

CR5 SERIES INSTRUCTIONS FOR USE

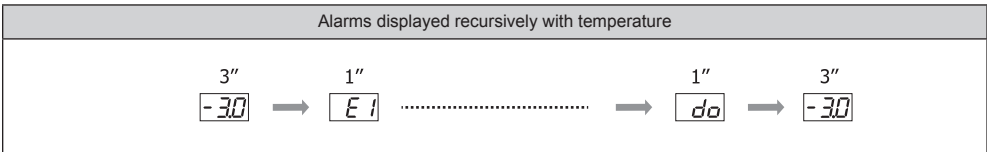
Thank you for having chosen an LAE Electronic product. Before installing the instrument, please read this instruction booklet carefully in order to ensure safe installation and optimum performance.

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 well separate 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_i	Room high temperature alarm
	Compressor output	L_o	Room low temperature alarm
	Fan output	h_c	Condenser high temperature
	Defrost output	RL_r	Digital input alarm
-	Controller in stand-by	r_{tc}	Check clock time
dEF	Defrost in progress	$E\ 1/2/3$	Probe T1/2/3 failure
do	Door open alarm		



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

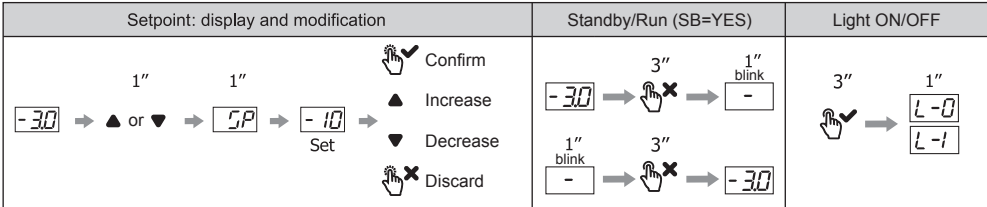


= Tap

= Hold

3. OPERATION

SETTING

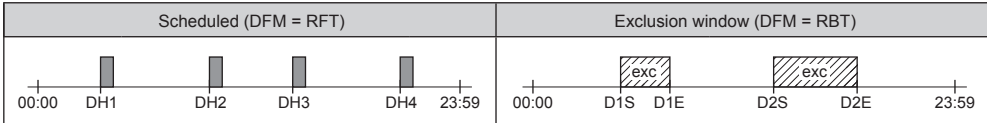


Info items	Navigation																				
<table><tr><td>$t\ 1$</td><td>Instant T1 temperature</td></tr><tr><td>$t\ 2^{(1)}$</td><td>Instant T2 temperature</td></tr><tr><td>$t\ 3^{(1)}$</td><td>Instant T3 temperature</td></tr><tr><td>$hr\ 5$</td><td>Hours of time RTC</td></tr><tr><td>$\bar{m}\ 10$</td><td>Minutes of time RTC</td></tr><tr><td>$t\ h_i$</td><td>Max T1 temperature</td></tr><tr><td>$t\ L_o$</td><td>Min T1 temperature</td></tr><tr><td>$r_{tc}^{(2)}$</td><td>Real time defrost menu</td></tr><tr><td>L_{oc}</td><td>Keypad state lock</td></tr><tr><td>$P\ 5_d$</td><td>Configuration menu password</td></tr></table>	$t\ 1$	Instant T1 temperature	$t\ 2^{(1)}$	Instant T2 temperature	$t\ 3^{(1)}$	Instant T3 temperature	$hr\ 5$	Hours of time RTC	$\bar{m}\ 10$	Minutes of time RTC	$t\ h_i$	Max T1 temperature	$t\ L_o$	Min T1 temperature	$r_{tc}^{(2)}$	Real time defrost menu	L_{oc}	Keypad state lock	$P\ 5_d$	Configuration menu password	
$t\ 1$	Instant T1 temperature																				
$t\ 2^{(1)}$	Instant T2 temperature																				
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$r_{tc}^{(2)}$	Real time defrost menu																				
L_{oc}	Keypad state lock																				
$P\ 5_d$	Configuration menu password																				
	Keypad Lock																				
	THI/TLO reset																				

DEFROST START

Manual	Timed (DFM=TIM)	Optimised (DFM=FRO)	Remote start (DRS=RDS)

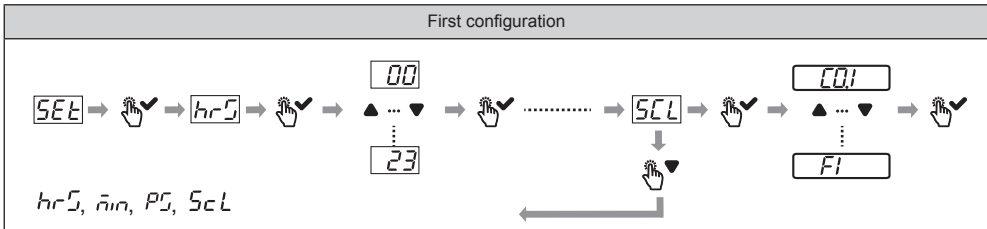
DEFROST SCHEDULER



4. CONFIGURATION PARAMETERS

4.1 FIRST CONFIGURATION

At the first power-up, “SEt” is displayed, to indicate that the controller needs a first configuration of clock (HRS, MIN), profile (PS) and readout scale (SCL). At the end of this operation the controller will start working as desired.



5. PARAMETER SETTING

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

Preset profiles:

CBT: storage cabinet with busy time defrost skipped

CFT: storage cabinet with real time clock defrost

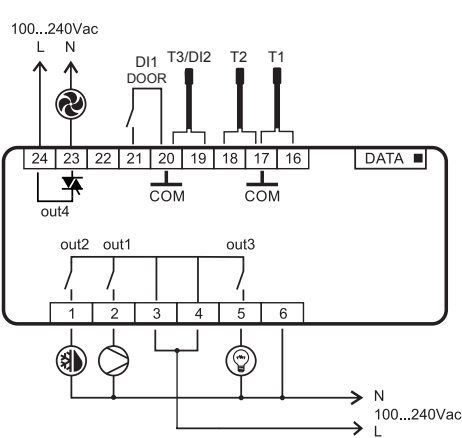
FBT: freezer with busy time defrost skipped

FFT: freezer with real time clock defrost

PARAMETERS PROFILES						
Parameters	Description	Profiles				Dim.
		Cbt	Cft	Fbt	Fft	
SCL	Readout scale	C0.1	C0.1	C1	C1	
SPL	Minimum temperature setpoint	2.0	2.0	-22.0	-22.0	°C
SPH	Maximum temperature setpoint	12.0	12.0	-15.0	-15.0	°C
SP	Setpoint	3.0	3.0	-20.0	-20.0	°C
CH0	Thermostat OFF -> ON (ref. to SP)	2.0	2.0	2.0	2.0	°K
CH1	Thermostat ON -> OFF (ref. to SP)	1.0	1.0	2.0	2.0	°K
CRT	Compressor minimum OFF time	3	3	3	3	min
CMT	Compressor minimum ON time	1	1	1	1	min
CT1	Compressor output ON when probe T1 is faulty	2	2	5	5	min
CT2	Compressor output OFF when probe T1 is faulty	5	5	5	5	min
DFM	Defrost Start Mode	RBT	RFT	RBT	RFT	
DFT	Time based defrost	6	6	4	4	hrs
DDS	Minimum Time between defrosts	4	4	2	2	hrs
DAR	Defrost time optimisation	YES	YES	YES	YES	
DH1	Scheduled time 1 for defrost	-	00.0	-	00.0	hh.m
DH2	Scheduled time 2 for defrost	-	06.0	-	06.0	hh.m
DH3	Scheduled time 3 for defrost	-	12.0	-	12.0	hh.m
DH4	Scheduled time 4 for defrost	-	18.0	-	18.0	hh.m
DH5	Scheduled time 5 for defrost	-	NO	-	NO	hh.m
DH6	Scheduled time 6 for defrost	-	NO	-	NO	hh.m
D1S	Start busy time 1 for defrost skip	11.0	-	11.0	-	hh.m
D1E	End busy time 1 for defrost skip	14.0	-	14.0	-	hh.m
D2S	Start busy time 2 for defrost skip	19.0	-	19.0	-	hh.m
D2E	End busy time 2 for defrost skip	22.0	-	22.0	-	hh.m
D3S	Start busy time 3 for defrost skip	NO	-	NO	-	hh.m
D3E	End busy time 3 for defrost skip	NO	-	NO	-	hh.m
SOD	Max. defrost start delay for sync	30	30	30	30	min

PARAMETERS PROFILES						
Parameters	Description	Profiles				Dim.
		Cbt	Cft	Fbt	Fft	
DTY	Defrost type	OFF	OFF	ELE	ELE	
DPD	Delay for pressure equalisation for hot gas	0	0	0	0	sec
DLI	Defrost end temperature	6.0	6.0	12.0	12.0	°C
DTO	Maximum defrost duration	30	30	30	30	min
DRN	Drain down time	0	0	3	3	min
DDM	Display defrost mode	DEF	DEF	DEF	DEF	
DDY	Display delay	3	3	5	5	min
FID	Fans active during defrost	YES	YES	NO	NO	
FDD	Fan re-start temperature after defrost	-1.0	-1.0	-1.0	-1.0	°C
FTO	Maximum fan stop for FDD/FET	3	3	3	3	min
FCM	Fan mode during thermostatic control	TMP	TMP	TMP	TMP	
FET	Target evaporator temperature	-3.0	-3.0	-20.0	-20.0	°C
FT1	Fan stop delay after compressor stop	30	30	30	30	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
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	ALR	ALR	ALR	ALR	
DAD	Door alarm delay	3	3	3	3	min
CSD	Compressor stop delay	5	5	5	5	min
DOT	Door stop timeout (0=inhibited)	60	60	60	60	min
D1O	DI1 digital input operation	DOR	DOR	DOR	DOR	
D1A	DI1 digital input activation	OPN	OPN	OPN	OPN	
D2O	DI2 digital input operation	NON	NON	NON	NON	
D2A	DI2 digital input activation	CLS	CLS	CLS	CLS	
LSM	Light control mode	MAN	MAN	NON	NON	
DFS	Door frame heater set	-5.0	-5.0	-5.0	-5.0	°C
OA1	RL1 output operation	CMP	CMP	CMP	CMP	
OA2	RL2 output operation	LGT	LGT	DEF	DEF	
OA3	RL3 output operation	NON	NON	DFH	DFH	
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	YES	YES	YES	YES	
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
TLD	Delay for minimum and maximum temperature logging	5	5	5	5	min
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	Cbt	Cft	Fbt	Fft	

6. WIRING DIAGRAM



7. TECHNICAL DATA

Power supply
CR5 100-240Vac ±10%, 50/60Hz, 3W

Relay output max loads

Output	Model	CR5-01WR
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

*In compliance with IEC60079-15, the maximum current on the OUT2 and OUT3 outputs is 7A.

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

0L0033R01-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	Compressor minimum OFF time. The output is switched on <i>at least</i> after CRT minutes have elapsed since the previous compressor cut-out.
CMT	0...30min	Compressor minimum ON time.
CT1	0...30min	Compressor output run when probe T1 is faulty. With CT1=0 the output will always remain OFF.
CT2	0...30min	Compressor 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 compressor will cycle 4 minutes ON and 6 minutes OFF.
DFM	NON; TIM; FRO; RFT; RBT	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. WWith setpoints much lower than 0°C, defrost frequency mainly depends on the compressor operating time. RFT : the defrost time is scheduled by parameters DH1, DH2, ... DH6. RBT : defrost takes place preferably outside the busy time window.
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.
DH1 DH2 ... DH6	00.0...23.5; NO; HH.M(x10)	DFM = RFT Scheduled time for defrost 1 to 6. HH hours from midnight, M tens of minutes. Accepted values go from 00.0 to 23.5. "NO" means "skipped defrost". <i>Example</i> : DH1=8.3 means 8.30 AM.
D1S D1E ... D3E	00.0...23.5; NO; HH.M(x10)	DFM = RBT DxS is the busy time start, DxE is the busy time end. Defrost is optimised on frost by using the algorithm FRO and DFT, however it doesn't take place preferably within the busy time start and end.
SOD	0...60 min	Maximum defost start delay. If DFM=FRO, defrost start will be postponed until compressor cuts out. With DFM=RBT, defrost will be postponed to the end of the busy time.
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 equalisation 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.
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 temperature based 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 X 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	NO; 1...200 min	Door stop timeout. If the door switch remains open for longer than DOT minutes, it will then be ignored. With DOT=NO, this function is disabled.
D1O	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 : when contacts open CLS : when contacts close
D2O	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 ouput controlled through button ✓ DOR : lights ON/OFF following the door state (Dlx=DOR).
DFS	-50...-3°	Door frame heater set. When T1<DFS then door heater is ON until T1>0.
OA1	NON; CMP; DEF; FAN; LGT; DFH; ALO; ALC	OUT1 output operation NON : output disabled (always off). CMP : compressor / condenser fan. 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.
TDL	1...30 min	Delay for minimum and maximum temperature logging.
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	CR5-xx address for PC communication.
PRT	ASC; RTU	ASCII and RTU Modbus protocol selection.
PS	CBT; CFT; FBT; FFT	CBT : storage cabinet with busy time defrost skipped CFT : storage cabinet with real time clock defrost FBT : freezer with busy time defrost skipped FFT : freezer with real time clock defrost

