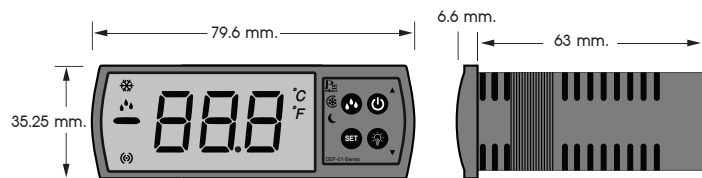




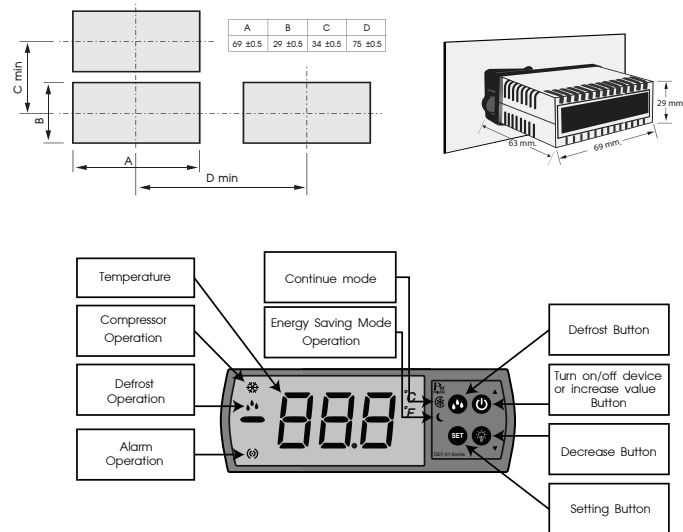
TECHNICAL SPECIFICATION

Model			DEF-01-F2-24	DEF-01-F2-115	DEF-01-F2-230
Power Supply			24 VAC/VDC ±15%	115 VAC ±15% 50/60Hz	230 VAC ±15% 50/60Hz
Power Consumption			2.5 VA		
Voltage Protection			-	80 - 140 VAC	180 - 260 VAC
Voltage Accuracy			-	± 3VAC	
Display			7-Segment Size 0.56 Inch 3 Digit		
Input	Sensor	Room	NTC/PTC (-40 to 130 °C)		
		Evaporator	NTC/PTC (-40 to 130 °C)		
		Probe 3 (Option)	NTC/PTC (-40 to 130 °C)		
		Probe 4 (Option)	NTC/PTC (-40 to 130 °C)		
	Digital Input		Free Voltage Contact		
Input Accuracy			± 2 °C		
Output	Relay	Compressor	5A 250 VAC (NO)		
	Output	Defrost	5A 250 VAC (NO)		
Ambient Operation		Temperature	-10 °C to 60 °C		
		Humidity	85 % RH Non-Condensing		
Ambient Storage		Temperature	-20 °C to 80 °C		
		Humidity	85 % RH Non-Condensing		
Protection Degree		Front Protection Rating	IP52		
		Case Protection Rating	IP20		
Installation			Panel Mounting		
Material			ABS-V0		
Size			35.25 x 79.6 x 63 mm.		
Weight			90 g.	155 g.	

DIMENSION



CUTTING PANEL AND INSTALLATION



DESCRIPTION

- Temperature control and show result in digital suitable to chiller or freezer.
- Receive input in Thermistor : NTC or PTC measure range and display -40 to 130 °C
- 7-Segment display white color 3 digits with LED show operation status.
- Defrost system and notification signal 8 pattern.
- 2 Output Relay for compressor and defrost.

OPERATION

DEF-01 is temperature control with timer for defrost setting can choose controlling both Cooling or Heat by use Sensor Thermistor NTC or PTC besides there are Alarm that can notice temperature in 8 type. Dongle terminal that can connect with Option sensor probe, RS485 Expansion Module for reading or control operation via Modbus RTU Protocol or use with Dongle Module in case need to copy controller parameter to other device suitable with chiller or freezer manufacturer.

How to press buttons

How to use continue operation.

1. Press UP + DOWN hold for order or cancel the operation.

How to see maximum temperature

1. Press SET + UP hold until display show "HI".
2. Then the page display maximum temperature.
3. Press SET for exit or wait 5 seconds.

How to see minimum temperature

4. Press SET + DOWN and hold until screen show "LO"
5. Then the screen will display minimum temperature result
6. Press SET to exit or wait 5 second.

How to delete maximum or minimum temperature

1. Press SET and hold while show maximum or minimum temperature
2. Screen shows "RST" result for inform that value was deleted.

How to lock key

1. Press DEF + SET hold until screen show "LOC"

How to unlock key

1. Press DEF + SET hold until screen show "ULO"

How to change parameter value

1. Press SET hold until screen show parameter (Obvious C or F will flash)
2. Press UP or DOWN for choosing parameter as require
3. Press SET for enter to see parameter
4. Press UP or DOWN to change parameter value
5. Press SET to save value

* Press SET and hold in parameter page or wait 30 seconds to exit

How to enter to Menu 2

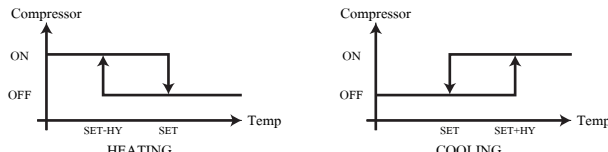
1. Press SET and hold in display page until it shows parameter (Menu 1)
2. Press SET + UP and hold until page show result "M 2"
3. Display screen will show parameter in Menu 2

How to move parameter between Menu 1 and 2

1. Press SET+DOWN and hold at parameter as require in Menu 2
- * Obvious setting parameter is set in Menu 1 will have "." show in Menu 2
* Obvious setting parameter is set in Menu 2 will not have "." show in Menu 2

Cooling control system

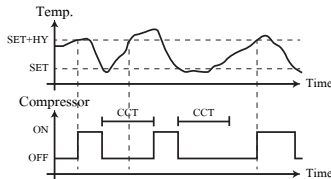
DEF-01 will measure room temperature 1 to control COMP. Relay operation to command compressor operate until temperature has decrease to Set Point value from setting and it will back to operate again when temperature higher or equal to Set Point + Hysteresis if user set operation to be Heating will made COMP. Relay work opposite as picture 1.



Picture 1 Compressor Relay Operation

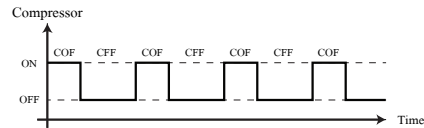
and can set delay value compressor operation time (CCT) for protecting compressor work too

often as picture 2



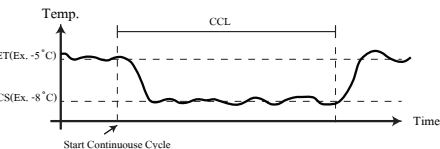
Picture 2 CCT operation

In case Room Probe break or malfunction which DEF-01 can detect. Compressor operation will change to use COF time controlling or CFF (ON Time and OFF Time) as picture 3 or set to operate all the time or stop operation.



Picture 3 COF and CFF time in operation phase

Continuous Cycle or continue operate is operate in 2 Set Point has main Set Point (SET) that is set and Temporary Set Point (CCS) follow time which operate in user press to order only suit to decrease temperature when the goods that have just been brought into the chiller or cooler in setting (CCL) as picture 4.



Picture 4 Continue mode operation

Probe 2 (EVAP. Probe) use to measure temperature in Evaporator channel for display temperature and Temporary Set Point (SET+HES) suitable for chiller that require adjust temperature while close curtain

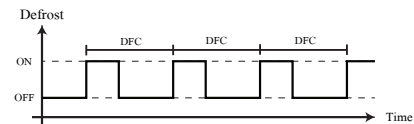
Energy Saving or saving energy mode is operation by choosing to use Digital Input change Set Point to and set end temperature of defrost.

Probe 3 will use Terminal position same as Digital Input use to measure temperature value of condenser which can command High Low Band Alarm.

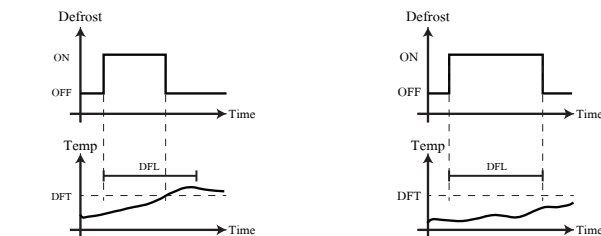
Probe 4 in case user require to use Digital Input. Temperature probe of condenser will must change to use probe 4 instead which connect at Dongle Terminal position (DEF-01-A4).
to use probe 4 instead which connect at Dongle Terminal position (DEF-01-A4).

Defrost System

Defrost can command from Digital Input button or follow time that was set DFC as picture during defrost can choose between DFT temperature or DFL time to set the end of defrost as picture 6 and 7.



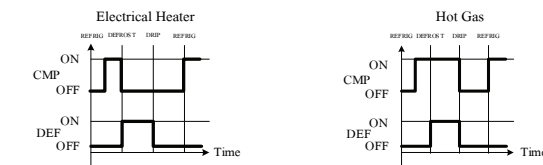
Picture 5 Defrost operation by time.



Picture 6 the end of defrost system by temperature.

Picture 7 the end of defrost system by time.

can choose to use defrost both Electrical Heater or Hot Gas as picture 8.



Picture 8 Defrost pattern

Alarm

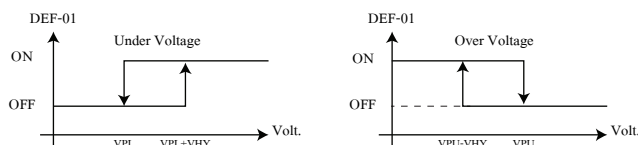
can set it to notice when temperature is high or lower from setting and can delay time before it notice Alarm has 8 function as picture 10.

Digital Input operation

Can set to receive input to use in many application such as show notification sign, start operation of defrost system or open-close switch for dppr or curtain etc. and can set delay time before notification.

Voltage Protection

DEF-01 will have Over-Under Voltage Protection except 10-24 VAC/VDC for checking voltage that supply to system. Voltage value that over or lower value from setting DEF-01 will stop all operation after time that setting for protect compressor or cooling from damage as picture 9 and show result when voltage or lower than value from setting.



Picture 9 Voltage Protection operation pattern.

Display Method

LED	Mode	Function
	Flash	in CCT and OSD time.
	Flash	in DDT time.

Notification Message

Message	Cause
P1_, P1_	Room Probe malfunction
P2_, P2_	Evaporator Probe malfunction
P3_, P3_	Third Probe malfunction
P4_, P4_	Fourth Probe malfunction
HA	Alarm high temperature from Room Probe
LA	Alarm low temperature from Room Probe
HA2	Alarm high temperature from Condenser
LA2	Alarm low temperature from Condenser
EA	Alarm signal from External Alarm
SA	Alarm signal from External Serious Alarm
PA	Alarm from pressure switch
DA	Door Alarm
LOC	Keypad is locked
NOP	Selected probe is disable

How to use Dongle Module

Download data to DEF-01

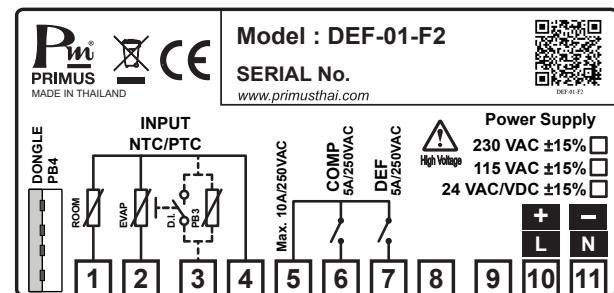
1. Plug Dongle during DEF-01 has no supply.
2. Supply power to DEF-01 at display screen will shows text "DOL".
3. Wait until display screen shows text "END" or green LED on Dongle continue turn on means downloaded completely.

Upload data from DEF-01

1. Plug Dongle during DEF-01 is operating.
2. Go to parameter DOG (It will not show this parameter if user doesn't plug Dongle).
3. Choose "UP" then press SET button and hold until display screen show text "UP".
4. Wait until display screen shows text "END" or green LED on Dongle continue turn on means downloaded completely.

Text	Cause
ERR	Upload or Download has error.
EMP	No data in Dongle.
MOD	Downloaded data do not match with model controller.

WIRING DIAGRAM



- Make sure the correct wiring connection before turning on electricity. Mis-wiring may cause malfunction of the unit and fire.
- Never modify the unit to prevent damage or incident such as malfunction and fire etc.

ORDERING CODE

DEF-01- OUTPUT		POWER SUPPLY	
F2	2 Relay Output (Compressor) (Compressor, Defrost)	24	24 VAC/VDC ±15%
		115	115 VAC ±15%
		230	230 VAC ±15%

PACKAGE LIST	
1	DEF-01-F2
2	Sensor NTC 10K Wire 1 M. 2 wire
3	Fastening
4	User Manual

• Power ON

When device start to operate (start to supply) device will show **888**

• Show Model

Screen will show device model

• Operation Mode Display

show present result value.

DEFAULT SETTING VALUES (Factory)

Description	Parameter	Value	Value
1. Set Point	SET	-5.0	LS : US
2. Hysteresis	HY	2.0	0.1 : 25.5
3. Maximum Set Point	US	100	LS : 130
4. Minimum Set Point	LS	-40.0	-40.0 : US
5. Operating Mode	OPM	CL	CL : HT
6. Type of Probe	TPB	n10	P02 : N10
7. Evaporator Probe Available	P2A	YES	NO : YES
8. Third Probe Available	P3A	NO	NO : YES
9. Fourth Probe Available	P4A	NO	NO : YES
10. Room Probe Calibration	P1C	0.0	-20.0 : 20.0
11. Evaporator Probe Calibration	P2C	0.0	-20.0 : 20.0
12. Third Probe Calibration	P3C	0.0	-20.0 : 20.0
13. Fourth Probe Calibration	P4C	0.0	-20.0 : 20.0
14. Temperature Unit	C/F	C	C : F
15. Decimal point	DP	0.0	0 : 0.0
16. Controller Display	CDP	P1	P1 : VP
17. Remote Display	RD	P1	P1 : VP
18. Display Stability	DPS	0.0	0.0 : 20.0 min (res. 10 sec)
19. Percentage of Virtual Probe	PVP	50	0 : 100
20. Compressor and Defrost Start Up Delay	CCT	1	0 : 255 min
21. Minimum Time Between Compressor Cycle	CTC	1	0 : 255 min
22. Set Point for Continuous Cycle	CCS	-5.0	-40.0 : 130
23. Length for Continuous Cycle	CCL	0.0	0.0 : 24.0 hours (res. 10 min)
24. Percentage of First and Second Probe For Regulation	PPR	100	0 : 100
25. Delta Temperature During an Energy Saving Cycle	HES	0.0	-30.0 : 30.0
26. Compressor ON Time During Faulty Probe	COF	15	0 : 255 min
27. Compressor OFF Time During Faulty Probe	COF	30	0 : 255 min
28. Type of Defrost	EDF	ELC	ELC : HOT
29. Probe Selection for Defrost Terminate	NP	P2	NP : P4
30. Defrost Terminate Temperature	DFT	8.0	-40.0 : 50.0
31. Defrost Length	DFL	30	0 : 255 min
32. Interval Between Defrost Cycle	DFC	6	0 : 120 hours
33. Defrost Drip Time	DDT	0	0 : 255 min
34. Defrost After Start Up	DFA	NO	NO : YES
35. Start Up Defrost Delay	DDD	0	0 : 255 min
36. Defrost Delay After Continuous Cycle	DAD	0.0	0.0 : 24.0 hours (res. 10 min)
37. Display During Defrost	DDF	RT	RT : DEF
38. Digital Input Polarity	DIP	CL	OP : CL
39. Digital Input Configuration	DIC	DOR	EAL : ES
40. Digital Input Alarm Delay	DID	15	0 : 255 min
41. Number of Pressure Switch Activation	NPS	15	0 : 255
42. Compressor Status When Open Door	COD	CMP	NO : CMP
43. Output Restart After Door Open Alarm	ORD	YES	NO : YES
44. Temperature Alarms Configuration	ALC	5	0 : 8
45. Maximum Temperature Alarm	ALU	110	DEV : (0.0 : 50.0) ABS : (ALU : 130)
46. Minimum Temperature Alarm	ALL	-40.0	DEV : (0.0 : 50.0) ABS : (-40.0 : ALU)
47. Alarm Hysteresis	AHY	1.0	0.1 : 25.5
48. Temperature Alarm Delay	ALD	15	0 : 255 min
49. Temperature Alarm Start Up Delay	ASD	1.3	0.0 : 24.0 hours (res. 10 min)
50. Probe Selection for Temperature Alarm of Condenser	CTA	P4	NP : P4
51. High Temperature Alarm of Condenser	CAU	110	-40.0 : 130
52. Low Temperature Alarm of Condenser	CAL	-40.0	-40.0 : 130
53. Condenser Alarm Hysteresis	CAH	5	0.1 : 25.5
54. Condenser Temperature Alarm Delay	CAD	15	0 : 255 min
55. Condenser Temperature Alarm Exclusion at Start Up	CAS	1.3	0.0 : 24.0 hours (res. 10 min)
56. Compressor Off With High Temperature Alarm of Condenser	COU	NO	NO : YES
57. Compressor Off With Low Temperature Alarm of Condenser	COL	NO	NO : YES
58. Maximum Voltage	VPU	140	VPL + 10 : 140 (VU 115) 260 : VPL + 10 : 260 (VU 230)
59. Minimum Voltage	VPL	80	80 : VPU - 10 (VU 115) 180 : VPU - 10 (VU 230)
60. Voltage Hysteresis	VHY	10	0 : 50
61. Voltage Alarm Delay	VAD	1	0 : 255 min
62. Voltage Alarm Configuration	VAC	STB	ALM : OFF
63. Serial Address	ADR	1	1 : 247
64. Baud Rate	BDR	192	9.6 : 38.4
65. ON OFF Key Enable	ONF	DIS	DIS : EN
66. Dongle	DOS	UP	UP : DOW
67. Room Probe Display	DP1	-	-
68. Evaporator Probe Display	DP2	-	-
69. Third Probe Display	DP3	-	-
70. Fourth Probe Display	DP4	-	-
71. Voltage Display	V	-	-
72. Factory Reset	RSE	NO	NO : YES
73. Software Revision	REV	1.0	-

1. Set Point Menu 1
Set Point temperature value of compressor.

2. Hysteresis Menu 1
Changed temperature value from Set Point that compressor will back to operate.

3. Maximum Set Point Menu 2
Maximum set point temperature.

4. Minimum Set Point Menu 2
Minimum set point temperature.

5. Operating Mode Menu 2
Operation mode CL = Cooling
HT = Heating

6. Type of Probe Menu 2
Probe Type P02 = PTC 2K
P10 = PTC 10K
N02 = NTC 2K
N10 = NTC 10K

7. Evaporator Probe Available Menu 2
Enable probe 2

8. Third Probe Available Menu 2
Enable probe 3

9. Fourth Probe Available Menu 2
Enable probe 4

10. Room Probe Calibration Menu 2
Compensation temperature probe 1

11. Evaporator Probe Calibration Menu 2
Compensation temperature probe 2

12. Third Probe Calibration Menu 2
Compensation temperature probe 3

13. Fourth Probe Calibration Menu 2
Compensation temperature probe 4

14. Temperature Unit Menu 1
Temperature Unit C = Celsius
F = Fahrenheit

15. Decimal point Menu 1
Display resolution 0 = Integer
0.0 = Decimal

16. Controller Display Menu 2
Display probe temperature
P1 = Probe 1 P2 = Probe 2
P3 = Probe 3 P4 = Probe 4
SET = Set Point
VP = Virtual Probe (Temperature between P1 and P2)

17. Remote Display Menu 2
Temperature probe display on Remote Display
P1 = Probe 1 P2 = Probe 2
P3 = Probe 3 P4 = Probe 4
SET = Set Point
VP = Virtual Probe (Temperature between P1 and P2)

18. Display Stability (Minutes) Menu 2
Time to increase the temperature every 1 degree on display.

19. Percentage of Virtual Probe Menu 2
Ratio between probe 1 and 2 temperature to simulate Virtual Probe value.
 $(\frac{PVP}{100} \times (P1-P2)) + P2$

20. Compressor and Defrost Start Up Delay (Minutes) Menu 1
Compressor output operation delay time and defrost when controller start to operate.

21. Minimum Time Between Compressor Cycle (Minutes) Menu 1
minimum time during operation in each cycle of compressor.

22. Set Point for Continuous Cycle Menu 2
Target temperature that require to operate in continue us mode.

23. Length for Continuous Cycle (hours) Menu 2
Operation in continue mode

24. Percentage of First and Second Probe For Regulation Menu 2
Ratio between probe 1 and 2 temperature to control compressor operation.
 $(\frac{PPR}{100} \times (P1-P2)) + P2$

25. Delta Temperature During an Energy Saving Cycle Menu 2
Set point offset temperature for setting Set Point in saving energy mode (SET + HES).

26. Compressor ON Time During Faulty Probe (Minutes) Menu 2
Compressor operation time when probe malfunction.

27. Compressor OFF Time During Faulty Probe (Minutes) Menu 2
Compressor stop operation time when probe malfunction.

28. Type of Defrost Menu 1
Defrost operation pattern
ELC = Electrical Heater URC = HOT = Hot Gas

29. Probe Selection for Defrost Terminate Menu 2
Temperature probe to end defrost operation.
NP = None Probe, P1 = Probe 1, ..., P4 = Probe 4

30. Defrost Terminate Temperature Menu 1
Temperature probe to end defrost operation except time come first.

31. Defrost Length (Minutes) Menu 1
Time to spend during defrost except temperature come first.

32. Interval Between Defrost Cycle (Hours) Menu 1
Time to defrost in each cycle

33. Defrost Drip Time (Minutes) Menu 2
Time for condense water after defrosting before back to operate as normal.

34. Defrost After Start Up Menu 2
Defrost after controller operate
NO = Do not operate, YES = Operate

35. Start Up Defrost Delay (Minutes) Menu 2
Defrost delay time after controller operate.

36. Defrost Delay After Continuous Cycle (Hours) Menu 2
Defrost start time after use continue mode.

37. Display During Defrost Menu 1
Display value during defrost
RT = Real temperature (P1)
DT = Start defrost operation (DFF)
DEF = show "DEF"

38. Digital Input Polarity Menu 1
Set Input operation form
CL = Input will operate when contact surface is closed
OP = Input will operate when contact surface is opened

39. Digital Input Configuration Menu 1
Set input operation
EAL = External Alarm display will show "EA"
SAL = Serious Alarm display will show "SA"
and will stop compressor output operation and defrost.
PAL = Pressure Switch Alarm screen will show "PA"
and it will stop compressor output and defrost until it will start controller operation again
DOR = Door Open
DEF = Defrost, start defrost operation
AUX = Auxiliary Relay
HTR = Inverse Action Mode
ES = Energy Save

40. Digital Input Alarm Delay (Minutes) Menu 1
Input operation delay before show alarm.

41. Number of Pressure Switch Activation Menu 2
The number of times counted within the DID time before Alarm is displayed. Except in case DID is 0 when it is finished count alarm will happen immediately (DIC = PAL)

42. Compressor Status When Open Door Menu 2
Operation status of compressor when open door
(DIC = DOR) NO = No change.
CMP = stop compressor operation only.
and it will back to operate as normal after DID time.
(when ORD = Y) condition is do not operate during defrost.

43. Output Restart After Door Open Alarm Menu 2
YES = Output from parameter COD will back to operate as normal after DID time.
NO = Output from parameter COD will operate follow COD function until no input.

44. Temperature Alarms Configuration Menu 1
Condition pattern that made Alarm follow ALARM DISLAY graph as attached (0 = disable)

45. Maximum Temperature Alarm Menu 1
Maximum temperature of probe 1 that made Alarm and will stop Alarm when temperature minimum or equal to ALU - AHY

46. Minimum Temperature Alarm Menu 1
Minimum temperature of probe 1 that made Alarm and will stop Alarm when temperature minimum or equal to ALL + AHY

47. Alarm Hysteresis Menu 2
Changed temperature that amde Alarm stop operation.

48. Temperature Alarm Delay (Minutes) Menu 2
Delay before Temperature Alarm operate.

49. Temperature Alarm Start Up Delay (Hours) Menu 2
Delay before Temperature Alarm operate after supply to controller.

50. Probe Selection for Temperature Alarm of Condenser Menu 2
Temperature of probe that use to made alarm.
NP = None Probe, P1 = Probe 1, ..., P4 = Probe 4

51. High Temperature Alarm of Condenser Menu 2
Maximum temperature that made Alarm and will stop alarm when temperature lower or equal to CAU - CAH (condition is do not operate in continue mode and if there are alarm will stop defrost operation immediately)

52. Low Temperature Alarm of Condenser Menu 2
Minimum temperature that made Alarm and will stop Alarm when temperature higher or equal to CAL + CAH (Condition do not operate during operate in continue mode and if there are Alarm will stop defrost operation immediately)

53. Condenser Alarm Hysteresis Menu 2
Temperature changed made Condenser Alarm stop operation.

54. Condenser Temperature Alarm Delay (Minutes) Menu 2
Delay before Condenser Alarm operate.

55. Condenser Temperature Alarm Exclusion at Start Up (Hours) Menu 2
Delay before Condenser Alarm operate after supply to controller.

56. Compressor Off With High Temperature Alarm of Condenser Menu 2
Stop compressor when Condenser Alarm High;
NO / YES

57. Compressor Off With Low Temperature Alarm of Condenser Menu 2
Stop compressor when Condenser Alarm Low;
NO / YES

58. Maximum Voltage Menu 1
Maximum Voltage that made Alarm and will stop Alarm when voltage lower or equal to VPU - VHY.

59. Minimum Voltage Menu 1
Minimum Voltage that made Alarm and will stop Alarm when voltage higher or equal to VPU + VHY.

60. Voltage Hysteresis Menu 1
Changed voltage that made Volt Phase Alarm stop operation.

61. Voltage Alarm Delay (Minutes) Menu 1
Delay before Volt Protection Alarm operate

62. Voltage Alarm Configuration Menu 1
Define operation pattern when Volt Protection Alarm
ALM = show alarm.
STB = show alarm and stop output operation.
OFF = show alarm and stop output compressor and defrost operation until start operation of controller again.

63. Serial Address Menu 2
Address for connect to RS485

64. Baud Rate Menu 2
Baud Rate for connect to RS485
9.6 = 9600 bps
19.2 = 19200 bps
38.4 = 38400 bps

65. ON OFF Key Enable Menu 2
Enable ON/OFF button controller.
DIS = Disable
EN = Enable

66. Dongle Menu 1
Download or Upload parameter to Dongle
UP = Upload
DOW = Download
(Parameter will show when connect to Dongle only)

67. Room Probe Display Menu 1
Show Room Probe temperature from measure

68. Evaporator Probe Display Menu 1
Show Evaporator temperature from measure

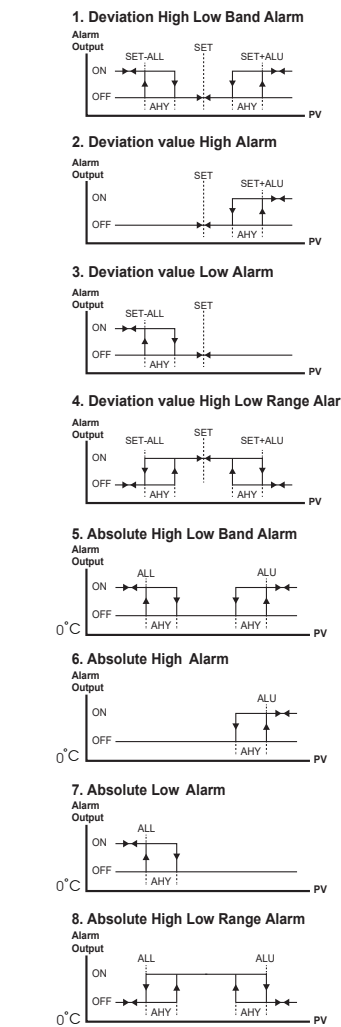
69. Third Probe Display Menu 2
Show Third Probe temperature from measure

70. Fourth Probe Display Menu 2
Show Fourth Probe temperature from measure

71. Voltage Display Menu 1
Show voltage from measure

72. Factory Reset Menu 2
For reset parameter back to default value from factory

73. Software Revision Menu 1
Show software version.

ALARM DISPLAY : Process value (PV) to be used as Alarm Display.


Picture 10 Alarm operation function.



DEF-01-F2

บริษัท ไพรมัส จำกัด
119 ซ.สีมวงอนุสรณ์ ถ.สุทธิสารวินิจฉัย แขวงดินแดง เขตดินแดง กรุงเทพฯ 10400
โทร 0-2693-7005, 0-2277-8027 แฟกซ์ 0-2277-3565
E-mail : sales@primusthai.com