



# UNIVERSAL-R

## **GREAT NEW FEATURES on the Universal-R**

- **DUAL VOLTAGE 12V & 230V POWER SUPPLY**

Both low (12Vac/dc) and high voltage (230Vac) power supply inputs are present in this single controller (see the rear connections of the device).

- **QUICK AND SAFE START UP FUNCTION SELECTION**

Direct selection of the controller functionality by pressing a dedicated button, during a fixed time interval, at start up.

- **NEW FRONT FASCIA DESIGN**

Display with illuminated icons to indicate loads, alarms, status indications. Six buttons give direct access to main functions and menu.

- **DOUBLE EVAPORATOR DEFROST FUNCTION**

A new feature allows defrost control of twin evaporators. The 4<sup>th</sup> (AUX) relay and probe 3 (Pb3) control defrost of the second evaporator. Only when both have terminated will refrigeration re-start. Independent parameters are present to control the second evaporator.

- **ON/OFF BUTTON**

Dedicated button to switch the controller on and off.

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## 2. GENERAL WARNING

**WARNING: The Universal-R should always be installed by a suitable qualified person, in accordance with best electrical and refrigeration practice. Take time to read the instructions. Do not exceed the relay ratings. The Universal-R should not be considered a safety device, use suitable safety cutout devices when appropriate.**

- This manual is part of the product and should be kept near the instrument for easy and quick reference.
- The instrument shall not be used for purposes different from those described hereunder. It cannot be used as a safety device.
- Check the application limits before proceeding.

### 2.1 SAFETY PRECAUTIONS

- Check the supply voltage is correct before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- **Warning:** Disconnect all electrical connections before any kind of maintenance.
- The instrument must not be opened.
- Fit the probes where they are not accessible by the End User.
- In case of failure or faulty operation send the instrument back to the distributor with a detailed description of the fault.
- Do not exceed the maximum current that can be applied to each relay (see Technical Data).
- Ensure that the wires for probes, electrical loads and the power supply are separated and far enough away to each other, without crossing or intertwining.
- In case of applications in industrial environments, the use of mains filters (our mod. DIXL930) in parallel with inductive loads could be useful.
- **Heating applications – Do not exceed 105°C** with the NTC probes supplied. For higher temperatures (up to a maximum of 150°C) use special PTC probes (e.g. our Part No. DIXL957).

## 3. GENERAL DESCRIPTION

Model **Universal-R** is a 71x29 mm format microprocessor based controller, suitable for applications on high, medium or low temperature refrigeration units. It is provided with three relay outputs to control compressor, defrost - which can be both electrical or hot gas - and evaporator fans. It can work with PTC or NTC probes. Where defrost is being terminated by time, it can operate with just one thermostat probe. Where defrost is being terminated by temperature, it has an input for an evaporator probe(s).






The **Universal-R** is equipped with an internal alarm buzzer, a flashing visual alarm as well as a 4th relay (volt free) that can be configured as Auxiliary or Alarm, to control a heater in Dead Band control (see parameter **oAC**) or to control the defrosting of a second evaporator (when **tC** parameter is set to 6).

**Double evaporator defrost:** When **tC=6**, the controller is set up to defrost twin evaporators. Defrost of both evaporators will start simultaneously but each evaporator will terminate defrost individually on temperature. Only when both evaporators have terminated defrost, will the controller revert to refrigeration.

Each instrument is fully configurable through special parameters that can be easily programmed through the keypad.

#### 4. QUICK START UP PROCEDURE – Up and running in 5 easy steps

This Quick Start Up section is designed to get you up and running with the minimum of fuss. Just follow these 5 simple steps.

STEP 1		Install the new Universal-R, connect the correct number of probes and connect the wiring - See below: 1. Table 1: parameter tC settings 2. Section 5: Typical connections
STEP 2		Turn on power,  <b>THEN WITHIN 1 MINUTE COMPLETE STEPS 3, 4 AND 5.</b>
STEP 3		Press the "DOWN" key for 3 seconds and the controller will automatically recognise and adjust itself to the type of probes connected. (The display briefly shows tPd followed by nTc or PTC).
STEP 4		Press the "AUX/tC" key for 3 seconds and the setting of parameter tC is displayed. Use the UP or DOWN keys to adjust to required setting then confirm by pressing SET (see table 1 below).
STEP 5		Press SET for 3 seconds until the °C or °F icon starts to flash, then adjust the SET POINT using the UP or DOWN keys, then press SET again to confirm.

**Notes:**

1. All probes must be of the same type, either PTC or NTC;
2. Probes must be at between -50 to 60°C for auto recognition to work;
3. If 1 minute expires before you have completed quick set up, either turn OFF / ON power to start set up again or enter parameter as per the instructions and adjust your parameter settings manually (see Section 9).

**Table 1: parameter "tC" settings**

Parameter tC	Type of Control	Required probes
1	On / Off thermostat – Cooling	x 1
2	Off cycle defrost (timed)	x 1
3	Electrical / Hot Gas defrost, time initiated / time terminated	x 1
4	Electrical / Hot Gas defrost, time initiated / temperature terminated	x 2
5	Electrical / Hot Gas defrost, time initiated / temperature terminated + evap. fan delay	x 2
6	Double evaporators applications (similar to setting 5)	x 3
7	On / Off thermostat – Heating	x 1

**Note:** "tC" settings 3, 4, 5 and 6 use Electrical defrost as default. Hot Gas is possible by setting parameter "tdF" for gas defrost. Settings 1, 2, 3 & 7 do not require that the 2nd and the 3rd probe to be fitted. Take note of the number of probes to be connected for the selected application.

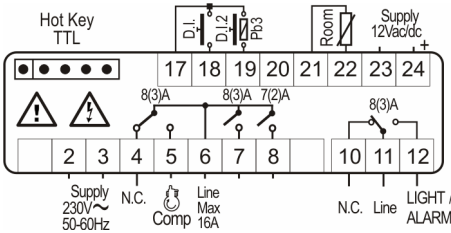
As you change parameter tC, defaults change and should be approximately correct for that application but we strongly recommend you check all parameter default values listed in these instructions to ensure they suit your particular application and make further adjustments if necessary. Read the following sections for information about programming.

## 5. TYPICAL CONNECTIONS - FOR GENERAL GUIDANCE ONLY

Table 2: typical connections

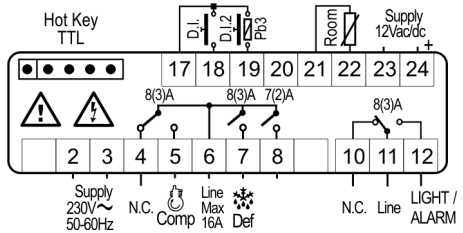
### Parameter tC = 1, 2

On / Off thermostat or Off Cycle Defrost Controller.



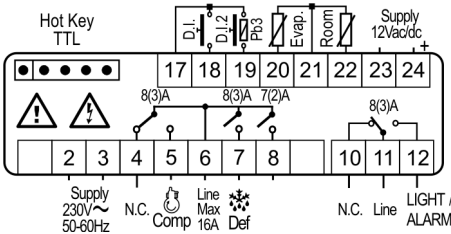
### Parameter tC = 3

Forced defrost controller, time initiated & time terminated.



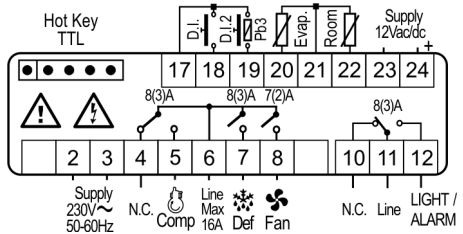
### Parameter tC = 4

Forced defrost controller, time initiated & temperature terminated.



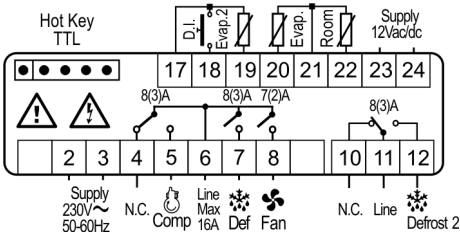
### Parameter tC = 5

Forced defrost controller, time initiated & temperature terminated with evaporator fan delay after defrost.



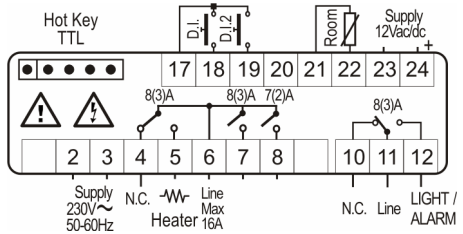
### Parameter tC = 6

Double evaporator applications.



### Parameter tC = 7

Heating applications.



## 6. PARAMETER TABLE and factory default settings

**IMPORTANT: Always** set parameter "tC" first. As you move "tC" between settings 1 to 7, all non-relevant parameters will be masked. After setting "tC", it will be possible to modify all the other relevant parameters.

### WARNING!!

Always switch the power OFF and then ON at the end of programming to update any parameter changes.

Make sure you connect the correct number of probes to suit the setting of parameter tC. Failure to do this will cause probe alarms

tC setting	No. Probes	Type
1, 2, 3 and 7	1	Room only
4, 5	2	Room + Evaporator 1
6	3	Room + Evaporator 1 + Evaporator 2

Any probe alarms can be cleared by turning off / on the power

Table 3: default controller parameters

Description	Label	Adjustment Range	Factory defaults with parameter "tC" 1- 7							
Type (category) of controller	tC	1 = On / Off Thermostat	1							
		2 = Off cycle defrost		2						
		3 = Time / time defrost			3					
		4 = Time / temp defrost				4				
		5 = Time / temp defrost + fan delay					5			
		6 = Double evaporator defrost						6		
		7 = On / Off Thermostat for heating								7
Set Point		LS to US	2.0°C; 36°F	2.0°C; 36°F	2.0°C; 36°F	2.0°C; 36°F	2.0°C; 36°F	2.0°C; 36°F	2.0°C; 36°F	40.0°C; 104°F
Probe type	PbC	0 = PTC 1 = NTC	1	1	1	1	1	1	1	1
Differential	HY	0.1 to 25.5°C; 1 to 45°F	2.0°C; 2°F	2.0°C; 2°F	2.0°C; 2°F	2.0°C; 2°F	2.0°C; 2°F	2.0°C; 2°F	2.0°C; 2°F	2.0°C; 2°F
Minimum Set Point limit	LS	-55°C to Set Point; -67°F to Set Point	-50.0°C; -58°F	-50.0°C; -58°F	-50.0°C; -58°F	-50.0°C; -58°F	-50.0°C; -58°F	-50.0°C; -58°F	-50.0°C; -58°F	-50.0°C; -58°F
Maximum Set Point limit	US	Set Point to 150°C; Set Point to 302°F	50.0°C; 122°F	50.0°C; 122°F	50.0°C; 122°F	50.0°C; 122°F	50.0°C; 122°F	50.0°C; 122°F	50.0°C; 122°F	50.0°C; 122°F
Anti-short cycle delay	AC	0 to 50 min	1	1	1	1	1	1	1	0
Second compressor start delay	AC1	0 to 255 sec	2	2	2	2	2	2		
Temperature alarm configuration	ALC	0 = Relative to Set Point; 1 = Absolute	1	1	1	1	1	1	1	1
High temperature alarm	ALU	0 to 50°C (Rel); ALL to 150°C (Abs); 0 to 90°F (Rel); ALL to 302°C (Abs)	50.0°C; 122°F	50.0°C; 122°F	50.0°C; 122°F	50.0°C; 122°F	50.0°C; 122°F	50.0°C; 122°F	50.0°C; 122°F	50.0°C; 122°F
Low temperature alarm	ALL	0 to 50°C (Rel); -55°C to ALU (Abs); 0 to 90°C (Rel); -67°C to ALU (Abs)	-50.0°C; -58°F	-50.0°C; -58°F	-50.0°C; -58°F	-50.0°C; -58°F	-50.0°C; -58°F	-50.0°C; -58°F	-50.0°C; -58°F	-50.0°C; -58°F
Temperature alarm delay	ALd	0 to 255 min	15	15	15	15	15	15	15	15
Delay of temperature alarm at start up	dAo	0 to 720 min	90	90	90	90	90	90	90	90
Outputs activation delay at start up	odS	0 to 255 min	0	0	0	0	0	0	0	0
Thermostat override	CCt	0 to 990 min		0	0	0	0	0	0	0
Set point for continuous cycle	CCS	-55 to 150°C; -67 to 302°F		2.0°C; 36°F	2.0°C; 36°F	2.0°C; 36°F	2.0°C; 36°F	2.0°C; 36°F	2.0°C; 36°F	2.0°C; 36°F
Defrost delay after thermostat override	dAF	0 to 255 min		2	2	2	2	2	2	2
Interval between defrosts	idf	1 to 250 hours		4	6	6	6	6	6	6
Delay start of defrost	dSd	0 to 255 min		0	0	0	0	0	0	0

Description	Label	Adjustment Range	Factory defaults with parameter "tC" 1- 7						
Maximum duration of defrost	<i>ndf</i>	0 to 255 min		15	15	30	30	30	
Defrost termination temperature	<i>dtE</i>	-55 to 50°C; -67 to 122°F	8.0°C 46°F	8.0°C 46°F	8.0°C 46°F	8.0°C 46°F	8.0°C 46°F	8.0°C 46°F	
Maximum duration of defrost (second evaporator)	<i>nds</i>	0 to 255 min						30	
Defrost termination temperature (second evaporator)	<i>dtS</i>	-55 to 50°C; -67 to 122°F						8.0°C 46°F	
Display during defrost	<i>dfd</i>	0 = Real temp. 1 = Temp. at defrost start 2 = Set Point 3 = "DEF" label 4 = "DEG" label		3	3	3	3	3	
Defrost display time out	<i>dAd</i>	0 to 255 min		10	10	10	10	10	
Defrost type (forced)	<i>tdf</i>	0 = Electrical 1 = Hot Gas			0	0	0	0	
Drain down time	<i>Fdt</i>	0 to 255 min			0	0	2	2	
First defrost after power on	<i>dPo</i>	1 = Immediate 0 = After normal interval		0	0	0	0	0	
Evaporator fan operating mode	<i>FnC</i>	0 to 3 (1 = Fan always on apart from during defrost. See section 10 for info. on other settings )						1	1
Evaporator fan stop temperature	<i>FSt</i>	-55 to 50°C; -67 to 122°F					25°C; 77°F	25°C; 77°F	
Evaporator fan delay after defrost	<i>Fnd</i>	0 to 255 min					7	7	
Fan ON time	<i>Fon</i>	0 to 15 min					0	0	
Fan Off time	<i>Fof</i>	0 to 15 min					0	0	
Thermostat probe calibration	<i>ot</i>	-12.0 to 12.0°C; -21 to 21°F	0.0°C; 0°F	0.0°C; 0°F	0.0°C; 0°F	0.0°C; 0°F	0.0°C; 0°F	0.0°C; 0°F	0.0°C; 0°F
Evaporator probe presence	<i>PpP</i>	0 = evaporator probe not present 1 = evaporator probe present				1	1	1	
Evaporator probe calibration	<i>oE</i>	-12.0 to 12.0°C; -21 to 21°F				0.0°C; 0°F	0.0°C; 0°F	0.0°C; 0°F	
Third probe presence	<i>P3P</i>	0 = third probe not present, 1 = third probe present.	1	1	1	1	1	1	
Third probe calibration	<i>o3</i>	-12.0 to 12.0°C; -21 to 21°F	0.0°C; 0°F	0.0°C; 0°F	0.0°C; 0°F	0.0°C; 0°F	0.0°C; 0°F	0.0°C; 0°F	
Display Resolution	<i>rES</i>	0 = With decimal point 1 = No decimal point	0	0	0	0	0	0	0
Temperature measurement unit (°C/°F)	<i>CF</i>	0 = Celsius 1 = °Fahrenheit	0	0	0	0	0	0	0
Instrument display	<i>Lod</i>	0 = Thermostat probe 1 = Evaporator probe 2 = Third probe 3 = SET-POINT	0	0	0	0	0	0	0
Display delay	<i>dLY</i>	0 to 20min/Sec, res. 10sec	0	0	0	0	0	0	0
Type of action	<i>CH</i>	0 = cooling 1 = heating	0	0					
Compressor ON time with faulty probe	<i>Con</i>	0 to 255 min	15	15	15	15	15	15	0
Compressor OFF time with faulty probe	<i>CoF</i>	0 to 255 min	30	30	30	30	30	30	30
Alarm muting configuration for buzzer & relay	<i>tBA</i>	0 = Mute buzzer only 1 = Mute buzzer & relay	1	1	1	1	1	1	1































Description	Label	Adjustment Range	Factory defaults with parameter "tC" 1- 7						
Digital input configuration	<i>dIC</i>	0 = Start defrost 1 = Door switch 2 = Auxiliary relay 3 = Energy saving 4 = Remote On/OFF 5 = Generic alarm 6 = Serious alarm	5	5	5	5	5	5	5
Digital input polarity	<i>dIP</i>	0 = Closed circuit 1 = Open circuit	0	0	0	0	0	0	0
Second Digital input configuration	<i>i2F</i>	0 = Start defrost 1 = Door switch 2 = Auxiliary relay 3 = Energy saving 4 = Remote On/OFF 5 = Generic alarm 6 = Serious alarm	5	5	5	5	5		5
Second Digital input polarity	<i>i2P</i>	0 = Closed circuit 1 = Open circuit	0	0	0	0	0		0
Digital input 1 delay	<i>d1d</i>	0 to 255 min	0	0	0	0	0	0	0
Digital input 2 delay	<i>d12</i>	0 to 255 min	0	0	0	0	0	0	0
Door open – compressor / fan status	<i>odC</i>	0 = No change 1 = Fan off 2 = Compressor off 3 = Compressor & Fan off	0	0	0	0	0	0	0
Configuration of 4 <sup>th</sup> relay	<i>o4C</i>	0 = Alarm relay 1 = Heater relay (for Neutral Zone) 2 = Auxiliary relay 3 = Second compressor relay 4 = Light output 5 = Second defrost output	0	0	0	0	0		0
Alarm relay polarity	<i>RoP</i>	0 = [11 -12] closed with alarm 1 = [11 -12] open with alarm	0	0	0	0	0		0
Exclude temperature alarm - door open	<i>dot</i>	0 to 255 min	20	20	20	20	20	20	20
Restart regulation with door open alarm	<i>rrd</i>	0 = No 1 = Yes	0	0	0	0	0	0	0
Low temperature alarm of condenser	<i>AL2</i>	-55 to 150°C; -67 to 302°F	-40°C; -40°F	-40°C; -40°F	-40°C; -40°F	-40°C; -40°F	-40°C; -40°F		
High temperature alarm of condenser	<i>AU2</i>	-55 to 150°C; -67 to 302°F	110°C; 230°F	110°C; 230°F	110°C; 230°F	110°C; 230°F	110°C; 230°F		
Differential for temperature condenser alarm recovery	<i>AH2</i>	0.1 to 25.5°C; 1 to 45°F	5°C; 5°F	5°C; 5°F	5°C; 5°F	5°C; 5°F	5°C; 5°F		
Condenser temperature alarm delay	<i>Ad2</i>	0 to 254 min, 255 = nU	15	15	15	15	15		
Condenser temperature alarm exclusion at start up	<i>dAR2</i>	0 to 720 min, res.10min	90	90	90	90	90		
Compressor off with low temperature alarm of condenser	<i>bLL</i>	0 = No 1 = Yes	0	0	0	0	0		
Compressor off with high temperature alarm of condenser	<i>AC2</i>	0 = No 1 = Yes	0	0	0	0	0		
Temperature deviation from normal Set Point during Energy Saving	<i>HES</i>	-30.0 to 30°C; -54 to 54°F	0°C; 0°F	0°C; 0°F	0°C; 0°F	0°C; 0°F	0°C; 0°F	0°C; 0°F	0°C; 0°F
ON / OFF key enabling	<i>onF</i>	0 = Disabled 1 = Enabled 2 = Energy saving	0	0	0	0	0	0	0
Buzzer enabling	<i>bEn</i>	0 = Disabled 1 = Enabled	1	1	1	1	1	1	1
Parameter table	<i>Pt6</i>	For factory use only	-	-	-	-	-	-	-
Software release number	<i>rEL</i>	Read only	-	-	-	-	-	-	-
Evaporator probe temperature	<i>dP2</i>	Read only					-	-	-
Third probe temperature	<i>dP3</i>	Read only	-	-	-	-	-	-	-

















# READ ON IF YOU NEED MORE DETAIL















## 7. PARAMETERS – THEIR FUNCTIONS IN DETAIL













**Table 4: controller parameters in detail**

Display visualisation	Description
	<p><b>Type of Controller:</b> tells the Universal-UDS which type of controller it will be operating as.</p> <p>1 = on/off refrigeration thermostat – 1 relay &amp; 1 probe;                  2 = Combined thermostat with off cycle defrost timer – 1 relay &amp; 1 probe;                  3 = Combined thermostat with time initiated &amp; time terminated defrost – 2 relays &amp; 1 probe;                  4 = Combined thermostat with time initiated &amp; temperature terminated defrost – 2 relays &amp; 2 probes;                  5 = Combined thermostat with time initiated, temperature terminated defrost + evaporator fan control with delay after defrost – 3 relays &amp; 2 probes;                  6 = Double evaporator operations: combined thermostat with time initiated, temperatures terminated defrost + evaporator fans control with delay after defrost – 3 relays &amp; 3 probes;                  7 = on/off heating thermostat – 1 relay &amp; 1 probe.</p>
	<p><b>Probe Type:</b> configures the controller to work with PTC or NTC probes.</p> <p>0 = PTC,                  1 = NTC.</p>
	<p><b>Differential:</b> (0.2°C to 12.0°C) sets the degrees above Set Point at which the compressor cuts in.</p> <p><b>Note:</b> when <b>TC = 7</b> (heating applications) the <b>TC</b> value is automatically set <b>below</b> the Set Point. If the temperature decreases and reaches set point minus differential the regulation output is activated and then turned off when the temperature reaches the set point value again.</p>
	<p><b>Minimum set point limit:</b> (-55°C to SET or -67°F to SET) sets the lower limit of set point adjustment.</p>
	<p><b>Maximum set point limit:</b> (SET to 150°C or SET to 302°F) sets the upper limit of set point adjustment.</p>
	<p><b>Anti-short cycle delay:</b> (0 to 50min) minimum interval between the compressor stop and the next possible restart.</p>
	<p><b>Second compressor start delay:</b> (0 to 255sec)</p>
	<p><b>Temperature alarm configuration:</b></p> <p>0 = Related to Set Point;                  1 = Absolute.</p> <p><b>Note:</b> <b>Related</b> means alarms are linked to the Set Point and will follow it if it is adjusted. In this case <b>ALU</b> &amp; <b>ALL</b> set degrees over &amp; under Set Point for alarm. <b>Absolute</b> means <b>ALU</b> &amp; <b>ALL</b> will set fixed alarm temperatures, which are not affected by any Set Point adjustment.</p>
	<p><b>High temperature alarm:</b></p> <p>ALC = 0 → [0 to 50°C] or [0 to 90°F];                  ALC = 1 → [ALL to 150°C] or [ALL to 302°F].</p>
	<p><b>Low temperature alarm:</b></p> <p>ALC = 0 → [0 to 50°C] or [0 to 90°F];                  ALC = 1 → [-55°C to ALU] or [-67 to ALU].</p>
	<p><b>Temperature alarm delay:</b> (0 to 255min) time interval between an alarm condition occurring and the alarm signalling.</p>
	<p><b>Delay of temperature alarm at start-up:</b> (from 0 to 720min; res. 10min) time delay of any temperature alarm during pull down following "power on".</p>

	<b>Outputs activation delay at start up:</b> (0 to 255min) time delay before any output relay activates following "power on".
	<b>Thermostat override:</b> (0 to 990min; res. 10min) period during which the compressor will run continuously, irrespective of temperature. Setting this parameter to 0 inhibit this function.
	<b>Set point for continuous cycle:</b> (-55 to 150 °C or -67 to 302°F) it sets the set point used during the continuous cycle.
	<b>Defrost delay after fast freezing:</b> (0 to 255min) time interval between the end of the thermostat override period and the start of the following defrost related to it.
	<b>Interval between defrosts:</b> (0 to 255hours) time interval between the beginning of two consecutive defrosts.
	<b>Delay start of defrost:</b> (0 to 255min) delay between reaching the defrost interval time (as defined by parameter idf) and the defrost actually starting. Used to stagger defrosts between multiple systems.
	<b>(Maximum) duration of defrost:</b> (0 to 255min) time duration of defrost when only one probe is in use, or defrost time out override when second (evaporator) probe is in use. Set it to zero to disable defrost cycles.
	<b>Defrost termination temperature:</b> (-55 to 50°C or -67 to 122°F) sets the defrost termination temperature. Measured by the evaporator probe.
	<b>(Maximum) length for second defrost:</b> (0 to 255min) when P3P = 0, (not evaporator probe: timed defrost) it sets the defrost duration, when P3P = 1 (defrost end based on temperature) it sets the maximum length for defrost. <b>Note:</b> The P3 probe will be automatically set as second evaporator probe by the tC parameter.
	<b>Second termination temperature:</b> (-55 to 50°C or -67 to 122°F) sets the temperature measured by the second evaporator probe (P3), which causes the end of defrost.
	<b>Display during defrost:</b> 0 = real temperature; 1 = temperature at defrost start; 2 = set point; 3 = dEF label; 4 = dEG label.
	<b>Defrost display time out:</b> (0 to 250min) after a defrost, the controller will revert to current temperature display when the temperature is back down within its normal working range, or after the time set in this parameter, whichever is the sooner.
	<b>Defrost type:</b> 0 = electrical heater; 1 = hot gas, compressor runs during defrost.
	<b>Drain down time:</b> (0 to 255min) drain down time. Runs concurrently with Fnd (Fan delay after defrost time).
	<b>First defrost after power-on:</b> 0 = immediately; 1 = after the idf interval time.
	<b>Fan operating mode:</b> 0 = cycles on/off with the compressor, OFF during defrost; 1 = continuous mode, OFF during defrost; 2 = cycles on/off with the compressor, ON during defrost; 3 = continuous mode, ON during defrost;

	<b>Fan stop temperature:</b> (-55 to 50°C or -67 to 122°F) temperature above which the evaporator fan stops (during the normal refrigeration cycle).
	<b>Fan delay after defrost:</b> (0 to 255min) the time interval between end of defrost and evaporator fans starting. Runs concurrently with <b>Fdt</b> (Drain down time). Always keep <b>Fnd</b> longer than <b>Fdt</b> .
	<b>Fan ON time:</b> (0 to 15min) used to set an On/Off cycle of the evaporator fans while the compressor is off. With <b>FnC = 0</b> or <b>FnC = 2</b> , it sets the evaporator fan ON cycling time when the compressor is OFF. With <b>Fon = 0</b> and <b>FoF ≠ 0</b> , the fans are always off. With <b>Fon = 0</b> and <b>FoF = 0</b> the fans are always on.
	<b>Fan OFF time:</b> (0 to 15min) used to set an On/Off cycle of the evaporator fans while the compressor is off. With <b>FnC = 0</b> or <b>FnC = 2</b> , it sets the evaporator fan OFF cycling time when the compressor is OFF. With <b>Fon = 0</b> and <b>FoF ≠ 0</b> , the fans are always off. With <b>Fon = 0</b> and <b>FoF = 0</b> the fans are always on.
	<b>Thermostat probe calibration:</b> (-12.0 to 12.0°C or -21 to 21°F) adjustment for thermostat probe (named <b>Room</b> ) offset.
	<b>Evaporator probe presence (probe named Evap on the label):</b> 0 = not present; 1 = present.
	<b>Evaporator probe calibration:</b> (-12.0 to 12.0°C or -21 to 21°F) adjustment for evaporator probe (named <b>Evap</b> ) offset.
	<b>Third probe presence (probe named Evap.2 on the label):</b> 0 = not present, the third input (the one signed with label "D.1.2 / Pb3") Input operates as digital input; 1 = present, the third input (the one signed with label "D.1.2 / Pb3") Input operates as third probe.
	<b>Third probe calibration:</b> (-12.0 to 12.0°C or -21 to 21°F) adjustment for third probe (named <b>Evap.2</b> on the label) offset.
	<b>Display resolution:</b> 0 = with decimal point; 1 = without decimal point.
	<b>Temperature measurement unit:</b> 0 = Celsius; 1 = Fahrenheit. <b>Warning:</b> If you alter the setting of parameter <b>rES</b> ( decimal point on/off ) re-check the settings of all temperature related parameters <b>Set Point, HY, LS, US, ALU, ALL, dE, FSt, ot &amp; oE</b> , as they can be effected.
	<b>Probe for Display:</b> 0 = Thermostat probe; 1 = Evaporator probe; 2 = Third probe; 3 = DISPLAY ONLY SHOWS THE SET-POINT.
	<b>Display delay:</b> (0 + 20min0sec; resolution 10 sec) when the temperature increases, the display is updated of 1°C or 1°F after this time.
	<b>Type of action:</b> 0 = cooling; 1 = heating.
	<b>Compressor ON time with faulty probe:</b> (0 to 255min) If there is a P1 probe failure the controller will automatically cycle the compressor on/off according to <b>Con</b> & <b>CoF</b> to maintain basic cooling. <b>Con</b> is the compressor "ON" time.
	<b>Compressor OFF time with faulty probe:</b> (0 to 255min) If there is a P1 probe failure the controller will automatically cycle the compressor on/off according to <b>Con</b> & <b>CoF</b> to maintain basic cooling. <b>CoF</b> is the compressor "OFF" time.







	<p><b>Alarm muting:</b></p> <ul style="list-style-type: none"> <li>0 = Alarm relay remains active when alarm buzzer is muted;</li> <li>1 = Alarm relay is cancelled when alarm buzzer is muted.</li> </ul>
	<p><b>Digital input operating mode:</b> configures the digital input function:</p> <ul style="list-style-type: none"> <li>0 = Starts a defrost;</li> <li>1 = Input from a door switch (see parameter <b>odC</b>);</li> <li>2 = Activates the auxiliary relay;</li> <li>3 = Starts Energy Saving (Control Point becomes Set Point +/- value in <b>HES</b>);</li> <li>4 = Remote On/OFF (puts the controller into standby);</li> <li>5 = Generic external alarm (normal regulation continues);</li> <li>6 = Serious external alarm (regulation is stopped).</li> </ul>
	<p><b>Configurable digital input polarity:</b></p> <ul style="list-style-type: none"> <li>0 = the digital input is activated by closing the circuit;</li> <li>1 = the digital input is activated by opening the circuit.</li> </ul>
	<p><b>Second digital input operating mode:</b> configures the second digital input function:</p> <ul style="list-style-type: none"> <li>0 = Starts a defrost;</li> <li>1 = Input from a door switch (see parameter <b>odC</b>);</li> <li>2 = Activates the auxiliary relay;</li> <li>3 = Starts Energy Saving (Control Point becomes Set Point +/- value in <b>HES</b>);</li> <li>4 = Remote On/OFF (puts the controller into standby);</li> <li>5 = Generic external alarm (normal regulation continues);</li> <li>6 = Serious external alarm (regulation is stopped).</li> </ul>
	<p><b>Configurable second digital input polarity:</b></p> <ul style="list-style-type: none"> <li>0 = the digital input is activated by closing the circuit;</li> <li>1 = the digital input is activated by opening the circuit.</li> </ul>
	<p><b>Time interval/delay for digital input 1 alarm:</b> (0 to 255min) it defines the time delay between the detection and the subsequent signalling of the alarm.</p>
	<p><b>Time interval/delay for digital input 2 alarm:</b> (0 to 255min) it defines the time delay between the detection and the subsequent signalling of the alarm.</p>
	<p><b>Compressor and fan status when open door:</b></p> <ul style="list-style-type: none"> <li>0 = normal;</li> <li>1 = Fan OFF;</li> <li>2 = Compressor OFF;</li> <li>3 = Compressor and fan OFF.</li> </ul>
	<p><b>Auxiliary relay configuration:</b></p> <ul style="list-style-type: none"> <li>0 = Alarm;</li> <li>1 = Dead Band;</li> <li>2 = Auxiliary;</li> <li>3 = Second compressor output;</li> <li>4 = Light output;</li> <li>5 = Second defrost output.</li> </ul>
	<p><b>Alarm relay polarity:</b></p> <ul style="list-style-type: none"> <li>0 = contact [13 – 14] closed with alarm;</li> <li>1 = contact [13 – 14] open with alarm.</li> </ul>
	<p><b>Temperature alarm exclusion with door open:</b> 0 to 255min.</p>
	<p><b>Regulation restart with door open alarm:</b></p> <ul style="list-style-type: none"> <li>0 = no;</li> <li>1 = yes, regulation will restart after "door open" alarms.</li> </ul>
	<p><b>Low temperature alarm of condenser:</b> (-55 to 150°C or -67 to 302°F) when this temperature is reached, the <b>HA2</b> alarm will be raised (after the <b>Ad2</b> delay time has expired).</p>
	<p><b>High temperature alarm of condenser:</b> (-55 to 150°C or -67 to 302°F) when this temperature is reached, the <b>LA2</b> alarm will be raised (after the <b>Ad2</b> delay time has expired).</p>

	<b>Differential for temperature condenser alarm recovery:</b> 0.1 to 25.5°C or 1 to 45°F.
	<b>Condenser temperature alarm delay:</b> (0 to 255min) time interval between the detection of an alarm condition at the condenser and the relative alarm signalling.
	<b>Condenser temperature alarm exclusion during start-up:</b> (0 to 720min, resolution 10min).
	<b>Compressor off when a low temperature alarm of the condenser is active:</b> 0 = the compressor keeps on working if a low temperature alarm at the condenser is active; 1 = the compressor is switched off while the low temperature alarm is active. The regulation will restart after elapsing AC delay time.
	<b>Compressor off when an high temperature alarm of the condenser is active:</b> 0 = the compressor keeps on working if a high temperature alarm at the condenser is active; 1 = the compressor is switched off while the high temperature alarm is active. The regulation will restart after elapsing AC delay time.
	<b>Temperature set point change during the Energy Saving cycle:</b> (-30.0 to 30.0°C or -54 to 54°F) sets the deviation from the normal set point during the Energy Saving cycle.
	<b>ON / OFF key enabling:</b> 0 = key functionality disabled; 1 = On Off function enabled; 2 = Energy Saving function enabled.
	<b>Buzzer enabling:</b> 0 = disabled; 1 = enabled.
	<b>Parameter table:</b> read only – for factory use.
	<b>Software release:</b> read only – shows the software release.
	<b>Evaporator probe:</b> shows the current temperature sensed by the evaporator probe.
	<b>Third probe temperature:</b> shows the current temperature sensed by the third probe.

## 8. BUTTONS AND THEIR FUNCTIONS

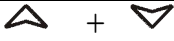
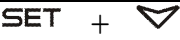
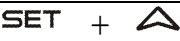
### 8.1 SINGLE BUTTON FUNCTIONS

Table 5: single button functions

BUTTON	FUNCTION
	<b>Type Controller menu:</b> keep this button pressed for at least 3 sec within 1 min after power on to enter the "Type Controller Menu" (tc). <b>AUX output control:</b> Switches the AUX relay output (if enabled as such).
	<b>Manual Defrost:</b> keep this button pressed for 3 s to start a manual defrost cycle. The defrost icon will illuminate. (Not possible if parameter tc = 1 or 7).
	<b>Display current set point:</b> after pressing and releasing this button, the set point will be displayed for 5 sec. This will not allow the set point to be altered. <b>Changing set point value:</b> keep this button pressed for at least 2 sec. Set point change mode is entered indicated by the small led's flashing. Change the set point using the <b>UP</b> and <b>DOWN</b> buttons. The new value can be stored either by pressing <b>SET</b> button (the instrument restores temperature display) or by waiting the exit time-out to expire (15 sec).
	<b>(UP):</b> to see the max stored temperature; in programming mode it browses the parameter codes or increases the displayed value.
	<b>(DOWN):</b> to see the min stored temperature; in programming mode it browses the parameter codes or decreases the displayed value. Keep press 3sec just after powering on the device (and within the first 60sec) to start automatic probe recognising.
	Keep pressed 2 sec to switch the instrument off when the parameter <b>onF</b> = 1.

### 8.2 BUTTON COMBINATION FUNCTIONS

Table 6: button combination functions

COMBINATION	FUNCTION
	<b>Lock &amp; unlock the keyboard:</b> keeping both buttons pressed for 3 sec will lock or unlock the keyboard. The display will flash <b>PoF</b> or <b>Pon</b> for a few seconds to confirm locking or unlocking respectively.
	<b>Enter programming mode:</b> keep both buttons pressed for 3 sec, release them and then press them again for 8 sec. The first label of <b>Pr2</b> level will be displayed.
	<b>Exit programming mode:</b> press together to return to normal display.

## 9. PROGRAMMING MODE

### 9.1 USER PROGRAMMING LEVEL – PR1

To enter programming level **Pr1** (user programming level), keep both **SET** and **DOWN** buttons pressed for 3 sec. The first parameter label will appear. Browse parameter list by using the **UP** or **DOWN** keys. Press **SET** to see a parameter's current value and **UP** or **DOWN** keys to alter its value. Press **SET** to confirm change (the display will blink for 3 sec and then the next parameter will appear) or by waiting for the menu timeout to expire (15 sec). If no parameter is available for changes in **Pr1** level, a **noP** label will be show.

### 9.1 PROTECTED PROGRAMMING LEVEL – PR2 (ALL VISIBLE PARAMETERS CAN BE FOUND HERE)

First enter **Pr1** level (as described above) then with any parameter label displayed keep both **SET** and **DOWN** buttons pressed for 8 sec. The first parameter label will appear. Browse parameter list by using the **UP** or **DOWN** keys. Press **SET** to see a parameter's current value and **UP** or **DOWN** keys to alter its value. Press **SET** to confirm change (the display will blink for 3 sec and then the next parameter will appear) or by waiting for the menu timeout to expire (15 sec).

From **Pr2** level it is also possible to add or remove any parameter to / from **Pr1** by pressing both **SET** & **DOWN** while its label is displayed. Accessibility of any particular parameter via **Pr1** level is confirmed by the alarm LED lighting up while its label is displayed

**WARNING:** if no button is pressed for 15 sec, any modified value will be stored into memory and the controller will return to the normal display mode.

## 10. OTHER FEATURES OF THE UNIVERSAL-R

As well as the main digital display, there are some small icons on the front panel. These are used to monitor the loads controlled by the instrument. Each icon function is described in the following table.



Table 7: display signalling description

ICON	FUNCTION	MEANING
	ON	Light (AUX) output enabled.
	ON	Cooling enabled.
	FLASHING	Anti-short cycle delay in progress.
	ON	Fan enabled.
	FLASHING	Delay time on fan activation is running ( $Fnd > 0$ )
	ON	Defrost in progress.
	FLASHING	Drip time in progress ( $Fdt > 0$ ) or delay on start defrosting is running ( $dSd > 0$ ).
AUX	ON	Auxiliary output activated.
	ON	Energy Saving activated.
	ON	Thermostat override enabled.
	ON	<b>ALARM signal:</b> when in programming mode and in Pr2 level, this icon lights up notifying this parameter is also accessible in the Pr1 level.
$^{\circ}C$	ON	All measurement units are in Celsius degrees.
	FLASHING	Programming mode.
$^{\circ}F$	ON	All measurement units are in Fahrenheit degrees.
	FLASHING	Programming mode.

## 11. THERMOSTAT OVERRIDE ( not available when parameter $tC = 1$ or $7$ )

For rapid chilling or freezing, the thermostat can be overridden by pressing the **UP** button until the icon lights up. The compressor will run in continuous mode, irrespective of temperature, for the time period set in parameter **CCt**. Normal operation will then resume automatically. The cycle can also be terminated manually by pressing the **UP** button again for about 3 seconds.

## 12. DEFROST TYPES

tC parameter value	Action
1 or 7	No defrost
2	Off cycle defrost by timer
3, 4, 5 or 6	Forced type of defrost: Electrical or Hot Gas

- **tdF = 0:** defrost is electrical;
- **tdF = 1:** defrost is by hot gas.

## 13. EVAPORATOR FAN CONTROL (only when parameter $tC = 5$ or $6$ )

The fan control mode is selected by means of the "**FnC**" parameter:

FnC parameter	Action
0	Fans will cycle ON and OFF with the compressor and <b>be off</b> during defrost cycle.
1	Fans will run continuously, but <b>be off</b> during defrost cycle.
2	Will switch ON and OFF with the compressor and <b>be on</b> during defrost cycle (*).
3	Fans will run continuously and <b>be on</b> during defrost cycle (*).

(\*) **Note:** Fans will stop if the temperature value set in parameter "**FSt**" is exceeded.



Parameter **FSt** sets the fan stop temperature. This is the maximum temperature, detected by the evaporator probe, above which the evaporator fans will stop.

Leave **FSt** above ambient temperature during commissioning to avoid fan short cycle.

After finishing the defrost phase, there is a stand still drain time, set by parameter **Fdt**. When this period has expired, the refrigeration cycle commence but the evaporator fans remain off until **Fnd** (fan delay) times out.

## 14. SPECIAL APPLICATIONS – DEAD BAND CONTROL

### 14.1 DEAD BAND CONTROL (COOLING & HEATING)

With [**oAC** = 1], the compressor relay controls cooling as normal but the 4th (auxiliary) relay is used to control a heater. The value entered in parameter **HY** will now be set equal on both sides of the **SET POINT**. Example: if [**HY** = 1°C] that will create a 2°C Dead Band.

At [**SET POINT + HY**], cooling switches on. At [**SET POINT – HY**], heating switches on. Either cooling or heating switch off when temperature returns to **SET POINT**.

## 15. ALARMS

Message	Message – Mode	Cause	Outputs
EE	Flashing	Data or memory failure	Alarm output ON; Other outputs unchanged.
P1	Flashing	Data or memory failure	Alarm output ON; Other outputs unchanged.
		Thermostat probe failure	Alarm output ON; Compressor output according to parameters <b>Con</b> and <b>CoF</b> .
P2	Alternating with room temperature	Evaporator probe failure	Alarm output ON; Other outputs unchanged; End defrost is timed.
P3	Alternating with room temperature	Second evaporator probe failure	Alarm output ON; Other outputs unchanged; End defrost is timed.
HA	Alternating with room temperature	High temperature alarm	Alarm output ON; Other outputs unchanged.
LA	Alternating with room temperature	Minimum temperature alarm	Alarm output ON; Other outputs unchanged.
HA2	Alternating with room temperature	Condenser max temp alarm	Alarm output ON; Other outputs unchanged.
LA2	Alternating with room temperature	Condenser max temp alarm	Alarm output ON; Other outputs unchanged.
dA	Alternating with room temperature	Door open alarm	Alarm output ON; Outputs re-start if parameter <b>rrd</b> = 1.
EA	Alternating with room temperature	Generic external alarm	Alarm output ON; Other outputs unchanged.
bAL	Alternating with room temperature	Serious external alarm	Alarm output ON; Other outputs OFF.

### 15.1 MUTING ALARM BUZZER & RELAY

The alarm buzzer can be muted, by pressing any button. The controller will briefly show the reset "rES" label. Parameter **tbA** defines how the alarm relay will respond to the muting of the buzzer.

- **tbA = 0**: the alarm relay will remain active until the alarm condition is rectified;
- **tbA = 1**: the alarm relay de-activates when the buzzer is muted.

In either case, the display will flash an alarm label until the condition is rectified.

### 15.2 ALARM "EE"

The Dixell Universal-R is provided with an internal watchdog verifying data and memory integrity. Alarm "EE" will flash after detecting a failure in data or in the internal memory. In this case, the alarm output is enabled.

#### WHAT TO DO

1. Cancel the alarm by pressing a key.
2. Check the value of all parameters and restore correct values when wrong.
3. Check the correct instrument operation and in case of further errors replace it.

### 15.3 ALARM RECOVERY

Probe alarms "P1", "P2" and "P3" start 30 seconds after a fault in probe is detected; they automatically stop 30 seconds after the probe restarts normal operation. Check connections before replacing the probe.

Temperature alarms "HA" and "LA" automatically stop as soon as the thermostat temperature returns to normal values and when defrost starts. Temperature alarms "HA2" and "LA2" automatically stop as soon as the condenser temperature returns to normal values.

## 16. REMOVING SECURITY LEVEL PROTECTION

It is possible to allow access to any parameter from **Pr1** level. To do this, go into **Pr2** as previously described. Scroll to the label of the parameter you require and then press the **SET** and **DOWN** buttons in quick succession. The decimal point LED will be on indicating that access to this particular parameter is now possible from **Pr1** level. Its label will now appear when in **Pr1** programming level and its value can be altered. To restore security level protection, use the same procedure (the decimal point LED will go out after pressing both buttons).

## 17. MOUNTING

The Universal-R should be mounted in a panel, in a 29 x 71 mm hole, and fixed using the special brackets supplied. Ambient temperature for correct operation is 0 to 50°C. Avoid places subject to strong vibrations, corrosive gases, excessive dirt or humidity (20 to 85% non-condensing RH is the recommended working range). Make sure air can freely circulate through the cooling holes slots at the rear side of the controller.

## 18. ELECTRICAL CONNECTIONS

The instrument is provided with screw terminal block to connect cables with a cross section up to 2.5 mm<sup>2</sup>. Before connecting cables make sure the power supply complies with the instrument's requirements. Separate the probe cables from the power supply cables, from the outputs and from the power connections. Do not exceed the maximum current rating for each relay; in case of heavier loads use a suitable external relay.

## 19. PROBES

It is recommended to place the thermostat probe away from rapid air streams to correctly measure the average room temperature. Place the defrost termination probe among the evaporator fins in the coldest place, where most ice is formed, far from heaters or from the warmest place during defrost, to prevent premature defrost termination.

## 20. TECHNICAL DATA

<b>Housing:</b>	Self extinguishing ABS
<b>Size:</b>	Frontal 32x74 mm; depth 70 mm
<b>Mounting:</b>	Panel mounting in a 71x29 mm panel cut-out
<b>Frontal protection:</b>	IP65
<b>Connections:</b>	Screw terminal block ≤ 2.5 mm <sup>2</sup> wiring
<b>Power supply:</b>	12Vac/dc, -10% +15% 230Vac, -10% +15%
<b>Power absorption:</b>	4 VA max
<b>Display:</b>	3 digits, red LED, 14.2 mm high
<b>Inputs:</b>	a maximum of 3 temperature probes, PTC or NTC type.
<b>Probes (supplied):</b>	2 x NTC, range [-40 to 105°C] with 2 metre cables
<b>Relay outputs:</b>	<b>Amps Resistive (Inductive)</b>
<b>Compressor:</b>	SPDT relay 8(3) A, 250Vac
<b>Defrost:</b>	SPDT relay 8(3) A, 250Vac
<b>Fans:</b>	SPST relay 7(2) A, 250Vac
<b>Alarm:</b>	SPDT relay 8(3) A, 250Vac
<b>Other output:</b>	Buzzer for acoustic signalling of alarms
<b>Data storing:</b>	Non-volatile memory (EEPROM)
<b>Ambient temperature:</b>	0 to 50°C
<b>Ambient humidity:</b>	20 to 85% (no condensing)
<b>Storage temperature:</b>	-30 to 85°C (-22 to 185°F)
<b>Operating range:</b>	<b>PTC:</b> -50 to 150°C (-58 to 302°F); <b>NTC:</b> -50 to 110°C (-58 to 230°F)
<b>Resolution:</b>	0.1°C or 1°F (selectable)
<b>Accuracy at 25°C:</b>	(range -40 to 50°C) ±0.5 °C ±1 digit

## 21. FAULT FINDING

Problem	Possible reason	Notes
Display flashing <b>HA</b>	<ul style="list-style-type: none"> <li>Temperature too high.</li> </ul>	<ul style="list-style-type: none"> <li>Check cooling system.</li> <li>Check alarm settings.</li> </ul>
Display flashing <b>LA</b>	<ul style="list-style-type: none"> <li>Temperature too low.</li> </ul>	<ul style="list-style-type: none"> <li>Check cooling system.</li> <li>Check alarm settings.</li> </ul>
Display flashing <b>HA2</b>	<ul style="list-style-type: none"> <li>Condenser temperature too high.</li> </ul>	<ul style="list-style-type: none"> <li>Check condenser cooling system.</li> <li>Check alarm settings.</li> </ul>
Display flashing <b>LA2</b>	<ul style="list-style-type: none"> <li>Condenser temperature too low.</li> </ul>	<ul style="list-style-type: none"> <li>Check condenser cooling system.</li> <li>Check alarm settings.</li> </ul>
Display flashing <b>P1</b>	<ul style="list-style-type: none"> <li>Fault with thermostat probe.</li> <li>Wrong type of probe fitted (NTC/PTC).</li> </ul>	<ul style="list-style-type: none"> <li>Check probe connections and resistance value.</li> <li>Change probe type or alter parameter <b>PbC</b>.</li> </ul>
Display flashing <b>P2</b>	<ul style="list-style-type: none"> <li>Fault with evaporator probe.</li> <li>Wrong type of probe fitted (NTC/PTC).</li> <li>Parameter <b>tC</b> has been set to 4, 5 or 6 without evaporator probe fitted.</li> </ul>	<ul style="list-style-type: none"> <li>Check probe connections and resistance value.</li> <li>Change probe type or alter parameter <b>PbC</b>.</li> <li>Fit evaporator probe or alter parameter <b>tC</b>.</li> </ul>
Display flashing <b>P3</b>	<ul style="list-style-type: none"> <li>Fault with third probe.</li> <li>Wrong type of probe fitted (NTC/PTC).</li> <li>Parameter <b>tC</b> has been set to 6 without third probe fitted.</li> </ul>	<ul style="list-style-type: none"> <li>Check probe connections and resistance value.</li> <li>Change probe type or alter parameter <b>PbC</b>.</li> <li>Fit evaporator probe or alter parameter <b>tC</b>.</li> </ul>
Display flashing <b>EE</b>	Data corruption.	Check for electrical spikes and interference. Fit filters D1XL930 & D1XL932. Ensure probe cables are separated from power cables. Re-check all parameter settings. Replace controller if still not working.
Display flashing <b>dA</b>	Door has been left open too long.	Shut the door.
Display flashing <b>EA</b>	A non serious external alarm has been detected by the digital input.	Trace and rectify the external problem.
Display flashing <b>bAL</b>	A serious external alarm has been detected by the digital input.	Trace and rectify the external problem.
Buttons will not work	Buttons have been locked.	Unlock buttons by pressing both <b>UP &amp; DOWN</b> buttons until display flashes <b>Pon</b> .
Parameter cannot be adjusted over its full range	Some other parameter is conflicting and preventing further adjustment.	Check other parameter settings.
Power on but no output operates Small LED's flashing	Anti short cycle delay in progress, all relays being held off until it expires.	Wait or adjust parameters <b>AC</b> or <b>odS</b> .
Evaporator fan short cycling	Parameter <b>FSt</b> set too low.	Adjust <b>FSt</b> to a higher setting. During commissioning, set it above ambient until pull down is complete, then re-set to a more suitable temperature.




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