

GW531B Cooler Controller

Manufacturer Instruction Manual

Read this manual carefully before installing the controller!

2021/04/23

Software Version : X1.GW531B.TY.F01M V100F01

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Table of contents

1 Instructions.....	1
2 Specifications.....	1
3 Panel Diagram.....	1
4 First Power-on.....	1
5 Common Screens.....	2
5.1 Main Screen.....	2
5.2 Alarm Screen.....	2
6 Common Operation.....	2
6.1 Quick Modification of Setting Temperature.....	2
6.2 Query/Reset Fault.....	2
7 Function Menu.....	2
8 Parameter Operation.....	2
9 User Parameters Table.....	4
10 Manufacturer Menu.....	4
10.1 Procedures of Entering Manufacturer Menu.....	4
10.2 Details of Manufacturer Menu.....	4
10.3 Manufacturer Debugging.....	5
10.4 Configuration Guide.....	5
11 Fault List.....	6
12 Control.....	9
12.1 Logic of compressor	9
12.2 Logic of pump freeze protection	9
13 Manufacturer Parameters Table.....	9
14 Electrical Connection Diagram.....	13
15 Installation Dimensions.....	13

1 Instructions

Dear Customer:

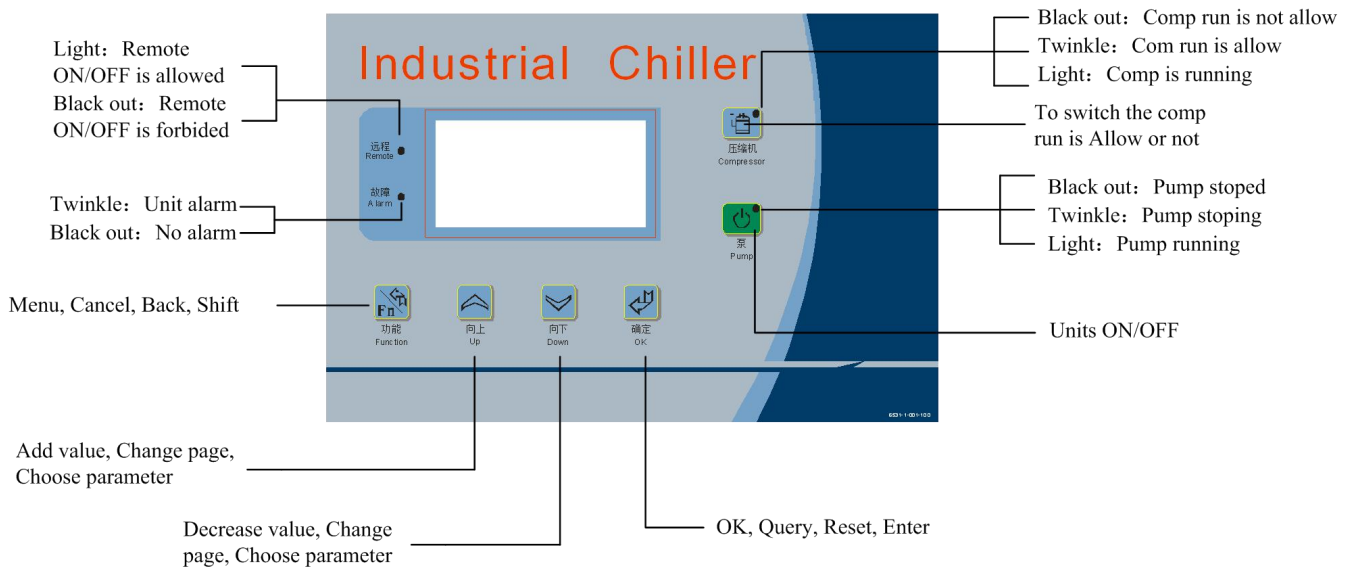
Thank you for choosing PUNP products!

For your convenience, please read the instructions carefully and follow the steps of the Manual.

2 Specifications

No.	Specification Parameter	Description	No.	Specification Parameter	Description
1	Rated input voltage	220-250VAC 50/60HZ	6	Switch Output	4 relays 250VAC 2A
2	Temperature Range	-40~100°C	7	Relay load type	D01:annunciator D02-D04: contactor or valve
3	Measurement Accuracy	0.1°C @25°C	8	Switch Input	8 passive signal inputs
4	Working Environment	-10°C~60°C, ≤85%RH non-condensation	9	Analog Input	1 NTC temperature sensor
5	Storage Environment	-20°C~70°C, ≤85%RH non-condensation	10	Current Input	3 ways of current (0.3~35A)

3 Panel Diagram



4 First Power-on

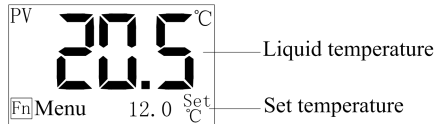
The controller needs to be configured when powered on for the first time. Please refer to 10.4 Configuration [guide](#) for specific operation.

5 Common Screens

Commonly used screens include the main screen and the alarm screen.

5.1 Main Screen

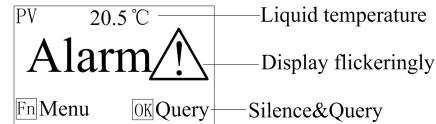
The system will enter the main screen after countdown, which displays as follows:



Press + for 3 seconds on the main screen can change the language quickly.

5.2 Alarm Screen

In case of unit failure, the alarm screen is as follows:

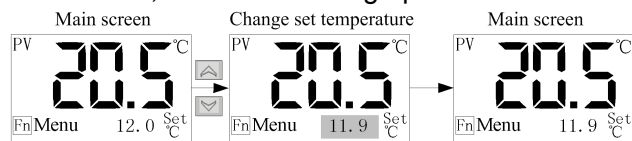


Press + during down count and enter Language screen, press or to change current Language, press to quit without saving, press to save and quit.

6 Common Operation

6.1 Quick Modification of Setting Temperature

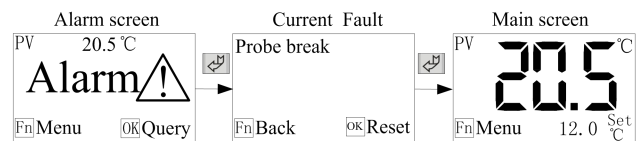
If the user parameter [Lock T.set] is set to "No", the setting temperature can be modified directly in the main screen, with the following operation details:



Note: the setting temperature can also be modified in the user parameters.

6.2 Query/Reset Fault

In case of fault, the alarm screen will automatically pop up. The operation details of query and reset faults are as follows:



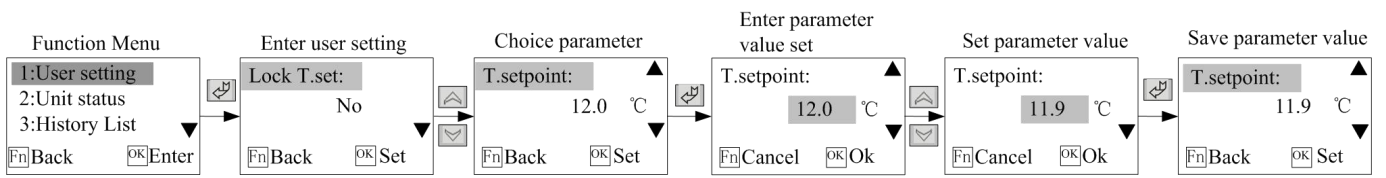
7 Function Menu

Press the button on the main screen to enter the Function Menu, which includes five items as the table below:

No.	Menu Item	Funtion	Remark
1	User Settings	To display user parameters	For number of user parameters and their implications, please refer to: 9 User Parameters Table.
2	Unit Status	To display the current operating status of the unit	Current value won't be displayed when current module is not used.
3	History List	Allowing the query of the last 10 faults	Press for 2s to clear the fault history.
4	Comp run time	To display the cumulative operation time of the compressor	
5	Version	To check the current software version	

8 Parameter Operation

For the modification operation of parameter value, the user's modification of setting temperature will be described as an example.





9 User Parameters Table

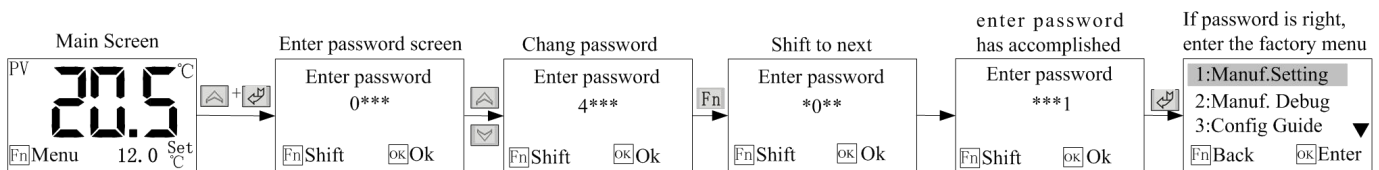
The implication of each parameter in the user parameters is listed in the following table:

No.	Parameter Name	Factory Default	Setting Range	Remark
1	Lock T.set	No	Yes ~ No	Yes: the set temperature can not be modified on the main screen when locked. No: the set temperature can be modified on the main screen.
2	T.setpoint	12.0°C	[T.setpoint min] ~ [T.setpoint max]	Setting range is limited by the manufacturer parameters [T.setpoint max], [T.setpoint min]. (When the [TEMP Unit] is set "Fahrenheit", the parameter is not displayed.)
3	T.setpoint	53.6 °F	[T.setpoint min] ~ [T.setpoint max]	Setting range is limited by the manufacturer parameters [T.setpoint max], [T.setpoint min]. (When the [Temp Unit] is set "Celsius", the parameter is not displayed.)
4	TEMP Unit	Celsius	Celsius ; Fahrenheit	
5	Contrast	32	20~44	Adjust the LCD contrast
6	On/Off type	Local	Local / Local + Remote / Remote	Local: the unit can only start and stop locally. Local + Remote: the start and stop of the unit can be controlled both locally and remotely. Remote: the unit can only start and stop remotely.
7	Backlight on	0	0~255 minute(s)	0: backlight won't be turned off.
8	Language	中文	中文~English	Select the display language.

10 Manufacturer Menu

Press  +  in the main screen to enter the Enter Password screen and enter the correct manufacturer password (default 4561, changing it is strongly recommended). Then enter the Manufacturer Function Menu.

10.1 Procedures of Entering Manufacturer Menu





10.2 Details of Manufacturer Menu

The details and function of manufacturer menu are as follows:

No.	Parameter Item	Function	Remark s
1	Manuf.setting	To set the parameters commonly used by the manufacturer	Refer to 13 Manufacture Parameters for specific parameters.
2	Manuf.Debug	To debug the abnormal operation of each electrical part of the unit	Not accessible during the unit running.
3	Config guide	Commonly used parameters of config the unit	Not accessible during the unit running. This screen will pop up when powered on for the first time.

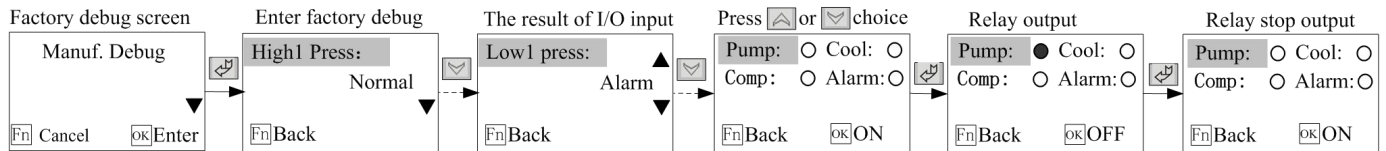
4	Initialize	For initializing all the parameters of the machine.	Refer to 10.5 Manufacture Parameters for the initial values of the parameters.
5	Password Set	To set the password to enter manufacturer menu.	Default one is 4561, and changing it is strongly recommended.

Note: Press  +  in the manufacturer input menu for 2 seconds and the accumulative operation time of the compressor will be reseted.

10.3 Manufacturer Debugging

Manufacturer debugging is mainly used to test whether the operation of each electrical part of the unit is normal, which is not accessible when the unit is running.

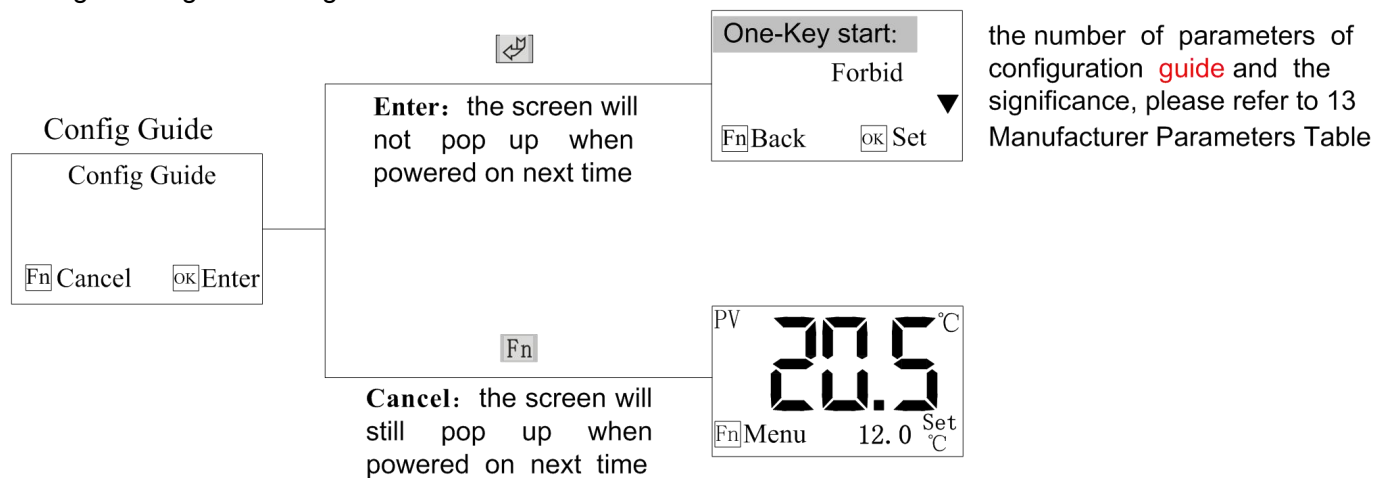
Method: to determine whether the unit is normal by testing three-phase power input, seven alarm inputs (10 alarm inputs for two compressors) and 5 relay outputs. For alarm input, it only displays the test result. If the result is normal the wiring is good and parameter settings are correct; if it alarms, it will display of alarm characters, then make sure whether the external wiring is good and the parameter settings are suitable.



10.4 Configuration Guide

Configure the common parameters of the machine. For the number of parameters of configuration guide and the significance, please refer to 13 Manufacturer Parameters Table. Access is not available during the unit operation.

Refer to the Parameter Operation for specific configuration method. The Configuration guide screen will pop up when powered on for the first time. And if you click “Cancel” operation without configuring at this time, the Configuration guide screen will still pop up when powered on next time. Once you have entered the Configuration guide, the Configuration guide screen will not pop up when powered on and you can only enter the Configuration guide through the Manufacturer Menu.



11 Fault List

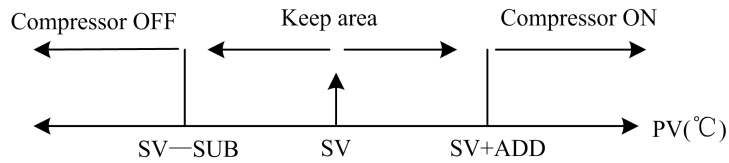
Fault	Description	Test Conditions	Troubleshooting	Solution
Comp.P high	High pressure of compressor	If the [HP check dly] is 0, test when the compressor button has pressed; If the HP check dly] is not 0, then compressor runs the test.	Stop compressor only without affect other equipments to work.	Check if the input is consistent with the switch setting.
Comp.P low	Low pressure of compressor	If the [LP check dly] is 0, test when the compressor button has pressed; If the [LP check dly] is not 0, then compressor runs the test.		
Comp overload	The compressor overload	Compressor runs the test.		Check if the input is consistent with the switch setting.
Comp.I high	The current of compressor is too high			Check if the rated current of compressor1 is input is reasonable.
Comp.I low	The current of compressor is too low			Check if the measure tool of the compressor1 current is connect.
Temp.low AL	The liquid temperature is too low	Test after cold pump starts	Stop the compressor and delay to stop the cool pump, and do not stop the cold pump.	Check if the Liquid temperature is lower than the set temperature of Liquid protection.
T.high warn	The liquid temperature is higher than the warn value.	If 【HT detect dly】 is 0,detect when the cold pump starts; if 【HT detect dly】 is not 0,detect when the cold pump has run for set time.	Alarm only without affect other equipments to work.	Check if the Liquid temperature is higher than the set temperature of Liquid warn.
Temp.high AL	The liquid temperature is too high		If the [Temp.high AL] is set “Pump keep”,Stop the compressor and delay to stop the cool pump, and do not stop the cold pump; If the [Temp.high AL] is set “Pump stop”, Stop the unit in case of fault.	Check if the Liquid temperature is higher than the set temperature of Liquid protection.
Anti-freez.AL	Antifreeze alarm	Power on to test	Stop all the compressor and cool pump, and do not	Check if the antifreeze input is consistent with the switch setting.

Probe break	The liquid temperature sensor is break		stop the cold pump.	Check if the temperature probe is in proper contact.
Probe short	The liquid temperature sensor is short			
Cool overload	The cool pump or fan overload	Test after Cool pump starts	Stop compressor and cool pump or fan only	Check if the fan1 overload input is consistent with the switch setting.
Cool.I high AL	The current of cool pump or Fan is too high			Check if the rated current of cool is input is reasonable.
Cool.I low AL	The current of cool pump or Fan is too low			Check if the measure tool of the cool current is connect.
Cool W.flow AL	Lack of cool water flow	Test after the cool pump starts for [Cool on delay] time.	Stop compressor and cool pump or fan only.	Check if the cool water flow input is consistent with the switch setting.
Cold W.flow AL	Lack of cold water flow	Test after the cold pump starts for [Pump on delay] time	If the [Lack of water] is set "Pump keep", Stop compressor and cool pump in case of fault. If the [Lack of water] is set "Pump stop", Stop the unit in case of fault.	Check if the cold water flow input is consistent with the switch setting.
Pump overload	The cold pump overload	Test after cold pump starts	Stop the unit	Check if the cold pump overload input is consistent with the switch setting.
Pump I high AL	The current of cold pump is too high			Check if the rated current of cold is input is reasonable.
Pump I low AL	The current of cold pump is too low			Check if the measure tool of the cold current is connect.
Phase AL	The three-phase power input is alarm	Power on to test	Stop the unit	Check if there is default phase or anti-phase in the three-phase power input and if the switch is correct.
Water lv.AL	The water level is low	Power on to test	If the [Low liquid lv] is set "Pump keep", Stop compressor and cool pump in case of fault.	Check if the water level input is consistent with the switch setting.

			If the [Low liquid lv] is set "Pump stop", Stop the unit in case of fault.	
Need Maintain	The total time of compressor run over the allow value	Test after cold pump starts	The unit cannot start once stops (the accumulative operation time of compressor exceeds the set value).	

12 Control

12.1 Logic of compressor



Control logic:

The increase temperature process, the compressor ON when $PV \geq SV + ADD$.
 The decrease temperature process, the compressor OFF when $PV < SV - SUB$

Note: PV: The liquid temperature SV: set temperature
 ADD: load temperature diefference SUB: unload temperature difference

12.2 Logic of pump freeze protection

- a) When [T.freeze prot] = “forbid”, there is no pump freeze protection.
- b) Otherwise under the idle state:
 - if $SV \leq [T.freeze prot]$, the pump opens;
 - if $SV \geq [T.freeze prot] + 2$, the pump will close after 10 seconds.

13 Manufacturer Parameters Table

Parameters set by the manufacturer and parameter meanings are listed as follows: (“*” is for parameters of the configuration [guide](#))

Setting Item	Name of Parameter	Factory Default	Setting Range	Remark
Func. Setting	*One-Key start	Forbid	Forbid ~ Use	Forbid: the compressor is allowed to ON only when press the compressor button; Used: the compressor allows ON when press the pump button.
	Auto start up	Forbid	Forbid ~ Use	Use: the unit starts automatically when powered on; Forbid: the unit doesn't start automatically when powered on; When the user parameter [On/Off type] is set to be "Remote", the electrical autostart is invalid.
	DO1 fuction	Alarm signal	Alarm signal; Run signal	If [DO1 fuction] is "Alarm signal", N.O: The
	Alarm output	Keep when mute	Keep when mute; Stop when mute	Keep when mute: press the "alarm output" parameter to take action once a fault occurs; Stop when mute: press the "alarm output" parameter to take action in case of no fault after silencing.
	Alarm type	N.O	N.O~N.C	N.O: the alarm relay is ON in case of faults; N.C: the alarm relay is OFF in case of faults.
	*Low water lv.	Pump stop	Pump stop ~ Pump keep	Pump stop: stop the cold pump in case of low water level fault; Pump keep: do not stop the cold pump in case of low water level fault.
	*Lack of water	Pump stop	Pump stop ~ Pump keep	Pump stop: stop the cold pump in case of cold water flow fault; Pump keep: do not stop the cold pump in case of cold water flow fault.
	*Current detect	Use	Forbid ~ Use	Use: there is a current detection module; Forbid: no current detection module
	*Comp.l rating	0.3A	0~35.0A	0A: do not detect the current fault. When [Current detect] is set "Forbid", those parameter is not displayed. (if the rating current of Comp or Pump is lower 1A, when
	*Pump. l rating	0.3A	0~35.0A	

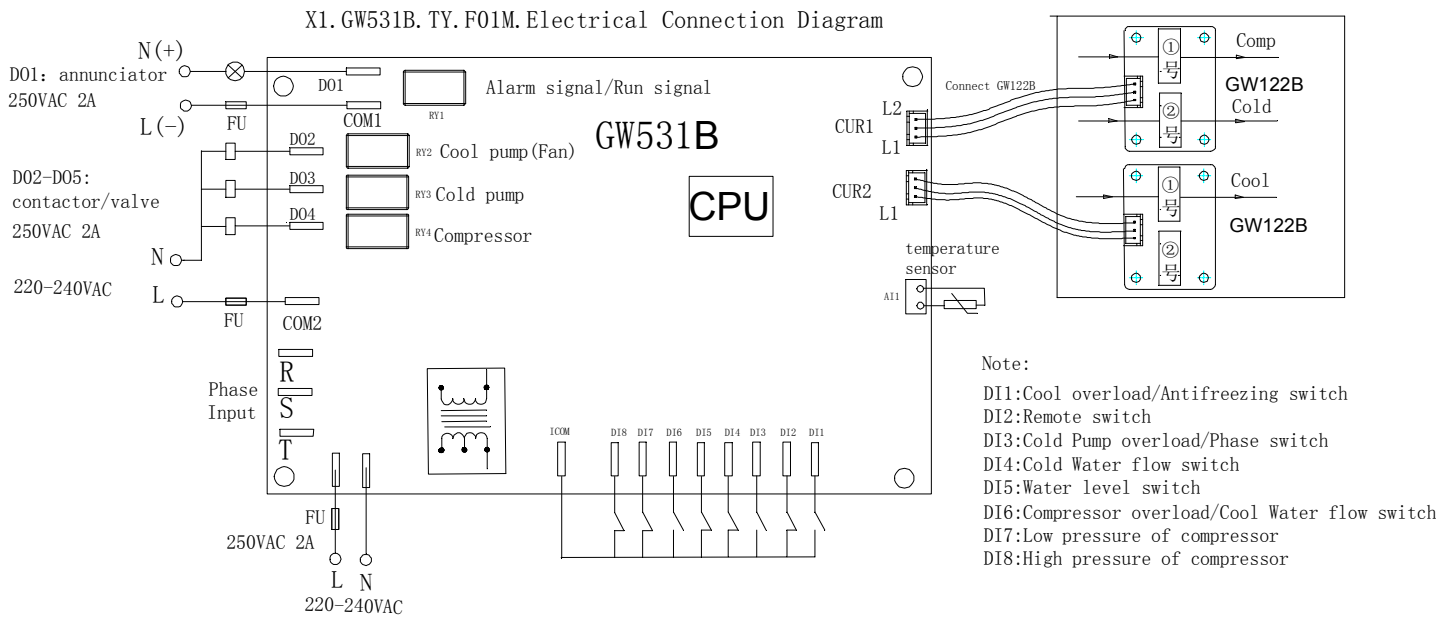
	*Cool. I rating	0.3A	0~35.0A	using please winding two or three laps on the sensor)
	Phase monitor	On_board	IO_input; On_board; Forbid;	When [Phase monitor] is set "IO_input" and [DI3 input opt] is set "Phase switch".the function of switch DI3 is phase protection
	DI1 input opt	Cool overload	Cool overload; Anti-freezing	Selection of switch DI1 input function
	DI6 input opt	Comp overload	Comp overload; Cool W.flow	Comp overload: DI6 input for Comp overload detection Cool W.flow: DI9 input for cool water flow detection
	Temp.high AL	Pump keep	Pump stop ~ Pump keep	Pump stop: stop the cold pump in case of Temp.high fault; Pump keep: do not stop the cold pump in case of Temp.high fault.
	DI3 input opt	Cold overload	Cold overload~ Phase switch	Selection of switch DI3 input function
Temp. Setting	Load offset	1.0°C	0~10.0°C	Temperature deviation of load the compressor, invisible when parameter [Temp unit] is Fahrenheit.
	Load offset	1.8°F	0~18.0°F	Temperature deviation of load the compressor, invisible when parameter [Temp unit] is Celsius.
	Unload offset	1.0°C	0~10.0°C	Temperature deviation of unload the compressor, invisible when parameter [Temp unit] is Fahrenheit.
	Unload offset	1.8°F	0~18.0°F	Temperature deviation of unload the compressor, invisible when parameter [Temp unit] is Celsius.
	T.setpoint max	30.0°C	-38.0~99.9°C	Top limit of set temperature, invisible when parameter [Temp unit] is Fahrenheit.
	T.setpoint max	86.0°F	-36.4~211.8°F	Top limit of set temperature, invisible when parameter [Temp unit] is Celsius.
	T.setpoint min	5.0°C	-38.0~99.9°C	Bottom limit of set temperature, invisible when parameter [Temp unit] is Fahrenheit.
	T.setpoint min	41.0°F	-36.4~211.8°F	Bottom limit of set temperature, invisible when parameter [Temp unit] is Celsius.
	T.bias	0.0°C	-9.9~9.9°C	Compensation for the liquid temperature, invisible when parameter [Temp unit] is Fahrenheit.
	T.bias	0.0°F	-17.8~17.8°F	Compensation for the liquid temperature, invisible when parameter [Temp unit] is Celsius.
	T.low protect	4.0°C	-40.0~99.9°C	Fault of "Temp.low AL" warning will be reported when liquid temperature is lower than this value. Invisible when parameter [Temp unit] is Fahrenheit.
	T.low protect	39.2°F	-40.0~211.8°F	Fault of "Temp.low AL" warning will be reported when liquid temperature is lower than this value. Invisible when parameter [Temp unit] is Celsius.
	T.high warn	50.0°C	0~99.9°C	Fault of "Temp.high warn" warning will be reported when liquid temperature is higher than this value. Invisible when parameter [Temp unit] is Fahrenheit.
	T.high warn	122.0°F	32.0~211.8°F	Fault of "Temp.high warn" warning will be reported when liquid temperature is higher than this value. Invisible when parameter [Temp unit] is Celsius.
	T.high alarm	60.0°C	0~99.9°C	Fault of "Temp.high AL" warning will be reported when liquid temperature is higher than this value. And meanwhile, the compressor will stop and then, the cool pump. Invisible when parameter [Temp unit] is Fahrenheit.
T.high alarm	140.0°F	32.0~211.8°F	Fault of "Temp.high AL" warning will be reported when liquid temperature is higher than this value. And meanwhile, the compressor will stop and then, the cool pump. Invisible when parameter [Temp unit] is Celsius.	
T.high reset	5.0°C	0~99.9°C	If liquid temperature<[T.high alarm]-[T.high reset], manual reset of "Temp.high AL" fault will be allowed; If liquid temperature<[T.high warn]-[T.high rese], the	

				“Temp.high warn” fault will be automatically reseted; Invisible when parameter [Temp unit] is Fahrenheit.
	T.high reset	9.0°F	0~179.8°F	If liquid temperature<[T.high alarm]–[T.high reset], manual reset of “Temp.high AL” fault will by allowed; If liquid temperature<[T.high warn]–[T.high rese], the “Temp.high warn” fault will by automatically reseted; Invisible when parameter [Temp unit] is Celsius.
	T.freeze prot	forbid	forbid~15.0°C	No such function when set to forbid.
	T.freeze prot	forbid	forbid~59.0°F	No such function when set to forbid(32.0°F).
Time Setting	Pump on delay	10 S	1~255 S	Delay after cold pump startup.
	Cool on delay	10 S	1~255 S	Delay after cool pump startup.
	Capacity ctrl.	5 S	0~255 S	Control the compressor ON/OFF every [Capacity ctrl.] interval time; For double-compressor control, if the conditions of two compressors ON are satisfied, then one of the compressors ON and the other after the time of [Capacity ctrl.].
	Comp protect	60 S	0~255 S	To avoid frequent ON/OFF the compressor, the interval between the start of two compressors must be greater than the set value.
	Input stable	2 S	0~255 S	The time General fault stable.
	W.flow stab.	5 S	0~255 S	It is considered to be valid only when the water flow alarm continue for the time.
	LP detect dly	60 S	0~255 S	Compressor low-pressure fault input is allowed only when the compressor has run for the set time.
	LP stable	5 S	0~255 S	Low-pressure fault stable time
	LP stop pump	0 S	0~300 S	0: the parameter has no effect . Non-0: in case of low pressure fault of the compressor, immediately stop all compressors and cool pump, delay the [LP stop pump] and stop the cold pump.
	Comp operation	0 H	0~9999 H	0: this parameter has no effect. Non-0: the compressor cannot start when the accumulative operation time is greater than the set value.
	Comp.I avoid	2 S	1~255 S	The current fault of compressor can only be detected after compressor has started for the set time. (When the [Current detect] is set “forbid”, the parameter is not displayed.)
	Pump. I avoid	2S	1~255 S	The current fault of cold pump can only be detected after it has started for the set time. (When the [Current detect] is set “forbid”, the parameter is not displayed.)
	Cool. I avoid	2S	1~255 S	The current fault of cool pump can only be detected after it has started for the set time. (When the [Current detect] is set “forbid”, the parameter is not displayed.)
	HT detect dly	0Min	0~30Min	0: this parameter has no effect. Non-0: T.high warn and Temp.high AL is detected only after the unit has run for the set time.
	LP stop pump	0 S	0~300 S	0: the parameter has no effect . Non-0: in case of low pressure fault of the compressor, immediately stop all compressors and cool pump, delay the [LP stop pump] and stop the cold pump.
	HP detect dly	0S	0~255 S	Compressor high-pressure fault input is allowed only when the compressor has run for the set time.
	HP stable	0S	0~255 S	High-pressure fault stable time
Input Setting	*Cool overload	N.C	N.O;N.C; Forbid	Selection of switch input mode

	*Freez overload	N.O	N.O;N.C; Forbid	N.O: switch off with no fault; N.C: the switch is closed with no fault. Forbid: the corresponding switching state is not detected.
	*Cold W.flow	N.C	N.O;N.C; Forbid	
	*W.level switch	N.C	N.O;N.C; Forbid	
	*Comp overload	N.O	N.O;N.C; Forbid	
	*Low pressure	N.C	N.O;N.C; Forbid	
	*High pressure	N.O	N.O;N.C; Forbid	
	Temp Low Reset	Manual Reset	Manual Reset; Auto Reset;	Reset type of "Temp.low AL"

[Note]: remote switch, if the remote control is used, the unit will start up when remote switch input is closed and stop when remote switch input is disconnected.

14 Electrical Connection Diagram



15 Installation Dimensions

