sub-Zero®
INDIA
www.pvrcontrols.com

OPERATING INSTRUCTIONS

sub-Zero®

SZ-CR2-FP

Introduction:

The SZ-CR2-FP is a two compressor controller with separate set points and differentials for each compressor.

They are specifically designed for refrigeration applications wherein the compressor cuts off at set point and is restarted at a temperature of set point plus differential.

Amongst other features, an important one is that incase one compressor is not capable of handling the load, the second compressor will activate and both compressors will cutout at the lowest set point.

The controller features cycling of compressors so that there is no overload on one compressor.

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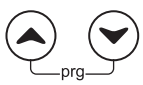
Set Point			Function : To set the cut out point of the controller.
Press and hold Set key for 4 seconds and release.			Display will Show 0 and flash. Press UP/DOWN keys to enter password. User can go into set mode by entering correct password.
Set Point 1 IN DEG. C MODE			
Min	Max	Fac.	● 1 Will flash along with respective setpoint 1 for compressor 1. The setpoint 1 value can now be changed by using the UP/DOWN keys. After achieving the desired value. Press the set key and you will see "–-" which confirms that the set point has been stored in memory.
P3+1	P2-1	0°C	
IN DEG. F MODE			
Min	Max	Fac.	
P3+1	P2-1	0°F	
Set Point 2 IN DEG. C MODE			
Min	Max	Fac.	
P3+1	P2-1	0°C	● 2 Will flash along with respective setpoint 2 for compressor 2. In the similar manner use UP/DOWN key to set the desired value and press set key to confirm the settings.
IN DEG. F MODE			
Min	Max	Fac.	
P3+1	P2-1	0°F	

Parameter Setting	
Hold Up & Down keys simultaneously for 4 seconds. 	Display will Show 0 and flash. To enter programming mode enter correct password by using Up/Down keys and press set key. Once user enters correct password display will show P2 and flash. To go to other parameters, use up/down keys. If user enters incorrect password, controller will come out of programming mode and will display temperature.

P2 Parameter	Function: To set high temperature limit.
To change P2 parameter, press the SET key. **IN DEG. C MODE** Min | Max | Fac. SP+1 | 35°C | 35°C **IN DEG. F MODE** Min | Max | Fac. SP+1 | 95°F | 35°F HE (Message on Display)	Use UP/DOWN key to set desired value. Once set at a particular value, this will not allow both set points to go above this value and below P3 setting. **Example :** Setting this parameter at 30°C will not allow both set points to go above 30°C. Also if the temperature reaches 30°C, the display will show Ht (High Temp.), Indicating that the temperature has reached or gone above the value in this parameter.

P3 Parameter	Function: To set low temperature limit.
To change P3 parameter, press the SET key. **IN DEG. C MODE** Min | Max | Fac. -45°C | SP-1 | -45°C **IN DEG. F MODE** Min | Max | Fac -49°F | SP-1 | -45°F LE (Message on Display)	Use UP/DOWN key to set desired value. Once set at a particular value, this will not allow both set points to go below this value and above P2 setting. **Example :** Setting this parameter at 10°C will not allow both set points to go below 10°C. Also if the temperature reaches 10°C, the display will show Lt (Low Temp.), Indicating that the temperature has reached or gone below the value in this parameter.

P4 Parameter	Function : To set the differential of set point 1 and set point 2.
To change P4 parameter, press the SET key. **Differential 1 & 2** Min | Max | Fac. 1°C | 20°C | 2°C **Differential 1 & 2** Min | Max | Fac. 1°F | 20°F | 2°F	Once in this mode, ● 1 and differential of set point 1 will flash. Use UP/DOWN keys. To set desired value. Once desired value is achieved, Press set key and you will see "---" which confirms that the differential for set point 1 has been stored. Immediately after up key is pressed ● 2 flashes along with the differential for set point 2. Use UP/DOWN keys to set desired value. Once value is achieved, press set key. This confirms differential for set point 2 has been stored. **Example :** If set point 1 is set at 10°C and differential for set point 1 is set at 2°C, then when the system reaches 10°C, the relay for compressor 1 will cutout and since the differential is 2° C, the relay will cutin (restart) at 12° C (10 + 2).

P5 Parameter	Function : To set probe calibration.
To change P5 parameter, press the SET key. **IN DEG. C MODE** Min | Max | Fac. -10°C | 10°C | 0°C **IN DEG. F MODE** Min | Max | Fac. -10°F | 10°F | 0°F	Use UP/DOWN key to set desired value. In time it may be possible that the display may be offset by a degree or so. To compensate for this error, you may need to add or minus the degree required to achieve the correct temperature. Setting value is from -10°C to + 10°C. **Example :** The temperature on the display is 28°C, whereas the actual temperature is 29°C. You will need to set the P5 parameter to 1, which means that once out of the programming mode, the display will show temperature 29°C (28°C + 1°C).

P6 Parameter	Function : Set time delay between relay restart time for compressor.
To change P6 parameter, press the SET key. Min | Max | Fac. 0 Min | 20 Min | 3 Min	Use UP/DOWN key to set desired value. This parameter is used to protect the compressor from restarting in a short period of time and can be set between 0 to 20 minutes. **Example :** If this parameter is set at 3 minutes, the relay will cut off at the set temperature, but will not restart for a minimum of 3 minutes, even if the differential is achieved earlier. This parameter is good to protect the life of the compressor or even in applications where the probe is placed at places where there are sudden & short changes in temperature like a cold room. To prevent both compressors from switching on together, there is an internal 15 second time delay between simultaneous startups to prevent an electrical surge.

P7 Parameter	Function : To set duration of defrost for Comp.1 & Comp2.
To change P7 parameter, press the SET key. Min | Max | Fac. 0 Min | 99 Min | 0 Min	Once in this mode, ● 1 and defrost duration of Comp.1 will flash. Use UP/DOWN keys. To set desired value. Once desired value is achieved, Press set key and you will see "--" which confirms that the defrost duration for Comp.1 has been stored. Immediately after up key is pressed ● 2 flashes along with the defrost duration for Comp.2. Use UP/DOWN keys to set desired value. Once value is achieved, press set key. This confirms defrost duration for Comp.2 has been stored. **Example :** If this parameter is set to 15min, and P8 parameter is set to 1 hr. Then '1 hr' after power is applied to the controller, defrosting for 15 Mins will take place. This cycle will repeat every 1 hr.

P8 Parameter	Function : To set the defrost frequency for Comp.1 & Comp2.
To change P8 parameter, press the SET key.	Once in this mode, ● 1 and defrost frequency of Comp.1 will flash. Use UP/DOWN keys. To set desired value. Once desired value is achieved, Press set key and you will see "--" which confirms that the defrost frequency for Comp.1 has been stored. Immediately after up key is pressed ● 2 flashes along with the defrost frequency for Comp.2. Use UP/DOWN keys to set desired value. Once value is achieved, press set key. This confirms defrost frequency for Comp.2 has been stored.
Min / Max / Fac. 1 hr / 31 hrs / 1 hr	Example : see P7 parameter.
	Note : SZ-CR2 keeps a record of the hours worked +/- half hour incase of a power failure.

t2 Parameter	Function : To start second comp. incase comp 1 cannot achieve the lower set point
To change t2 parameter, press the SET key.	This function is used to switch on the second compressor incase the heat load cannot be met with one compressor.
Min / Max / Fac. 0 Min / 30 Min / 10 Min	**Example :** If setpoint 1 is 23 and setpoint 2 is 25 and if t2 para is set to 7 minutes, if the second comp. cuts out at 25, if comp. 1 is not able to achieve 23 for a period of 7 minutes, then after 7 minutes, second compressor will also come on and both compressors will cutout at the lower setpoint. If t2 is set less than P6, then P6 parameter will override t2 parameter. If set to 0, this feature will not activate.

t4 Parameter	Function : To avoid overloading of either compressor.
To change t4 parameter, press the SET key.	This function is used to avoid overloading of any one compressor working at a stretch over a period of time.
Min / Max / Fac. 0Hr / 23Hrs / 6Hr	**Example :** If this parameter is set at 6 hours, the setpoint, differential & time delay of both compressors will interchange after 6 hours The interchange will occur every 6 hours.
	Time calculation will start at power on.
	This helps to avoid overworking of any one compressor for long hours and increases compressor life.If for any reason the t4 and setpoints have been changed,the time calculation will start from the last change in any of these parameters.
	Note : If set to '0' change over will not happen.

AL Parameter	Function : To activate alarm relay.
To change AL parameter, press the SET key.	Use UP/DOWN key to set alarm on or off. Once set to on, the alarm relay will cutin incase the temperature reaches or goes above or below the points set in parameter P2 & P3, if the probe fails, if HP/SPP or LP fault occurs.
Min / Max / Fac. 0 / 1 / 1	1 activates & 0 deactivates the alarm relay.

Ad Parameter	Function : To set power on time delay for LP fault alarm.
To change Ad parameter, press the SET key.	Use UP/DOWN key to set desired value. This parameter sets a time delay on power on for the LP fault alarm.
Min / Max / Fac. 0 Min / 99 Min / 10 Min	**Example :** If this parameter is set to 10 Min, Once the unit is powered on the alarm relay will not activate for 10 minutes even if there is a LP fault.

LP Parameter	Function : To lock keypad.
To change LP parameter, press the SET key.	Use UP/DOWN key to set desired value. This parameter can lock the keypad so that tampering is not possible by bystanders. 0 = Keypad unlocked. 1 = Keypad locked.
Min / Max / Fac. 0 / 1 / 0	When locked all parameters can only be viewed, but can not be modified.

E1 Parameter	Function : Relay status on probe failure.
To change E1 parameter, press the SET key.	Use UP/DOWN key to set desired value. When set to 0 = It will take P6 parameter as start up delay and also as restart delay. 1 = Both compressor performs a duty cycle of 10 minutes On and 4 minutes OFF. 2 = Both relays will stay OFF.

Min	Max	Fac.
0	2	1

tE Parameter	Function : To display temp. in deg. C or deg. F.
To change tE parameter, press the SET key.	Use UP/DOWN key to set desired value. 0 = Temp. Display in deg. C. 1 = Temp. Display in deg. F. **Note :** When this parameters is set to 1(deg. F mode) the user will have to manually set all parameters to the desired deg. F settings. If the user needs to change back to deg. C mode (tE=0). The user can utilise the FS parameter to return to factory setting.

Min	Max	Fac.
0	1	0

PA Parameter	Function : To change password.
To change PA parameter, press the SET key.	Use UP/DOWN keys to change password. User cannot enter into program mode, or set mode if correct password is not entered.

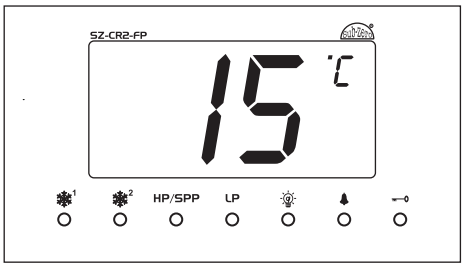
Min	Max	Fac.
0	99	0

FS Parameter	Function : To restore the default settings of the controller.
To change FS parameter, press the SET key.	When set to 1 all parameters are programmed to factory values. Useful to debug setting related problems.

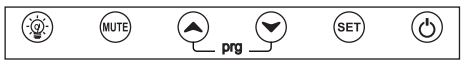
Min	Max	Fac.
0	1	0

EP Parameter	Function : To End programming.
To end the programming press the SET key.	Once the set key is pressed, the controller goes into the normal mode and displays the temperature and all settings are recorded.
Note : Manual Defrost	
▲	If this key pressed for 2 sec, it will start defrost cycle and when again pressed for 2 sec, it will come out and stop defrost cycle. (for Comp.1)
▼	If this key pressed for 2 sec, it will start defrost cycle and when again pressed for 2 sec, it will come out and stop defrost cycle. (for Comp.2)

Front View :



Keys



Key Functions	
	Used to ON / OFF light Relay.
MUTE	Used to reset alarm relay.
	Used to increment parameter values.
	Used to decrement parameter values.
prg	Press simultaneously to enter in main program.
SET	Used to Set Controller Setpoints.
	Used to On / Off Controller.
	Used to Defrost Unit 1.
	Used to Defrost Unit 2.

Operating messages and Icon status			
Indication	Message	Description	Parameter
	Ht	Temperature equal to or above the maximum limit of the set point.	P2
	Lt	Temperature equal to or below the minimum limit of the set point.	P3
	PP	Probe short circuit, circuit open or without probe, or temperature >35°C or <-45 °C	
❄1 ● On/Off		Compressor 1 relay ON/OFF.	Set Point 1, P4 for Comp.1
❄2 ● On/Off		Compressor 2 relay ON/OFF.	Set Point 2, P4 for Comp.2
❄1 ● Flashing		Compressor 1 relay time delay active.	P6
❄2 ● Flashing		Compressor 2 relay time delay active.	P6
HP/SPP ●	H1	HP / SPP Fault for Compressor 1.	
HP/SPP ●	H2	HP / SPP Fault for Compressor 2	

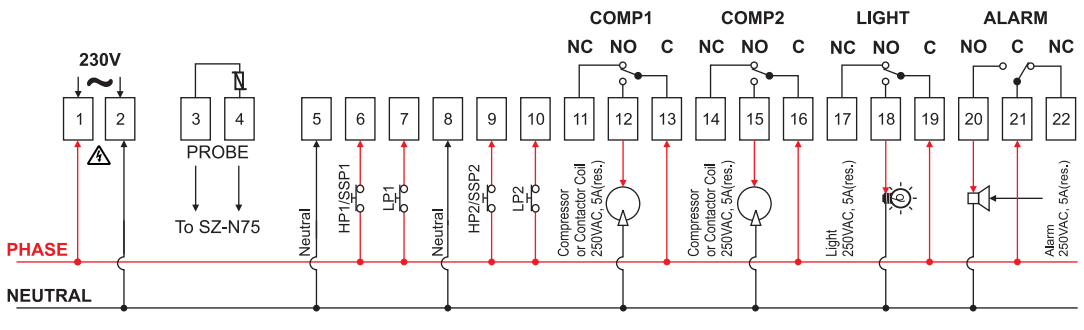
Operating messages and Icon status			
Indication	Message	Description	Parameter
LP ●	L1	LP fault for Compressor1	Ad
LP ●	L2	LP fault for Compressor2	Ad
	oF	Controller Switch off	
●		Light Relay ON/ OFF.	
0 ● On/Off		Keypad lock/unlock.	LP
Flashing		Alarm (Ht, Lt or PP, H1, H2, L1 & L2)	P2,P3,AL
	d1	Defrosting for Comp.1	P7, P8 for Comp.1
	d2	Defrosting for Comp.2	P7, P8 for Comp.2

Note : Light key will work independently of power key.

Technical Data

Mounting : Wall Mount
Connections : Screw terminal blocks.
≤ 2.5sq mm one wire/terminal only.
Display : 1" LED.
Data storage : Non-volatile EEPROM memory.
Power Input : 230V, 50HzAC, Other on request.
Operating temp. : 5°C to 50°C (Non-condensing).
Storage temp. : -20°C to 70°C (non-condensing).
All Relay : 5A/250Vac(res.).
Input : NTC PROBE SZ-N75.
Range : -45°C to 35°C / -49°F to 95°F.
Resolution : 1°C / 1°F.
Accuracy : +/-1°C.
Probe tolerance at 25°C : +/-0.3°C.

Suggested Wiring Diagram



Caution : Wiring for 230Vac Loads Only.

Controller : Controller should be installed in a place protected by vibration, water and corrosive gasses and where ambient temperature does not exceed the values specified in the technical data.

Probe : To give a correct reading, the probe must be installed in a place protected from thermal influences, which may affect the temperature to be controlled.

CAUTION

WIRING: The probe and its corresponding wires should never be installed in a conduit next to control or power supply lines. The electrical wiring should be done as shown in the diagram. The power supply circuit should be connected to a protection switch. The terminals admit wired of upto 2.5sqmm.

WARNING: Improper wiring may cause irreparable damage and personal injury. Kindly ensure that wiring is done by qualified personnel only.

Maintenance:

Cleaning : Clean the surface of the controller with a soft moist cloth. Do not use abrasive detergents, petrol, alcohol or solvents.

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Note : In $^{\circ}$C mode, P2, P3 can be set from -45°C to + 35°C while in $^{\circ}$F mode P2, P3 can be set from -49°F. to + 95°F

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sub-Zero®

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Humidity Controller
Pressure Controller

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Globe Valves
Hand Valves
Flow Switches
Solenoid Valves

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