

Universal-XR Unit of Measure Change Instructions



1. General Description

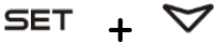
Model **Universal-XR** is a 71x29 mm format microprocessor based controller, it is available in 12/24Vac/dc, 120Vac or 230Vac, and is suitable for applications on high, medium or low temperature refrigeration units. It is provided with three relay outputs to control compressor, defrost - which can be 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-XR** is equipped with a flashing visual alarm and buzzer.

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

2. 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-XR per the installation instructions included with the controller.
STEP 2		Turn on power, THEN WITHIN 1 MINUTE COMPLETE STEPS 3, 4 AND 5.
STEP 3		Press the "SET" and "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 -58 to 140°F for auto recognition to work;
3. If 1 minute expires before you have completed quick set up, either cycle the power OFF then ON to start the set up again or enter Pr2 as per the instructions and adjust your parameter settings manually (see Section 9).

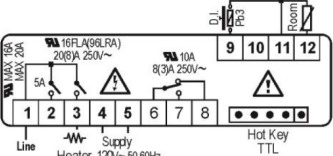
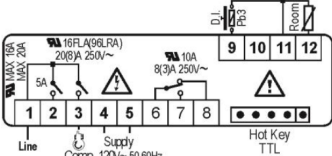
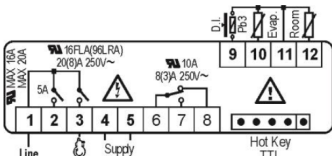
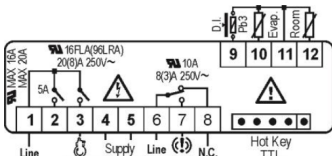
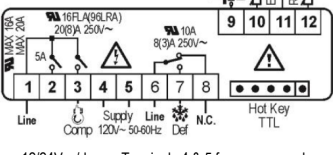
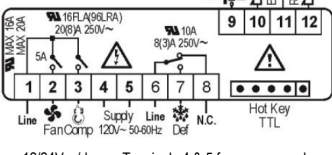
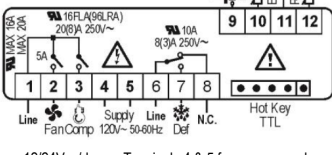
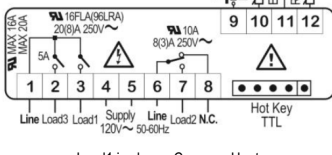
Table 1: parameter "tC" settings

Parameter tC	Type of Control	Models Replaced	Required probes
1	On / Off thermostat - Heating	XR110C, XR01CX, XR10C, XR10CX	x 1
2	Off cycle defrost (timed)	XR120C, XR02CX, XR20C, XR20CX	x 1
3	Off Cycle defrost time initiated / temperature terminated	XR120C, XR02CX, XR20C-E	x 2
4	Off Cycle defrost time initiated / temperature terminated, Alarm Relay	XR130C, XR03CX, XR30CX	x 2
5	Electrical / Hot Gas defrost, time initiated / temperature terminated	XR140C, XR04CX, XR40CX	x 2
6	Electrical / Hot Gas defrost, time initiated / temperature terminated + evap. Fan delay and control	XR160C, XR06CX, XR60CX	x 2
7	Full open map of parameters configure your own control	Your determination	1 to 3

Note: 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.

3. Typical Connections - For General Guidance Only

Table 2: typical connections

TC=1 Heating  12/24Vac/dc use Terminals 4 & 5 for power supply	TC=2 Cooling, Off Cycle Defrost, Time Ended  12/24Vac/dc use Terminals 4 & 5 for power supply	TC=3 Cooling, Off Cycle Defrost, Temperature Ended  12/24Vac/dc use Terminals 4 & 5 for power supply	TC=4 Cooling, Off Cycle Defrost, Temperature Ended, Alarm Relay  12/24Vac/dc use Terminals 4 & 5 for power supply
TC=5 Cooling, Electric or Hot Gas Defrost Temperature Ended  12/24Vac/dc use Terminals 4 & 5 for power supply	TC=6 Low Temp, Elec. Or Hot Gas Defrost, Temp. Ended, Fan Control  12/24Vac/dc use Terminals 4 & 5 for power supply	TC=7 Open Map to be Configured for any application  12/24Vac/dc use Terminals 4 & 5 for power supply	Actual Label on The Control in the Box.  Load1 is always Comp, or Heat. Load2 is OAA and Load3 is OAb.

4. 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.

Once the program is completed you may want to save the parameter map to a Hot Key. If the “tC” is changed after final programming the parameters will be changed back to the default listed below.

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	1	Room only
3, 4, 5, 6	2	Room + Evaporator 1
7	3	Room + Evaporator 1 + Display or AUX

Table 3: default controller parameters

Description	Label	Adjustment Range	tC1	tC2	tC3	tC4	tC5	tC6	tC7
Type (category) of controller		1 = On / Off Thermostat	1						
		2 = Off cycle defrost		2					
		3 = Time / time defrost			3				
		4 = Time / temp defrost + alarm				4			
		5 = Time / temp defrost					5		
		6 = Time / temp defrost + fan delay						6	
		7 = Full Open Map Configurable							7
Set Point		LS to US	40.0°C; 104°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
Probe type	PbC	PTC=0 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
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
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
Anti-short cycle delay	AC	0 to 50 min	1	1	1	1	1	1	0
Second compressor start delay	AC1	0 to 255 sec							0
Temperature alarm configuration	ALC	rE (0)= Relative to Set Point; Ab (1)= Absolute	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
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
Temperature alarm delay	ALd	0 to 255 min	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
Outputs activation delay at start up	odS	0 to 255 min	0	0	0	0	0	0	0
Thermostat override	Cct	0 to 990 min		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
Defrost delay after thermostat override	dAF	0 to 255 min		2	2	2	2	2	2
Interval between defrosts	idf	1 to 250 hours		4	6	6	6	4	4
Delay start of defrost	dSd	0 to 255 min		0	0	0	0	0	0
Maximum duration of defrost	ndF	0 to 255 min		15	15	30	30	30	30
Defrost termination temperature	dTE	-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
Maximum duration of defrost (second evaporator)	ndS	0 to 255 min						30	30
Defrost termination temperature (second evaporator)	dTS	-55 to 50°C; -67 to 122°F						8.0°C 46°F	8.0°C 46°F

Description	Label	Adjustment Range	tC1	tC2	tC3	tC4	tC5	tC6	tC7
Display during defrost	<i>dFd</i>	Rt (0) = Real temp. it (1) = Temp. at defrost start sEt (2) = Set Point dEF (3) = "DEF" label dEG (4) = "DEG" label		3	3	3	3	3	3
Defrost display time out	<i>dAd</i>	0 to 255 min		10	10	10	10	10	10
Defrost type (forced)	<i>tDF</i>	El (0) = Electrical rE (1) = Hot Gas					0	0	0
Drain down time	<i>Fdt</i>	0 to 255 min					0	2	2
First defrost after power on	<i>dPo</i>	Y (0) = Immediate N (1) = After normal interval		1	1	1	1	1	1
Evaporator fan operating mode	<i>FnC</i>	C_n (0) = On with Comp, off with defrost O_n (1) = On regardless of comp, off w/ defrost C_y (2) = On with comp, on with defrost O_y (3) = Always on						1	1
Evaporator fan stop temperature	<i>FSt</i>	-55 to 50°C; -67 to 122°F						8°C; 46°F	8°C; 46°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>P2P</i>	N (0) = evaporator probe not present Y (1) = evaporator probe present			1	1	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	0.0°C; 0°F	0.0°C; 0°F
Third probe presence	<i>P3P</i>	n (0) = third probe not present, Y (1) = third probe present.	1	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	0.0°C; 0°F
Display Resolution	<i>rES</i>	Y (0) = With decimal point in °C only N (1) = No decimal point	1	1	1	1	1	1	1
Temperature measurement unit (°C/°F)	<i>CF</i>	°C (0) = Celsius °F (1) = Fahrenheit	1	1	1	1	1	1	1
Instrument display	<i>Lod</i>	P1 (0) = Thermostat probe P2 (1) = Evaporator probe P3 (2) = Third probe sEt (3) = SET-POINT	0	0	0	0	0	0	0
Display delay	<i>dLY</i>	0 to 20min0sec, res. 10sec	0	0	0	0	0	0	0
Type of action	<i>CH</i>	Cl (0) = cooling Ht (1) = heating	1	0					0
Compressor ON time with faulty probe	<i>Con</i>	0 to 255 min	15	15	15	15	15	15	15
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>	n (0) = Mute buzzer only Y (1) = Mute buzzer & relay	1	1	1	1	1	1	1
Second Digital input configuration	<i>i2F</i>	dEF(0) = Start defrost dor (1) = Door switch AUS (2) = Auxiliary relay ES (3) = Energy saving onF (4) = Remote On/OFF EAl (5) = Generic alarm bAl (6) = Serious alarm	5	5	5	5	5	5	5
Second Digital input polarity	<i>i2P</i>	Cl (0) = Closed circuit oP (1) = Open circuit	0	0	0	0	0	0	0
Digital input 2 delay	<i>d i2</i>	0 to 255 min	0	0	0	0	0	0	0
Door open – compressor / fan status	<i>odC</i>	No (0) = No change FAn (1) = Fan off CPr (2) = Compressor off F_C (3) = Compressor & Fan off	0	0	0	0	0	0	0
Defrost relay configuration	<i>0AA</i>	Alr (0) = Alarm; db (1) = Dead Band; AUS (2) = Auxiliary; CP2 (3) = Second compressor output; liG (4) = Light output; dF2 (5) = Second defrost output. dEF (6) = 1st Defrost output Fan (7) = Fan output					6	6	6
Auxiliary relay configuration	<i>oAB</i>	Alr (0) = Alarm; db (1) = Dead Band; AUS (2) = Auxiliary; CP2 (3) = Second compressor output; liG (4) = Light output; dF2 (5) = Second defrost output. dEF (6) = 1st Defrost output Fan (7) = Fan output	0	0	0	0	7	7	7
Alarm relay polarity	<i>RoP</i>	Cl (0) = [11 -12] closed with alarm oP (1) = [11 -12] open with alarm	0	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>	n (0) = No Y (1) = Yes	0	0	0	0	0	0	0

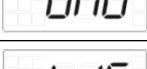
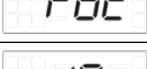
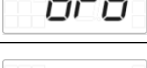
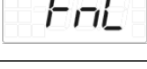
Description	Label	Adjustment Range	tC1	tC2	tC3	tC4	tC5	tC6	tC7
Probe selection for Condenser Alarm	AP2	nP (0) =No Probe selected P1 (1) =Probe 1 P2 (2) =Probe 2 P3 (3) =Probe3	0	0	0	0	0	0	0
Low temperature alarm of condenser	AL2	-55 to 150°C; -67 to 302°F	-40°C; -40°F	-40°C; -40°F	-40°C; -40°F	-40°C; -40°F	-40°C; -40°F	-40°C; -40°F	-40°C; -40°F
High temperature alarm of condenser	AU2	-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	110°C; 230°F	110°C; 230°F
Differential for temperature condenser alarm recovery	AH2	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	5°C; 5°F	5°C; 5°F
Condenser temperature alarm delay	Ad2	0 to 254 min, 255 = nU	15	15	15	15	15	15	15
Condenser temperature alarm exclusion at start up	dAP2	0 to 720 min, res.10min	90	90	90	90	90	90	90
Compressor off with low temperature alarm of condenser	bLL	n (0) = No y (1) = Yes	0	0	0	0	0	0	0
Compressor off with high temperature alarm of condenser	AC2	n (0) = No y (1) = Yes	0	0	0	0	0	0	0
Temperature deviation from normal Set Point during Energy Saving	HES	-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	onF	nU (0) = Disabled OFF(1) = Enabled ES (2) = Energy saving	0	0	0	0	0	0	0
Buzzer enabling	bEn	n (0) = Disabled Y (1) = Enabled	1	1	1	1	1	1	1
Parameter table	Ptb	For factory use only	-	-	-	-	-	-	-
Software release number	rEL	Read only	-	-	-	-	-	-	-
Evaporator probe temperature	dP2	Read only				-	-	-	-
Third probe temperature	dP3	Read only	-	-	-	-	-	-	-

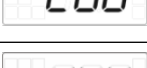
READ ON IF YOU NEED MORE DETAIL

5. Parameters – Their Functions in Detail

Table 4: controller parameters in detail

Display visualisation	Description
	Type of Controller: tells the Universal-XR which type of controller it will be operating as. 1 = on/off Heating thermostat – 1 relay & 1 probe; 2 = Combined thermostat with off cycle defrost timer – 1 relay & 1 probe; 3 = Combined thermostat with time initiated & time terminated defrost – 2 relays & 2 probe; 4 = Combined thermostat with time initiated & temperature terminated defrost – 2 relays & 2 probes; alarm 5 = Combined thermostat with time initiated, temperature terminated defrost + 2 relays & 2 probes; defrost 6 = Combined thermostat with time initiated, temperatures terminated defrost + evaporator fans control with delay after defrost – 3 relays & 3 probes; 7 = Combined thermostat with time initiated, temperatures terminated defrost + evaporator fans control with delay after defrost – 3 relays & 3 probes. Fully open map
	Probe Type: configures the controller to work with PTC or NTC probes. 0 = pTC = PTC, 1 = ntC = NTC.
	Differential: (1 to 50) sets the degrees above Set Point at which the compressor cuts in. Note: when tC = 1 (heating applications) the tC value is automatically set below 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.
	Minimum set point limit: (-55°C to SET or -67°F to SET) sets the lower limit of set point adjustment.
	Maximum set point limit: (SET to 150°C or SET to 302°F) sets the upper limit of set point adjustment.
	Anti-short cycle delay: (0 to 50min) minimum interval between the compressor stop and the next possible restart.
	Second compressor start delay: (0 to 255sec)
	Temperature alarm configuration: rE = Related to Set Point; Ab = Absolute. Note: Relative means alarms are linked to the Set Point and will follow it if it is adjusted. In this case ALU & ALL set the temp over & under Set Point for alarm. Absolute means ALU & ALL are fixed alarm temperatures, which are not affected by any Set Point adjustment.
	High temperature alarm: ALC = rE → [0 to 50°C] or [0 to 90°F]; ALC = Ab → [ALL to 150°C] or [ALL to 302°F].

Display visualisation	Description
	Low temperature alarm: ALC = rE → [0 to 50°C] or [0 to 90°F]; ALC = Ab → [-55°C to ALU] or [-67 to ALU].
	Temperature alarm delay: (0 to 255min) time interval between an alarm condition occurring and the alarm is signalling.
	Delay of temperature alarm at start-up: (from 0 to 720min; res. 10min) time delay of any temperature alarm during pull down following "power on".
	Outputs activation delay at start up: (0 to 255min) time delay before any output relay activates following "power on".
	Thermostat override: (0 to 990min; res. 10min) period during which the compressor will run continuously, regardless of temperature. Setting this parameter to 0 disables this function.
	Set point for continuous cycle: (-55 to 150 °C or -67 to 302°F) it sets the set point used during the continuous cycle.
	Defrost delay after fast freezing: (0 to 255min) time interval between the end of the thermostat override period and the start of the following defrost related to it.
	Interval between defrosts: (0 to 255hours) time interval between the beginning of two consecutive defrosts.
	Delay start of defrost: (0 to 255min) delay between reaching the defrost interval time (as defined by parameter idF) and when a defrost cycle actually starts. Used to stagger defrosts between multiple systems.
	(Maximum) duration of defrost: (0 to 255min) time duration of a defrost cycle 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.
	Defrost termination temperature: (-55 to 50°C or -67 to 122°F) sets the defrost termination temperature. Measured by the evaporator probe.
	(Maximum) length for second defrost: (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. *** Only if being used with tC7*** Note: The P3 probe will be automatically set as second evaporator probe by the tC parameter.
	Second termination temperature: (-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.
	Display during defrost: 0 = rt = real temperature; 1 = it = temperature at defrost start; 2 = sEt = set point; 3 = dEF = dEF label; 4 = dEG = dEG label.
	Defrost display time out: (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.
	Defrost type: 0 = El = electrical heater; 1 = rE = hot gas, compressor runs during defrost.
	Drain down time: (0 to 255min) drain down time. Runs concurrently with Fnd (Fan delay after defrost time). Both fan and compressor are off during this time period.
	First defrost after power-on: 0 = Y = immediately; 1 = n = after the idF interval time.
	Fan operating mode: 0 = C_n = cycles on/off with the compressor, OFF during defrost; 1 = O_n = continuous mode, OFF during defrost; 2 = C_Y = cycles on/off with the compressor, ON during defrost; 3 = O_Y = continuous mode, ON during defrost;
	Fan stop temperature: (-55 to 50°C or -67 to 122°F) temperature above which the evaporator fan stops (during the normal refrigeration cycle).
	Fan delay after defrost: (0 to 255min) the time interval between the end of a defrost cycle and evaporator fans starting. Runs concurrently with Fdt (Drain down time). Always keep Fnd longer than Fdt.

Display visualisation	Description
	Fan ON time: (0 to 15min) used to set an On/Off cycle of the evaporator fans while the compressor is off. With FnC = 0 or FnC = 2 , it sets the evaporator fan ON cycling time when the compressor is OFF. With Fon = 0 and FoF ≠ 0 , the fans are always off. With Fon = 0 and FoF = 0 the fans are always off.
	Fan OFF time: (0 to 15min) used to set an On/Off cycle of the evaporator fans while the compressor is off. With FnC = 0 or FnC = 2 , it sets the evaporator fan OFF cycling time when the compressor is OFF. With Fon = 0 and FoF ≠ 0 , the fans are always off. With Fon = 0 and FoF = 0 the fans are always off.
	Thermostat probe calibration: (-12.0 to 12.0°C or -21 to 21°F) adjustment for thermostat probe (Room) offset.
	Evaporator probe presence (Evap on the label): 0 = n = not present; 1 = Y = present.
	Evaporator probe calibration: (-12.0 to 12.0°C or -21 to 21°F) adjustment for evaporator probe offset.
	Third probe presence (probe named Evap.2 on the label): 0 = n = not present, the third input (the one signed with label "D.I. / Pb3") Input operates as digital input; 1 = Y = present, the third input (the one signed with label "D.I. / Pb3") Input operates as third probe.
	Third probe calibration: (-12.0 to 12.0°C or -21 to 21°F) adjustment for third probe offset.
	Display resolution (Only available in Celsius): 0 = dE = with decimal point; 1 = in = without decimal point.
	Temperature measurement unit: 0 = °C = Celsius; 1 = °F = Fahrenheit. Warning: If you alter the setting of parameter rES (decimal point on/off) re-check the settings of all temperature related parameters Set Point, HY, LS, US, ALU, ALL, dtE, FSt, ot & oE , as they can be effected.
	Probe for Display: 0 = P1 = Thermostat probe; 1 = P2 = Evaporator probe; 2 = P3 = Third probe; 3 = sEt = DISPLAY ONLY SHOWS THE SET-POINT. THE ACTUAL TEMPERATURE CAN BE SEEN BY PRESSING THE SET BUTTON.
	Display delay: (0 ÷ 20min0sec; resolution 10 sec) when the temperature increases, the display is updated of 1°C or 1°F after this time.
	Type of action: 0 = Cl = cooling; 1 = Ht = heating.
	Compressor ON time with faulty probe: (0 to 255min) If there is a P1 probe failure the controller will automatically cycle the compressor on/off according to Con & CoF to maintain basic cooling. Con is the compressor "ON" time.
	Compressor OFF time with faulty probe: (0 to 255min) If there is a P1 probe failure the controller will automatically cycle the compressor on/off according to Con & CoF to maintain basic cooling. CoF is the compressor "OFF" time.
	Alarm muting: 0 = n = Alarm relay remains active when alarm buzzer is muted; 1 = Y = Alarm relay is cancelled when alarm buzzer is muted.
	Second digital input operating mode: configures the second digital input function: 0 = Starts a defrost; 1 = Input from a door switch (see parameter odC); 2 = Activates the auxiliary relay; 3 = Starts Energy Saving (Control Point becomes Set Point +/- value in HES); 4 = Remote On/OFF (puts the controller into standby); 5 = Generic external alarm (normal regulation continues); 6 = Serious external alarm (regulation is stopped).
	Configurable second digital input polarity: 0 = the digital input is activated by closing the circuit; 1 = the digital input is activated by opening the circuit.
	Time interval/delay for digital input 2 alarm: (0 to 255min) it defines the time delay between the detection and the subsequent signalling of the alarm.
	Compressor and fan status when open door: 0 = no = normal; 1 = FAn = Fan OFF; 2 = CP= Compressor OFF; 3 = F_C = Compressor and fan OFF.

Display visualisation	Description
	Defrost relay configuration: Only on tC=7 0 = Alr = Alarm; 1 = db = Dead Band; 2 = AUS = Auxiliary; 3 = Cp2 = Second compressor output; 4 = LIG = Light output; 5 = dF2 = Second defrost output.
	Auxiliary relay configuration: 1 = Alr = Alarm; 2 = db = Dead Band; 3 = AUS = Auxiliary; 4 = Cp2 = Second compressor output; 5 = LIG = Light output; 6 = dF2 = Second defrost output.
	Alarm relay polarity: 0 = CL= contact [13 – 14] closed with alarm; 1 = oP = contact [13 – 14] open with alarm.
	Temperature alarm exclusion with door open: 0 to 255min.
	Regulation restart with door open alarm: 0 = n = no; 1 = Y = yes, regulation will restart after "door open" alarms.
	Probe selection for Condenser Alarm : 0 = nP = No Probe selected 1 = P1 = Probe 1 2 = P2 = Probe 2 3 = P3 = Probe3 *normally P3 would be used*
	Low temperature alarm of condenser: (-55 to 150°C or -67 to 302°F) when this temperature is reached, the HA2 alarm will be raised (after the Ad2 delay time has expired).
	High temperature alarm of condenser: (-55 to 150°C or -67 to 302°F) when this temperature is reached, the LA2 alarm will be raised (after the Ad2 delay time has expired).
	Differential for temperature condenser alarm recovery: 0.1 to 25.5°C or 1 to 45°F.
	Condenser temperature alarm delay: (0 to 255min) time interval between the detection of an alarm condition at the condenser and the relative alarm signalling.
	Condenser temperature alarm exclusion during start-up: (0 to 720min, resolution 10min).
	Compressor off when a low temperature alarm of the condenser is active: 0 = n = the compressor keeps on working if a low temperature alarm at the condenser is active; 1 = Y = the compressor is switched off while the low temperature alarm is active. The regulation will restart after elapsing AC delay time.
	Compressor off when an high temperature alarm of the condenser is active: 0 = n = the compressor keeps on working if a low temperature alarm at the condenser is active; 1 = Y = the compressor is switched off while the low temperature alarm is active. The regulation will restart after elapsing AC delay time.
	Temperature set point change during the Energy Saving cycle: (-30.0 to 30.0°C or -54 to 54°F) sets the deviation from the normal set point during the Energy Saving cycle.
	ON / OFF key enabling: 0 = nu = key functionality disabled; 1 = OFF = On Off function enabled; 2 = ES = Energy Saving function enabled.
	Buzzer enabling: 0 = n = disabled; 1 = Y = enabled.
	Parameter table: read only – for factory use.
	Software release: read only – shows the software release.
	Evaporator probe: shows the current temperature sensed by the evaporator probe.
	Third probe temperature: shows the current temperature sensed by the third probe.

6. Buttons and Their Functions

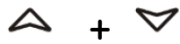
6.1 Single Button Functions

Table 5: single button functions

Button	Function
	Type Controller menu: keep this button pressed for at least 3 sec within 1 min after power on to enter the "Type Controller Menu" (tC). AUX output control: Switches the AUX relay output (if enabled as such).
	Manual Defrost: keep this button pressed for 3 s to start a manual defrost cycle. The defrost icon will illuminate. (Not possible if parameter tC = 1).
	Display current set point: 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. Changing set point value: 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 UP and DOWN buttons. The new value can be stored either by pressing SET button (the instrument restores temperature display) or by waiting the exit time-out to expire (15 sec).
	(UP): to see the max stored temperature; in programming mode it browses the parameter codes or increases the displayed value.
	(DOWN): 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.
	Energy Saving: Allows the control to use the HES offset parameter to change the set point.

6.2 Button Combination Functions

Table 6: button combination functions

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

7. Programming Mode

7.1 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.

7.2 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.

8. Other Features of the Universal-XR

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



Table 7: display signalling description

Combination	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	ALARM signal: when in programming mode and in Pr2 level, this icon lights up notifying this parameter is also accessible in the Pr1 level.
°C	ON	All measurement units are in Celsius degrees.
	FLASHING	Programming mode.
°F	ON	All measurement units are in Fahrenheit degrees.
	FLASHING	Programming mode.

9. Thermostat Override (not available when parameter $tC = 1$)

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, for the time period set in parameter **CCt**. Normal operation will then resume automatically after the **CCt** is exhausted or when the **CCS** is exhausted (Continuous Cycle Set Point). The cycle can also be terminated manually by pressing the **UP** button again for about 3 seconds.

10. Defrost Types

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

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

11. Evaporator Fan Control (only when parameter $tC = 6$ or 7)

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

FnC parameter	Action
C_n	Fans will cycle ON and OFF with the compressor and be off during defrost cycle.
O_n	Fans will run continuously, but be off during defrost cycle.
C_Y	Will switch ON and OFF with the compressor and be on during defrost cycle (*).
O_Y	Fans will run continuously and be on 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.

12. Special Applications – Dead Band Control

12.1 Dead Band Control (Cooling & Heating) $tc=7$

With [**oAb = db**], the compressor relay controls cooling as normal but the 3rd (auxiliary/ fan) 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**.

13. Alarms

Message	Message – Mode	Cause	Outputs
EE	Flashing	Data or memory failure	Alarm output ON; Other outputs unchanged.
P1	Flashing	Thermostat probe failure	Alarm output ON; Compressor output according to parameters Con and CoF.
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 rrd = 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.

13.1 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 = n**: the alarm relay will remain active until the alarm condition is rectified;
- **tbA = Y**: 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.

13.2 Alarm “EE”

The Copeland Universal-XR 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.

13.3 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.

14. 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).

15. Mounting

The Universal-XR should be mounted in a panel, in a 29mm (1.14") x 71mm (2.8") hole, and fixed using the special brackets supplied. Ambient temperature for correct operation is 32 to 140°F. 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.

16. Electrical Connections

The instrument is provided with screw terminal block to connect cables with a cross section up to 2.5 mm². 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.

17. 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.

18. Technical Data

Housing:	Self-extinguishing ABS
Size:	Frontal 32x74 mm; depth 70mm
Mounting:	Panel mounting in a 71x29 mm panel cut-out
Frontal protection:	IP65
Connections:	Screw terminal block ≤ 2.5 mm ² wiring
Power supply:	120Vac, -10% +15% or 230Vac, -10% +15%
Power absorption:	4 VA max
Display:	3 digits, red LED, 14.2mm high
Inputs:	a maximum of 3 temperature probes, PTC or NTC type.
Probes (supplied):	2 x NTC, range-50 TO 110°C (-58 to 230°F) with 1.5 meter (4.98') cables

Relay outputs:	Amps Resistive
Compressor:	SPST relay 16FLA / 96LRA, 250Vac
Defrost:	SPDT relay 10A, 250Vac
Fans:	SPST relay 5A, 250Vac
Other output:	Buzzer for acoustic signalling of alarms
Data storing:	Non-volatile memory (EEPROM)
Ambient temperature:	0 to 60°C (32 to 140°F)
Ambient humidity:	20 to 85% (non condensing)
Storage temperature:	-30 to 85°C (-22 to 185°F)
Operating range:	PTC: -50 to 150°C (-58 to 302°F); NTC: -50 to 110°C (-40 to 230°F)
Resolution:	0.1°C or 1°F (selectable)
Accuracy at 25°C:	(range -40 to 50°C) ±0.5 °C ±1digit

19. Troubleshooting

Problem	Possible reason	Notes
Display flashing HA	• Temperature too high.	• Check cooling system. • Check alarm settings.
Display flashing LA	• Temperature too low.	• Check cooling system. • Check alarm settings.
Display flashing HA2	• Condenser temperature too high.	• Check condenser cooling system. • Check alarm settings.
Display flashing LA2	• Condenser temperature too low.	• Check condenser cooling system. • Check alarm settings.
Display flashing P1	• Fault with thermostat probe. • Wrong type of probe fitted (NTC/PTC).	• Check probe connections and resistance value. • Change probe type or alter parameter PbC .
Display flashing P2	• Fault with evaporator probe. • Wrong type of probe fitted (NTC/PTC) • Parameter tC has been set to 4, 5 or 6 without evaporator probe fitted.	• Check probe connections and resistance value. • Change probe type or alter parameter PbC . • Fit evaporator probe or alter parameter tC .

Problem	Possible reason	Notes
Display flashing P3	- Fault with third probe. - Wrong type of probe fitted (NTC/PTC). - Parameter tC has been set to 6 without third probe fitted.	- Check probe connections and resistance value. - Change probe type or alter parameter PbC. - Fit evaporator probe or alter parameter tC.
Display flashing EE	Data corruption.	Check for electrical spikes and interference. Fit filters DIXL930 & DIXL932. Ensure probe cables are separated from power cables. Re-check all parameter settings. Replace controller if still not working.
Display flashing dA	Door has been left open too long.	Shut the door.
Display flashing EA	A non-serious external alarm has been detected by the digital input.	Trace and rectify the external problem.
Display flashing bAL	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 UP & DOWN buttons until display flashes Pon .
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 AC or odS .
Evaporator fan short cycling	Parameter FSt set too low.	Adjust FSt to a higher setting. During commissioning, set it above ambient until pull down is complete, then re-set to a more suitable temperature.

20. Change over from F to F or Vis-versa

- Hold the Set & Down (n) buttons, until HY is displayed, release both buttons then hold the Set and Down (n) buttons until Pr2 is displayed. Release the buttons.
- Scroll with the up button to CF, then press and release Set. Change the 1 to 0, then press and release Set.
- Scroll down and adjust the ALL, ALU, FST, AFH, ALH, LS, US, rES as well as the HY.
- Let the control time out to the temp display.

Adjust the Set temp by holding the Set until the C or F starts to flash, adjust the set point.

21. Enter Your Settings Here For Future Reference (Tc=7 Set Up As Dead Band Control)

Label	Description	Edit	Original	Vis. Level	Min	Max	Comment
tC	Parameter map selection		7	Pr2	1	7	
PbC	Kind of probe		ntC	Pr2			
Hy	Differential		4	Pr1	1	45	
LS	Minimum set point value		-50	Pr2	-67	75	
US	Maximum set point value		230	Pr2	75	302	
AC	Anti-short cycle delay		1	Pr2	0	50	
AC1	Second compressor start delay		0	Pr2	0	255	
ALP	Probe selection for temperature alarms		0	Pr2			
ALC	Temperature alarm configuration		Ab	Pr2			
ALU	High temperature alarm		230	Pr1	-50	302	
ALL	Low temperature alarm		-50	Pr1	-67	230	
AFH	Differential for temperature alarm recovery		1	Pr1	1	45	
ALd	Temperature alarm delay		15	Pr2	0	255	
dAo	Delay before activating a temperature alarm at start up		90	Pr2	0	720	
odS	Delay before activating outputs at start up		0	Pr2	0	255	
CCt	Continuous cycle duration		0	Pr2	0	990	
CCS	Set point for continuous cycle		0	Pr2	-67	302	

Label	Description	Edit	Original	Vis. Level	Min	Max	Comment
dAF	Defrost delay after fast freezing		2	Pr2	0	255	
idF	Interval between defrost cycles		6	Pr1	0	250	
dSd	Start defrost delay		0	Pr2	0	255	
dFP	Probe selection for first defrost		3	Pr2			
MdF	(Maximum) length for first defrost		30	Pr1	0	255	
dtE	Defrost termination temperature (first evaporator)		46	Pr1	-67	122	
dSP	Probe selection for second defrost		0	Pr2			
MdS	(Maximum) length for second defrost		0	Pr2	0	255	
dtS	Defrost termination temperature (second evaporator)		0	Pr2	-67	122	
dFd	Display during defrost		3	Pr2			
dAd	Max display delay after defrost		10	Pr2	0	255	
tdF	Defrost type		0	Pr2			
Fdt	Drain down time		2	Pr1	0	255	
dPo	First defrost after start-up		0	Pr2			
FnC	Fan operating mode		1	Pr2			
FSt	Fan stop temperature		46	Pr1	-67	122	
Fnd	Fan delay after defrost		5	Pr1	0	255	
Fon	Fan on time with compressor off		0	Pr2	0	15	
FoF	Fan off time with compressor off		0	Pr2	0	15	
FAP	Probe selection for fan management		1	Pr2			
FCt	Differential of temperature to force fan activation		5	Pr2	0	90	
FSU	Fan management		0	Pr2			
ot	Thermostat probe calibration		0	Pr2	-21	21	
P2P	Evaporator probe presence		1	Pr2			
oE	Evaporator probe calibration		0	Pr2	-21	21	
P3P	Third probe presence		0	Pr2			
o3	Third probe calibration		0	Pr2	-21	21	
rES	Display resolution		1	Pr2			
CF	Temperature measurement unit		1	Pr2			
Lod	Display visualization		0	Pr2			
dLy	Delay before updating the displayed temperature		0.00	Pr2			
CH	Kind of action: heating or cooling		0	Pr2			
Con	Compressor ON time with faulty probe		15	Pr2	0	255	
CoF	Compressor OFF time with faulty probe		310	Pr2	0	255	
tbA	Alarm output disabling by pushing any button		0	Pr2			
i2F	Digital input 2 configuration		5	Pr2			
i2P	Digital input 2 polarity		0	Pr2			
di2	Digital input 2 alarm delay		0	Pr2	0	255	
odC	Compressor and fan status when the door is open		0	Pr2			
oAA	First output configuration		0	Pr2			
oAb	Second output configuration		3	Pr2			

