thermostat ON -> OFF (ref. to SP)	1.0	1.0	1.0	2.0	°K
CRT	C/H minimum OFF time	3	3	3	3	min
CMT	C/H minimum ON time	1	1	1	1	min
CT1	C/H output ON when probe T1 is faulty	2	2	5	0	min
CT2	C/H output OFF when probe T1 is faulty	5	5	5	0	min
DFM	Defrost Start Mode	TIM	TIM	TIM	NON	
DFT	Time based defrost	8	8	6	-	hrs
DDS	Minimum Time Between Defrost	4	4	2	-	hrs
DAR	Defrost time optimization	YES	YES	YES	-	
DTY	Defrost type	OFF	OFF	ELE	-	
DPD	Delay for pressure equalization for hot gas	0	0	0	-	sec
DLI	Defrost end temperature	4.0	4.0	6.0	-	°C
DTO	Maximum defrost duration	20	20	30	-	min
DRN	Drain down time	0	0	3	-	min
DDM	Display defrost mode	DEF	DEF	DEF	-	
DDY	Display delay	3	3	5	-	min
FID	Fans active during defrost	YES	YES	NO	-	
FDD	Fan re-start temperature after defrost	-1.0	-1.0	-1.0	-	°C
FST	Fan stop temperature	12.0	12.0	12.0	-	°C
FTO	Maximum fan stop for FDD/FET	3	3	3	-	min
FCM	Fan mode during thermostatic control	NON	NON	NON	NON	
FET	Target evaporator temperature	-3	-3	-28	0	°C
FT1	Fan stop delay after compressor stop	30	30	30	60	sec
FT2	Timed fan stop	2	2	2	2	min
FT3	Timed fan run	2	2	2	2	min
FMS	Fan Minimum Stop	30	30	30	30	sec

Parameters	Description	Profiles				Dim.
		Ctm	Ctp	Fr	HeA	
ATM	Alarm threshold management	NON	NON	NON	NON	
ALA	Low temperature alarm threshold	-	-	-	-	°C
AHA	High temperature alarm threshold	-	-	-	-	°C
ALR	Low temperature alarm differential	-	-	-	-	°K
AHR	High temperature alarm differential	-	-	-	-	°K
ATI	Probe used for temperature alarm detection	-	-	-	-	
ATD	Temperature alarm delay	-	-	-	-	min
AHM	Operation in case of high condenser alarm	-	-	-	-	
AHT	Condensation temperature alarm	-	-	-	-	°C
SB	Stand-by button enabling	YES	YES	YES	YES	
DSM	Door switch input mode	STP	STP	STP	STP	
DAD	Door alarm delay	3	3	3	3	min
CSD	Compressor stop delay	5	5	5	0	min
DOT	Door stop timeout (0=inhibited)	60	60	60	0	min
D1O	D1 digital input operation	DOR	DOR	DOR	DOR	
D1A	D1 digital input activation	OPN	OPN	OPN	OPN	
D2O	D12 digital input operation	NON	NON	NON	NON	
D2A	D12 digital input activation	OPN	OPN	OPN	OPN	
LSM	Light control mode	MAN	MAN	NON	MAN	
OA1	RL1 output operation	CMP	CMP	CMP	HTR	
OA2	RL2 output operation	DEF	DEF	DEF	NON	
OA3	RL3 output operation	LGT	LGT	DFH	LGT	
OA4	RL4 output operation	FAN	FAN	FAN	FAN	
OS1	Probe T1 offset	0.0	0.0	0.0	0.0	°K
T2	Probe T2 enable	NO	YES	YES	NO	
OS2	Probe T2 offset	0.0	0.0	0.0	0.0	°K
T3	Auxiliary probe T3 operation	NON	NON	NON	NON	
OS3	Probe T3 offset	0.0	0.0	0.0	0.0	°K
TDS	Selects the temperature probe to be displayed	T1	T1	T1	T1	
AVG	The relative weight of T2 on T1	0	0	0	0	%
SIM	Display slowdown	10	10	10	10	
ADR	Address for PC communication	1	1	1	1	
PRT	Modbus protocol selection	ASC	ASC	ASC	ASC	
PS	Preset parameters	Ctm	Ctp	Fr	HeA	

6. WIRING DIAGRAM



7. TECHNICAL DATA

Power supply
CD5 100-240Vac ±10%, 50/60Hz, 3W

Relay output max loads

Output	Model	CD5-01WR
OUT1	15FLA; 90LRA - 15A resistive; 120Vac - 240Vac	
OUT2	10A resistive @ 120Vac; 7A resistive @ 240 Vac	
OUT3	10A resistive @ 120Vac; 7A resistive @ 240 Vac	
OUT4	1A (30A/1mS); 120Vac - 240Vac	

Input
NTC 10KΩ@25°C LAE Part No. SN4...

Measurement Range
-50...110°C; -50 / -9.9...19.9 °C / 110 °C
-58...180°F

Measurement accuracy
<0.5°C on the whole measurement range

Operating conditions
-10 ... +50°C; 15%...80% r.H.

Purpose: Operating Control
Construction: Incorporated Control
Indoor type 1 enclosure
Type 1B Action
Impulse voltage: 2500V
Pollution degree 2

Reference Norms

- IEC/EN 60079-15
- EN61000-6-1
- EN61000-6-3
- EN/UL60730-1
- EN/UL60730-2-9

OL0030R00-EN

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PAR	RANGE	DESCRIPTION
SCL	C0.1; C1; F1	Readout scale. C0.1: measuring range -50 ... 110°C (0.1°C resolution within -9.9 + 19.9 °C interval, 1°C outside) C1: measuring range -50 ... 110°C F1: measuring range -55 ... 180°F
SPL	-50...SPH	Minimum limit for SP setting.
SPH	SPL...110°	Maximum limit for SP setting.
SP	SPL... SPH	Setpoint (value to be maintained in the room).
CH0	1...10°	Thermostat OFF -> ON refer to SP (See fig.1).
CH1	1...10°	Thermostat ON -> OFF refer to SP (See fig.1).
CRT	0...30min	CMP / HTR minimum OFF time. The output is switched on <i>at least</i> after CRT minutes have elapsed since the previous switchover.
CMT	0...30min	CMP / HTR minimum ON time.
CT1	0...30min	CMP / HTR output run when probe T1 is faulty. With CT1=0 the output will always remain OFF.
CT2	0...30min	CMP / HTR output stop when probe T1 is faulty. With CT2=0 and CT1>0 the output will always be ON. <i>Example:</i> CT1=4, CT2= 6: In case of probe T1 failure, the CMP / HTR will cycle 4 minutes ON and 6 minutes OFF.
DFM	NON; TIM; FRO	Defrost start mode NON: defrost function is disabled. TIM: regular time defrost. FRO: the defrost time count is only increased when the conditions occur for frost to form on the evaporator (optimised time increase). If the evaporator works around 0°C, defrost frequency depends on the climatic conditions. With setpoints much lower than 0°C, defrost frequency mainly depends on the compressor operating time.
DFT	0...99 hours	Time interval between defrosts. When this time has elapsed since the last defrost, a new defrost cycle is started. For example, with DFM =TIM and DFT =06, a defrost will take place every 6 hours.
DDS	0...99 hours	Minimum time between defrosts.
DAR	NO/YES	Defrost time optimisation. If during temperature control the evaporator temperature is higher than DLI, this condition is considered as a defrost and thus the timer is re-started to count for the next defrost.
DTY	OFF; ELE; GAS	Defrost type. OFF: off cycle defrost (Compressor and Defrost OFF). ELE: electric defrost (Compressor OFF and Defrost ON). GAS: hot gas defrost (Compressor and Defrost ON).
DPD	0...240sec	Delay for pressure equalization for hot gas defrost. At the beginning of defrost, compressor and defrost are OFF for DPD seconds.
DLI	-50...110°	Defrost end temperature.
DTO	1...120min	Maximum defrost duration.
DRN	0...30min	Compressor, defrost and fan outputs are OFF after defrost for the evaporator drain down.
DDM	RT; LT; SP; DEF	Defrost display mode. During defrost the display will show: RT: the actual temperature; LT: the last temperature before defrost; SP: the current setpoint value; DEF: "dEF".
DDY	0...60min	Display delay. The display shows the information selected with parameter DDM during defrost and for DDY minutes after defrost termination.
FID	NO/YES	Fans active during defrost.
FDD	-50...110°	Evaporator fan re-start temperature after defrost.
FTO	0...120min	Maximum evaporator fan stop for FDD/FET.
FST	-50...110°	Fan stop temperature
FCM	NON; TIM; TMP	Fan mode during thermostatic control. NON: The fans remain ON all the time; TIM: Timed control: the fans are ON when the compressor is ON. When the compressor switches OFF, the fans are time controlled by parameter FT1, FT2, FT3 (See fig. 2). TMP: Temperature based control: as TIM with the difference that the fans are ON only after evaporator temperature has dropped below FET degrees (See fig. 2).
FET	-50...110°	Target evaporator temperature: In case of timed control (FCM = TMP).
FT1	0...180sec	Fan stop delay after compressor stop.
FT2	0...30min	Timed fan stop. With FT2=0 the fans remain on all the time.
FT3	0...30min	Timed fan run. With FT3=0 and FT2>0, the fans remain off all the time.
FMS	0...240sec	Fan Minimum Stop
ATM	NON; ABS; REL	Alarm threshold management. NON: temperature alarms are inhibited. ABS: it considers the absolute thresholds ALA and AHA only. REL: it considers the relative thresholds ALR and AHR only.
ALA	-50...110°	Low temperature alarm threshold.
AHA	-50...110°	High temperature alarm threshold.
ALR	-12...0°	Low temperature alarm differential linked to the setpoint. With ALR=0 the low temperature alarm is excluded.
AHR	0...12°	High temperature alarm differential linked to the setpoint. With AHR=0 the high temperature alarm is excluded.
ATI	T1; T2; T3	Probe used for temperature alarm detection.
ATD	0...120min	Delay before alarm temperature warning.
AHM	NON; ALR; STP	Operation in case of high temperature condenser alarm NON: high condenser alarm inhibited. ALR: in case of alarm, "HC" flashes on the display and the buzzer is switched on. STP: in addition to the alarm symbols displayed, the compressor is stopped and defrosts are suspended.
AHT	-50...110°	Condenser unit temperature alarm (referred to T3 probe).
SB	NO/YES	Stand-by button <input checked="" type="checkbox"/> enabling.
DSM	NON; ALR; STP	Door switch input mode: NON: door switch inhibited ALR: when Dlx=DOR and the digital input is on, an alarm is generated after DAD minutes STP: when Dlx=DOR and the digital input is on, the fans are immediately stopped, the compressor will be stopped after CSD minutes and the warning indication will be generated after DAD minutes.
DAD	0...30 min	Delay before door open alarm warning.
CSD	0...30 min NO	Compressor stop delay after door has been opened. If CSD=NO compressor never stops due to the door opening.

DOT	0...200 min	Door stop timeout. If the door switch remains open for longer than DOT minutes, it will then be ignored. With DOT=0, this function is disabled.
D10	NON; DOR; ALR; RDS	D11 digital input operation NON: digital input not active. DOR: door input. ALR: when the input is on, an alarm is generated (if AHM=STP, the compressor is stopped and the defrosts are suspended). RDS: remote defrost start.
D1A	OPN; CLS	D11 digital input activation OPN: on open CLS: on close
D20	NON; DOR; ALR; RDS; T3	D12 digital input operation NON: digital input not active. DOR: door input. ALR: when the input is on, an alarm is generated (if AHM=STP, the compressor is stopped and the defrosts are suspended). RDS: remote defrost start. T3: Auxiliary probe enable.
D2A	OPN; CLS.	D12 digital input activation. See D1A.
LSM	NON; MAN; DOR	Light control mode NON: light output not present. MAN: light output controlled through button <input checked="" type="checkbox"/> DOR: lights ON/OFF following the door state (Dlx=DOR).
OA1	NON; CMP; HTR; DEF; FAN; LGT; DFH; ALO; ALC	OUT1 output operation NON: output disabled (always off). CMP: compressor / condenser fan. HTR: heater. DEF: defrost. FAN: evaporator fan. LGT: output enabled for light control. DFH: door frame heater. ALO: contacts open when an alarm condition occurs. ALC: contacts make when an alarm condition occurs.
OA2	See OA1	OUT2 output operation. See OA1.
OA3	See OA1	OUT3 output operation. See OA1.
OA4	See OA1	OUT4 output operation. See OA1.
OS1	-12.5...12.5°	Probe T1 offset.
T2	NO/YES	Probe T2 enabling (evaporator).
OS2	-12.5...12.5°	Probe T2 offset.
T3	NON; AU; CND	Auxiliary probe T3 operation NON: probe T3 not fitted. AU: auxiliary probe. CND: condenser temperature measurement.
OS3	-12.5...12.5°	Probe 3 offset.
TDS	T1; 1-2; T3	Selects the temperature probe to be displayed. T1: probe T1. 1-2: the AVG-weighted average between T1 and T2. T3: probe T3.
AVG	0...100%	The relative weight of T2 on T1 (if TDS = 1-2) Example 1: T1 = -5°, T2 = -20°, AVG = 100%. The displayed temperature will be -20° (T1 has no effect). Example 2: T1 = -5°, T2 = -20°, AVG = 60%. The displayed temperature will be -14.
SIM	0...100	Display slowdown.
ADR	1...255	CD5-xx address for PC communication.
PRT	ASC; RTU	ASCII and RTU Modbus protocol selection.
PS	Ctm; Ctp; Fr; HeA	Ctm: storage cabinet with timed defrost (without evaporator temperature probe). Ctp: storage cabinet with timed or temperature terminated defrost (with evaporator temperature). Fr: freezer. HeA: heated box.

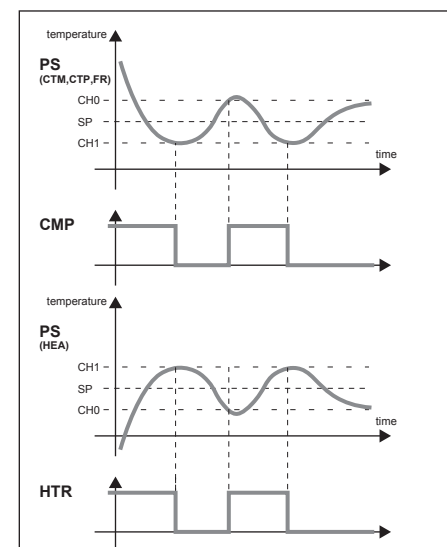


Fig. 1: Thermostat mode control

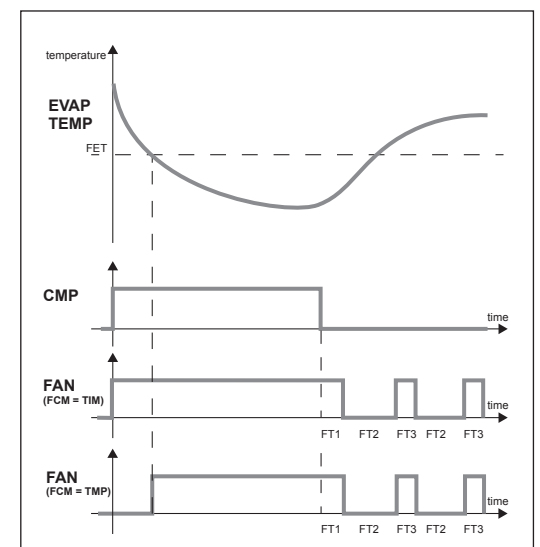


Fig. 2: Evaporator fan output when FCM = TIM and when FCM = TMP