Universal Intelligent Controller

UIC-DX220 for Dual Screw Compressor

Rev. 20170817

Application: Chiller, CDU, Spot Cooler

Compressor Maker: Bitzer, Roltec, Fusheng, Hanbell, Refcomp, Hitachi, Mitubishi, Etc

. DOTECH INC

※ Read this direction for safety first.

▣ Direction for safety

This direction is for using the product correctly so that you could be safe from danger or incident.
Please carefully keep this all direction.

- Please use with being attached to a dual safety device in case of using for controlling instruments which could be effective to human life or property (eg: controlling atomic energy, medical instruments, cars, trains, flights, burners, amusement instruments or safety machinery).
- Please use with panel, there is a possibility getting an electric shock.
- Do not inspect or test with connecting power.
- Please connect after checking the terminal number when connecting power.
- Do not reorganize except mechanic from 『Dotech』.
- Do not use outdoor. It would be a cause making the product life shorter.
- When connecting wires, please give a good screw on terminal. There is a possibility causing a fire with bad connection.
- Please use in the proper performance zone. If you don't, there is a possibility making the product life shorter or, causing a fire accident.
- Do not use a load which is exceeded proper value of opening and shutting capacity of a relay contact. This will cause bad insulation, bad contact and bad connection.
- When cleaning, water or liquid including oil are prohibited, only clean with soft and dried cloth.
- Do not use in the place where there is inflammability gas, explosiveness gas, moisture, a direct ray of light, radiation, vibration and a shock.
- Please prevent from getting a dirt or leftover wire inside of this product.
- When connecting a sensor, please connect correctly after checking the polarity.

Some of the setting, size etc. on this manual could be changed without an advance notice.

. Warranty Information

This is the warranty below for customer who has a license or product from 『Dotech』.

he condition of warranty

The warranty period for 『Dotech』 products is a year so that it is provided support of the product during the warranty period.

『Dotech』 does not have a responsibility for problems of product under the circumstance below.

In the case of using without concerning the proper form mentioned on the manual.

In the case of problems caused from both external artificial and environmental factors.

Please contact 『Dotech』 in advance if there is any problem of product caused during the warranty period.

If the problem of product is informed from customer in the warranty period, it will be checked up in the customer area or sent to 『Dotech』 to check and conduct repair of exchange services directly. If the product is over the warranty period or that is on the condition that it is not mentioned on manual, customer would be suggested to pay the cost of repair, exchange and delivery.

On the condition that suggestions for 'Warranty Condition Performance' below are not against the law, 『Dotech』 is not responsible for any compensation and guarantee caused by losses or damages by business interruption, loss, return.

Warranty Condition Performance

Dotech is not responsible for any loss, damages, expenses insisted by customer, delegate, contractor except for customer claims caused by the condition of warranty above.

The condition of warranty mentioned above is the exclusive customer's right. Dotech refuses any conditions of warranty for special purpose except for the condition of warranty.

Warranty Condition Performance does not apply any trouble caused by not following exact direction. It is responsibility for customer to decide usage or product.

All the conditions of warranty are actually applied and Nobody has authority to modify or extend.

Index

※ Please check the product to the model ordering before usage.

Model	Suffix Code	Description
DX220		UIC for 1~2 Screw Compressor (Chiller, CDU)
Type (optional)	- 0 0	None
	- 1 0	Analog Output 3 Channel (Temperature Retransmission)
	- 0 1	With Communication RS-485 Modbus RTU
Language	-	Korean
	-E	English
	-C	Chinese
	-J	Japanese

- Contents :
  DX220 Body ---- 1EA
  DX220 Connector (4mm – 4 Nuts Included)
  DX220-00 : (3P-1EA, 4P-1EA, 5P-4EA, 6P-2EA) ---- 1Set
  DX220-01 : (3P-2EA, 4P-1EA, 5P-4EA, 6P-2EA) ---- 1Set
  DX220-10 : (3P-1EA, 4P-1EA, 5P-4EA, 6P-3EA) ---- 1Set
  DX220-11 : (3P-2EA, 4P-1EA, 5P-4EA, 6P-3EA) ---- 1Set
  DX Transformer (P/N:24069001) ---- 1EA (Separately Purchase)
  Temperature Sensor (DPR-TH2-06D100L) : Discharged Gas Temperature (Separately Purchase)
  Temperature Sensor (DPR-TH1-06D100L) : Outlet, Inlet Temperature (Separately Purchase)
  Pressure Sensor (-1 ~ 9 bar or 0~30 bar) (Separately Purchase)

※ Related Models

DX200 : 1 C/S Screw Chiller, CDU Controller
DX220 : 1~2 C/S Screw Chiller, CDU Controller
DX240 : 1~4 C/S Screw Chiller,CDU Controller
DX260 : Multi Rack Compressor Controller
DX270 : 1 C/S Screw Chiller / CDU Controller (step control)
DX230 : 1~2 C/S Recipro/Scroll Chiller, CDU Controller
DX230H : 1~2 C/S Recipro/Scroll Heatpump Controller
DX100 : AHU, Precision Air-Conditionor Controller
DX140 : Constant Air-Conditionor Controller

1. Outline

UIC-DX220 is based on Micro Processor and the most advanced equipment for controlling electricity conducting efficient operation of a screw composer. UIC-DX220 is a system managing the compressor's operation intensively, saving energy through controlling content, preventing problems in advance with alarming system and informing information of the necessary maintenance and repair. In the other word, UIC-DX220 conducts the best operation by the condition set up and operating circumstance.
Additionally, UIC-DX220 could effectively operate a composer equipped the most advanced functions below.

▣ Adopted high reliable RISC MICOM.
▣ Adopted wide graphic LCD displaying Korean/English/Chinese.
▣ Easy analyze the cause of troubles because of storing 160 histories of Trip Warning (nonvolatile).
▣ Automation of economical operation including a cycle timer.
▣ Variety analog output (transfer outlet temperature, discharge gas temperature)

1) Special Advantages

UIC-DX220 having Korean display and trip warning background to control a screw freezer is an electronic control unit for a screw freezer. This adopted the method of digital process by RISC micro processor and just occupies small place to install. It provides convenience to let users know a state of operation at once through display.

1-1) Solution of the noise.

A measure of noise is necessary for industrial controller. Digital input/output signal is isolated so that external signal can not access inside. Hardware Watchdog Timer restoring automatically is operating every 32msec and Brown-Out function is built into CPU to supervise control power.

1-2) RISC TYPE MICOM

The assembly instruction code of CPU conducts 7.3738M instruction per second, controlling logic writing on CPU spends about 1[msec] per cycle. Thus, it is less possibility to make trouble and much detailed to control than normal controller.

1-3) Black box built-in : a record of states of the operation

DX 220 can save up to 160 events of trip warning background so that it is great to analyze trouble or to maintain the product. Additionally, users can know the state of operation on the spot easily during trip.

1-4) Display of states of the operation

DX 220 has a function which shows freezer's operation state and delay time, thus it is very good to know the state of operation.

1-5) Adopted Wide Graphic LCD (Wide Temperature Range Type : -20 ~ +70℃)

The display of UIC-DX220 adopted Wide Graphic LCD so that users can use and control easily.
(English, Korean and Chinese)

1-6) Miniaturization

It occupies just small spaces to set up, because the part of main control and display is all in one.

1-7) Scalability

RS485 port, Modbus RTU standard protocol, MMI software & automatic interface

2) Basic Condition

2-1) General setting

Power Conditions	Input Power	AC24V 50/60Hz, DC24V
	Power Consumption	20VA(maximum)

2-2) CPU and LCD

CPU, LCD	C P U	RISC, 16MHz
	L C D	240 X 128 pixel, LED Backlight

2-3) Digital input/output

Digital Input	Input Method	Opto-Isolation
	Number of Input	10EA (5 X 2 Common)
	Signal Power	AC24V or DC24V
Digital Output	Output Method	Relay contact
	Number of Output	12EA, (4 X 3 Common)
	Relay Contact	250V, 10A (used Max. 0.5A)

2-4) Analog input/output

Analog Input	Temperature Sensor	NTC 4EA
	0~1Vdc, 4~20mAdc	1EA (Internal Sensor Power 24V)
	Declination Revision	Software
Analog Output	Number of Channel	3 channel
	Output Method	4~20mA
	Setting Form	Software

2-5) Communication condition

Communication	Communication Method	RS485(half-duplex), 2 channel
	Communication Speed	4800, 9600, 19200, 38400 BPS Parity None, Data 8bit, Stop 1bit
	Communication Distance	1.2Km (maximum)
	Suggested Cable	BELDEN 9841(2) or 8761

2-6) Field condition

Field Conditions	Install Place	Indoor
	Operation Temp.	-10 ~ 60 ℃
	Storage Temp.	-30 ~ 80 ℃
	Operation Humidity	Non-humidity 5~95%

2. Input/output condition

1) Digital Input Signal

Pin	Name	Function	Active state
J13.1	ID1	#01 Unit Total Alarm	fault (open)
J13.2	ID2	#01 Unit HP Alarm	fault (open)
J13.3	ID3	#01Unit LP Alarm	fault (open)
J13.4	ID4	#01 Unit Oil Level Alarm/Condenser Alarm / INT Alarm	fault (open)
J13.5	ID5	#02 Unit Total Alarm	fault (open)
J13.6	IDCM1	Input common terminal 1	

Pin	Name	Function	Active state
J14.1	ID6	#02 Unit HP Alarm	fault (open)
J14.2	ID7	#02 Unit LP Alarm	fault (open)
J14.3	ID8	#02 Unit Oil Level Alarm / Condenser Alarm / INT Alarm	fault (open)
J14.4	ID9	Pump (Fan) Interlock / Flow Switch	fault (open)
J14.5	ID10	Remote Start/Stop Control	Run(closed)
J14.6	IDCM2	Input common terminal 2	

2) Digital Output Signal

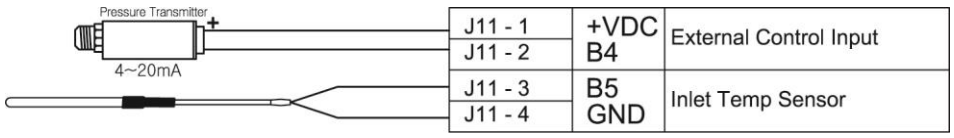
Pin	Name	Function	Active state
J21.1	N1	Increment SOL V/V Control	ON
J21.2	N2	Decrement SOL V/V Control	ON
J21.3	N3	#01 Unit Compressor Main/PW1 On/Off Signal	ON
J21.4	N4	#01 Unit Compress Delta/PW2/Start SOL On/Off Signal	ON
J21.5	C1	Output Common Terminal 1	

Pin	Name	Function	Active state
J22.1	N5	#01 Unit Liquid SOL V/V	ON
J22.2	N6	#01 Unit Liquid Injection SOL V/V	ON
J22.3	N7	#02 Unit Compressor Main/PW1 On/Off Signal	ON
J22.4	N8	#02 Unit Compressor Delta/PW2/Start SOL On/Off Signal	ON
J22.5	C2	Output Common Terminal 2	

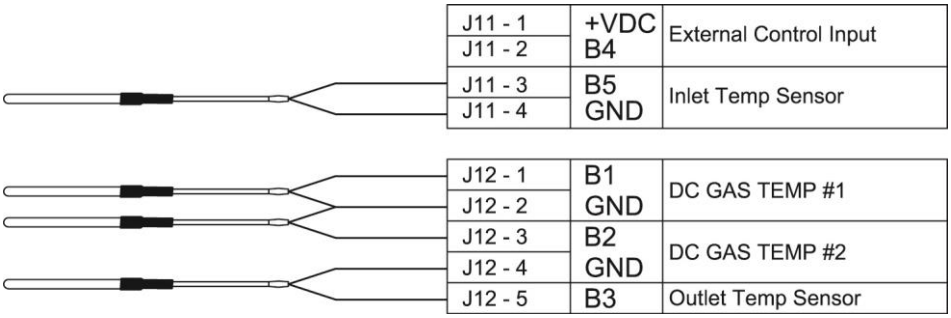
Pin	Name	Function	Active state
J23.1	N9	#02 Unit Liquid SOL V/V	ON
J23.2	N10	#02 Unit Liquid Injection SOL V/V	ON
J23.3	N11	Total Alarm Signal	ON
J23.4	N12	Pump(Fan) On/Off Signal	ON
J23.5	C3	Output Common Terminal 3	

3) Analog Input Signal

Pin	Name	Function	Type	Range
J11.1	+VDC	Power of Pressure Sensor (+V common)		
J11.2	B4	Pressure Sensor Input	-1 ~ 9bar	4 ~ 20mA
J11.3	B5	Inlet Temp. Sensor	NTC 5K	-40 ~ 70℃
J11.4	AVSS	0V Common (a ground wire of Shield Wire)		



Pin	Name	Function	Type	Range
J12.1	B1	#01 Discharge Gas Temp. Sensor	NTC 10K	-20 ~200℃
J12.2	AVSS			
J12.3	B2	#02 Discharge Gas Temp. Sensor	NTC 10K	-20 ~ 200℃
J12.4	AVSS			
J12.5	B3	Outlet Temp. Sensor	NTC 5K	-40 ~ 70℃



4) ANALOG OUTPUT SIGNAL (Optional Function)

Pin	Name	Function	Type
J6.1	Y1	Outlet Temp. Retransmission Signal (+)	4 ~ 20mA
J6.2	YG1	Outlet Temp. Retransmission Signal (-)	(-50 ~ 50℃)
J6.3	Y2	#01 Discharge Gas Temp. Retransmission Signal (+)	4 ~ 20mA
J6.4	YG2	#01 Discharge Gas Temp. Signal (-)	(0 ~ 200℃)
J6.5	Y3	#02 Discharge Gas Temp. Signal (+)	4 ~ 20mA
J6.6	YG3	#02 Discharge Gas Temp. Signal (-)	(0 ~ 200℃)

5) Communication Signal (Optional Function)

5-1) SYSTEM BUS

Pin	Name	Function	Type
TB1.1	SG	Signal Ground	RS-485
TB1.2	B	System Bus TRX-	
TB1.3	A	System Bus TRX+	

5-2) LOCAL BUS

Pin	Name	Function	Type
TB2.1	SG	Signal Ground	RS-485
TB2.2	B	Local Bus TRX-	
TB2.3	A	Local Bus TRX+	

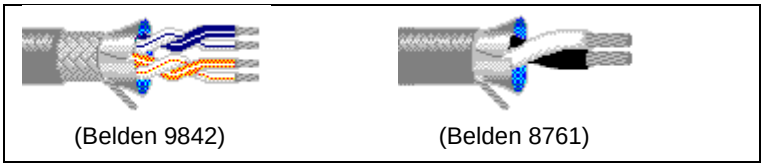
※ Communication Condition (System Bus, Local Bus)

① Communication Method: RS-485 Half-duplex

② Communication Speed: 4800, 9600, 19200, 384000 BPS, N, 8, 1

③ Communication Protocol: MODBUS RTU MODE

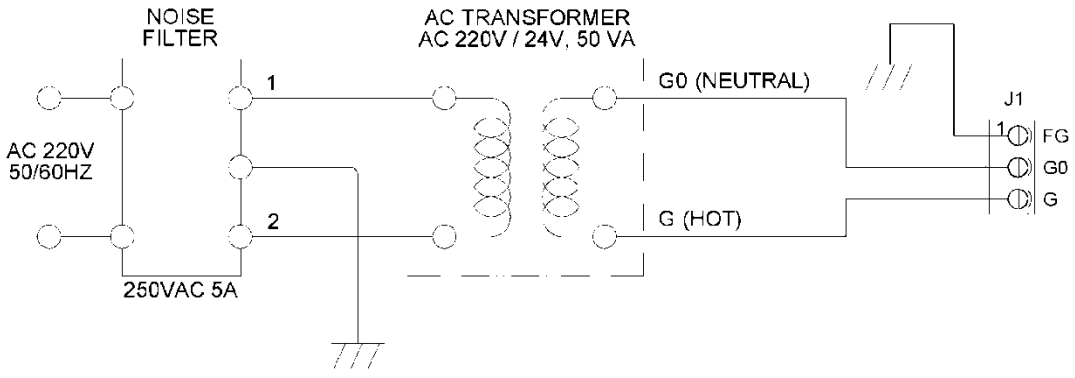
④ Communication Cable (suggested) : BELDEN 9842 or 8761



(Belden 9842) (Belden 8761)

6) Control Power Input

Pin	Name	Function	Type
J1.1	FG	-	
J1.2	G0	AC24V(-) or DC24V(-)	
J1.3	G	AC24V(+) or DC24V(+)	



3. Consistence

1) Operation and Display

1-1) General Consistence

Display: 240 X 128 Graphic LCD (LED BACKLIGHT), LED Green 1, Red 1
Keyboard: 8 membrane main switches

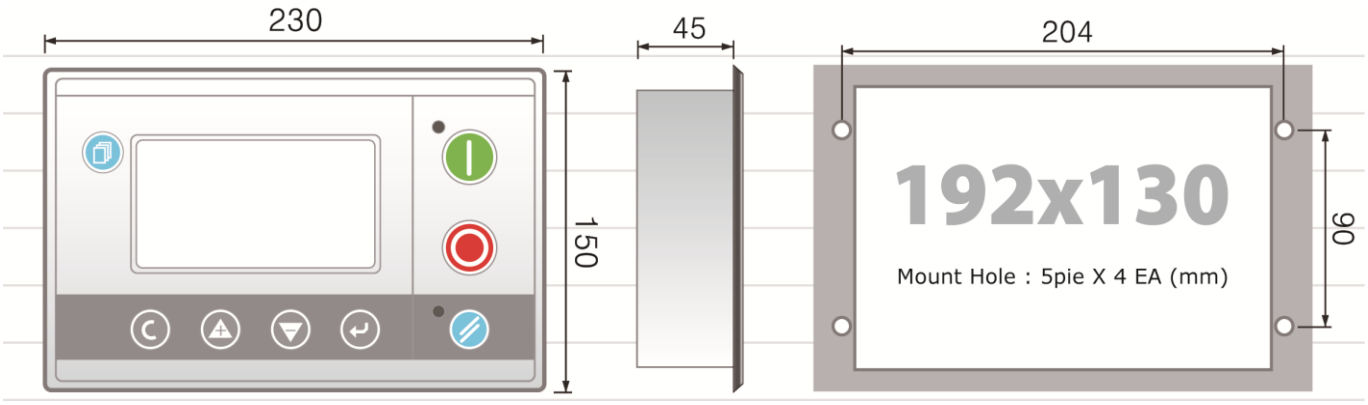
1-2) Operation

Start Switch: Start
Stop Switch: Stop
Reset Switch: Reset during trip
Green Lamp: Lamp showing the state of operation
Red Ramp: Lamp showing the warning or bad trip

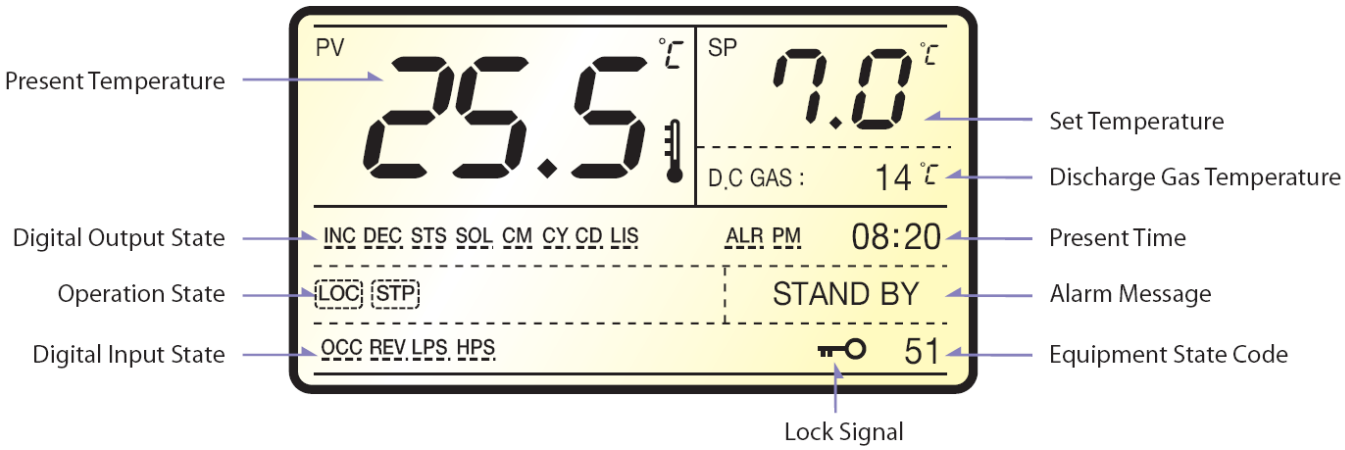
1-3) Setting up Program

Enter Switch: Choose the program or value
Down Switch: Control down movement
Up Switch: Control up movement
Menu Switch: Call menu
Cancel Switch: Return to previous menu or the first menu

2) Dimension & Mount Panel Cut



3) Display of the State of Operation



4) Operation Button Function

Start/Stop		Start or Stop. Start when press the start button. Stop when press the stop button.
Reset		Reset during trip. The Trip having automatic reset function will reset automatically without press the button.
Menu		Menu button to set for a control and state
Enter		Choose or Save button.
UP / DOWN		Up/ Down.
Cancel		Return to previous menu or first menu.

5) State Display Lamp

Operation state Lamp	Green	Operating ON / OFF
Alarm State Lamp	Red	Alarming ON / OFF

ON : LED is on always, OFF : LED is not on always.
Low speed flickering : ON 0.5sec, OFF 0.5sec
High speed flickering : ON 0.1sec, OFF 0.1sec
Spot flickering : ON 0.1sec, OFF 4sec

5-1) State Number & Lamp State

State No.	state	Operation (GREEN) Lamp	Alarm (RED) Lamp
0	Port Initialization	OFF	Normal: OFF Trip: High speed flickering Alarm: Low speed flickering
1	Operation Prohibit Check	OFF	
2	Operation Ready	OFF	
3	Timer Value Initialization	OFF	
4	Pump (fan) Operation Delay	High speed flickering	
5	Pump(fan) Operation Start	High speed flickering	
6	Operation Waiting State	High speed flickering	
7	Capacity control value Initialization	High speed flickering	
8	Comp. Operation Delay	High speed flickering	
9	Comp. Operation Start	High speed flickering	
10	Operation Stop Delay	ON	
30	Comp. Manual Stop Delay	Low speed flickering	
31	Pump Down Delay	Spot flickering	
32	Restart Delay	Low speed flickering / Spot flickering	
40	Pump(Fan)Stop Delay	Spot flickering	
41	Pump(Fan)Stop	Low speed flickering / Spot flickering	
50	Capacity Steady Operation	ON	
51	Capacity Decrease Operation	ON	
52	Capacity Increase Operation	ON	
53	Comp. Automatic Stop Delay	Low speed flickering	
99	Shut Down	OFF	

6) Symbol Explanation

6-1) Equipment State Display

Start/Stop Mode State Icon LOC RMT SCH	LOC: Control Start/Stop button on the body RMT: Remote controlling start/stop SCH: Pre-organized start/stop on the Operation Design Setting Menu
Start/Stop State Icon RUN STP CoL	RUN: Start or in Process STP: Stop CoL: Cooling State
	System Lock Signal

6-2) Digital Input Signal Symbol

Symbol	Description	Symbol	Description
CA1	#1 Unit Total Alarm	CA2	#2 Unit Total Alarm
HP1	#1 Unit HP Alarm	HP2	#2 Unit HP Alarm
LP1	#1 Unit LP Alarm	LP2	#2 Unit LP Alarm
OL1	#1 Unit Oil Level Alarm	OL2	#2 Unit Oil Level Alarm
CF1	#1 Unit Condenser Alarm	CF2	#2 Unit Condenser Alarm
OT1	#1 Unit INT(Over-temp) Alarm	OT2	#2 Unit INT(Over-temp) Alarm
PIL	Pump(Fan) Interlock / Flow switch	RET	Remote Start/Stop Control

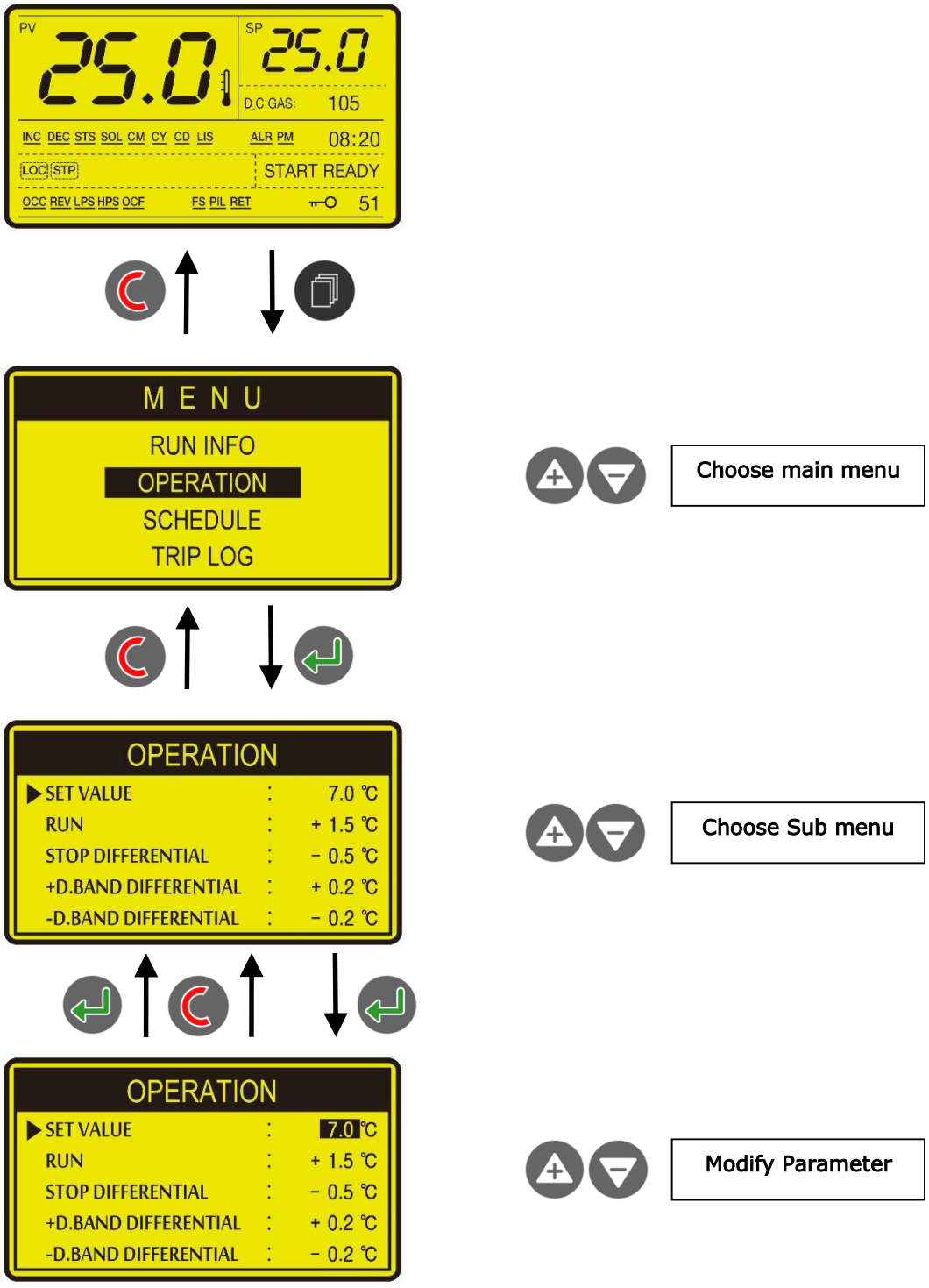
6-2) Digital Output Signal Symbol

Symbol	Description	Symbol	Description
INC	Increment SOL V/V Control	DEC	Decrement SOL V/V Control
CM	#1 Compressor Main/PW1 On/off Signal	CM	#2 Compressor Main/PW1 On/off Signal
CM	#1 Compressor Delta/PW2 On/off Signal	CM	#2 Compressor Delta/PW2 On/off Signal
SL1	#1 Compressor Liquid SOL V/V	SL2	#2 Compressor Liquid SOL V/V
ST1	#1 Compressor Start Sol On/off Signal	ST2	#2 Compressor Start Sol On/off Signal
LI1	#1 Unit Liquid Injection SOL V/V	LI2	#2 Unit Liquid Injection SOL V/V
ALR	Total Alarm Signal	PM	Pump(Fan) On/Off Signal

* In case of displaying a reverse image of CM1 ~ CM2, it means the delay for re-start.
* In case of flickering of CM1 ~ CM2, it means the delay for comp. operation.

4. Menu Construction

1) Menu Consistence Form



2) Menu Structure

00:RUN INFO
- Inlet Temperature
- Outlet Temperature
- Present Press.
- Comp #1 Discharge Gas T
- Comp #2 Discharge Gas T
- Total Operation Hour
- Comp#1 Total Run Hour
- Comp#1 Total On/Off Times
- Comp#2 Total Run Hour
- Comp#2 Total On/Off Times

01:OPERATION
- Set Point
- 1 Step Start Deviation
- 2 Step Start Deviation
- 1 Step Stop Deviation
- 1 Step Stop Deviation
- Steady Zone Dead Band (+)
- Steady Zone Dead Band (-)
- Liquid Injection Control Temp
- Liquid Injection Deviation
- LCD Back Light Mode

02:SCHEDULE
- SUN Start~Stop
- MON Start~Stop
- TUE Start~Stop
- WED Start~Stop
- THU Start~Stop
- FRI Start~Stop
- SAT Start~Stop

03:TRIP LOG
- Event #1
- Event #2
- Event #3
- |
- |
- Event #160

04:TRIP & ALARM
- Pump(Fan) Interlock Delay
- Pump(Fan) Interlock Hold
- Discharge Gas Over Temp
- Freezing Protection Temp
- Low Temp Alarm
- Low Load Protection Time
- Low Press. Sensing Delay
- Low Press. Sensing Hold
- Oil Level Sensing Delay
- Oil Level Sensing Hold
- Condenser Fault Use
- Chiller Mode

05:EXTENTION
- Running Mode Select
- External Set Point
- Control Source Select
- Capacity Increase Time
- Capacity Increase Interval
- Capacity Decrease Time
- Capacity Decrease Interval
- Comp. Start Delay Time
- Comp. Restart Guard Time
- Comp. Step interval Time
- Capacity Unload Prestart
- Capacity Unload End
- Pump(Fan) Start Delay
- Pump(Fan) Stop Delay
- YDelta/PW Change Time
- Pump-Down Time
- System ID Set **
- Local ID Set **
- System Baudrate Set **
- Local Baudrate Set **

06:CONFIGURE
- Comp Manufacture Select
- Comp #1 Use
- Comp #2 Use
- Comp Rotation Mode
- Comp. Interlock Start Mode
- Capacity Decrease Control
- Comp Start Method
- Inlet Temp Sensor Use
- Outlet Temp Sensor Use
- Discharge Gas Temp Use
- Capacity Start SOL Use
- Liquid Injection SOL Use
- Capacity INC SOL Type
- Capacity DEC SOL Type
- Capacity Start SOL Type
- Capacity Start Method
- Capacity Increase Method
- Capacity Decrease Method
- Capacity Steady Method

07:CALIBRATION
- Inlet Temp Correct
- Outlet Temp Correct
- Control Press Correct
- D.C Gas Temp#1 Correct
- D.C Gas Temp#2 Correct

09:FACTORY SET
- SELF TEST
- LOG CLEAR
- INFO CLEAR
- B1 INPUT
- B2 INPUT
- B3 INPUT
- B4 INPUT
- B5 INPUT
- B4 4mA
- B4 20mA
- B5 4mA
- B5 20mA
- Y1 4mA
- Y1 20mA
- Y2 4mA
- Y2 20mA
- Y3 4mA
- Y3 20mA
- ADC FILTER
- DAC FILTER

3) Menu Access Level

Access Level	USER 2 (CODE = 0009)	SERVICE 1 (CODE = 0100)	SERVICE 2 (CODE = 0119)	SERVICE 3 (CODE = ****)
Accessible Menu	RUN INFO OPERATION TRIP LOG. SCHEDULE TRIP & ALARM CONFIGURE CALIBRATION FACTORY SET	RUN INFO OPERATION TRIP LOG. SCHEDULE TRIP & ALARM EXTENTION CALIBRATION CONFIGURE FACTORY SET	RUN INFO OPERATION TRIP LOG. SCHEDULE TRIP & ALARM EXTENTION CALIBRATION CONFIGURE FACTORY SET	RUN INFO OPERATION TRIP LOG. SCHEDULE TRIP & ALARM EXTENTION CALIBRATION CONFIGURE FACTORY SET
Time	1 min.	10 min.	30 min.	1 hour

When changing Access Level Mode, locked by press Cancel button for 3 Sec

1) If putting [Menu] on operating display, it shows access code input display below.
(If putting [Menu] during supporting time, it does not ask Access Code.)
2) After input Access Code by [Up]/[Down] key, put [Enter] and then, convert to Menu display.
3)

<Display of Access Code Input >

4) If Access Level is under [Service] level 1, [Set expanded operation] parameter does not change.

4) RUN INFO

Item	Description	Unit	step	Min	max	default	View	Access
000	Inlet Temperature	°C	0.1	-40.0	70.0	View only		
001	Outlet Temperature	°C	0.1	-40.0	70.0			
002	Present Pressure	Bar	0.1	-1.0	45.0			
003	Comp#1 Discharge Gas T	°C	1	0	180			
004	Comp#2 Discharge Gas T	°C	1	0	180			
005	Total Operation Hour	H	1	0	99999	0	USER1	SVC2
006	Comp#1 Total Run Hour	H	1	0	99999	0	USER1	SVC2
007	Comp#1 Total On/Off Times	Time	1	0	99999	0	USER1	SVC2
008	Comp#2 Total Run Hour	H	1	0	99999	0	USER1	SVC2
009	Comp#2 Total On/Off Times	Time	1	0	99999	0	USER1	SVC2

1) Over 99999 Operation Time or Number, it is initialized ‘0’ automatically.
2) Operation Time or Number could be changed over Service Level 2.

5) OPERATION

Item	Description	unit	step	Min	max	default	View	Access
100	Set Point	°C	0.1	-50.0	99.9	10.0	USER 1	USER 1
101	1 Step Start Deviation	°C	0.1	+0.1	+20.0	+3.0	USER 1	SVC 2
102	2 Step Start Deviation	°C	0.1	+0.1	+20.0	+4.0	USER 1	SVC 2
103	1 Step Stop Deviation	°C	0.1	-20.0	0.0	-2.0	USER 1	SVC 2
104	1 Step Stop Deviation	°C	0.1	-20.0	0.0	-1.0	USER 1	SVC 2
105	Steady Zone Dead Band (+)	°C	0.1	0.0	+10.0	+0.3	SVC 1	SVC 2
106	Steady Zone Dead Band (-)	°C	0.1	-10.0	0.0	-0.3	SVC 1	SVC 2
107	Liquid Injection Control Temp.	°C	1	0	180	90	SVC 1	SVC 2
108	Liquid Injection Deviation	°C	1	-50	-1	-10	SVC 1	SVC 2
109	LCD Back Light Mode	Off / On				On	USER 1	USER 1

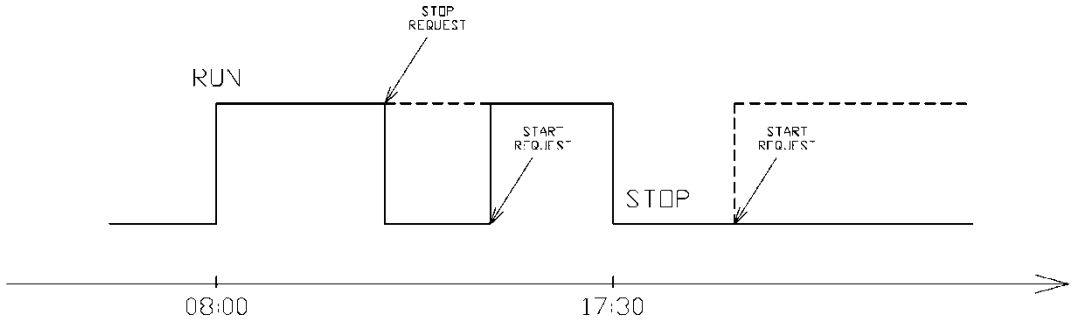
1) 1 Step Start Deviation : Input 1 Step Operation Temperature ex) 10.0(SP) + 3.0 = 13.0°C (Start)
2) 2 Step Start Deviation : Input 2 Step Operation Temperature ex) 10.0(SP) + 4.0 = 14.0°C (Start)
3) 1 Step Stop Deviation : Input 1 Step Stop Temperature ex) 10.0(SP) - 2.0 = 8.0 (Stop)
4) 2 Step Stop Deviation : Input 2 Step Stop Temperature ex) 10.0(SP) - 1.0 = 9.0 (Stop)
5) Dead Band (+): Input capacity steady operation zone. ; (+)Dead Band: 10.0(SP) +0.3=10.3°C
6) Dead Band (+): Input capacity steady operation zone. ; (-)Dead Band: 10.0(SP) -0.3=9.7°C
7) ex) Capacity steady operation zone is performed from (-)Dead Band 9.7°C to (+)Dead Band 10.3°C.
8) Liquid Injection Control / Deviation : Input temp. control zone by liquid injection Solenoid Valve.
9) ex) On over 105°C, Off below 95°C
10) LCD Back Light Mode: On(Always On), Off (During Alarm, On / press keys, On after 60 Sec., Off)

6) SCHEDULE

Item	Description	RUN ~ STOP
400	SUN	00 : 00 ~ 00 : 00
401	MON	08 : 30 ~ 18 : 30
402	TUE	08 : 30 ~ 18 : 30
403	WED	08 : 30 ~ 18 : 30
404	THU	08 : 30 ~ 18 : 30
405	FRI	08 : 30 ~ 18 : 30
406	SAT	08 : 30 ~ 12 : 30

※ It is displayed when setting to Reservation Operation from Expanded operation.

1) Operate at the set time, Stop at the set time.
2) Equipments is operating automatically during operating time and stops during stop time.
3) If it does not need to operate on exact day, set Operating Time and Stop Time equally.
4) If Operating Time is after Stop Time, Equipment does not work.
5) During Schedule Operation, it is possible to control with [Start] key and [Stop] key. (Picture below)
6) After Stop Time, it does not operate by putting [Start] key.(Picture below)

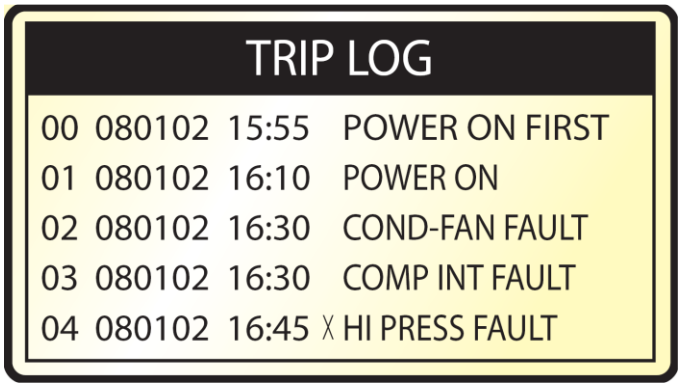


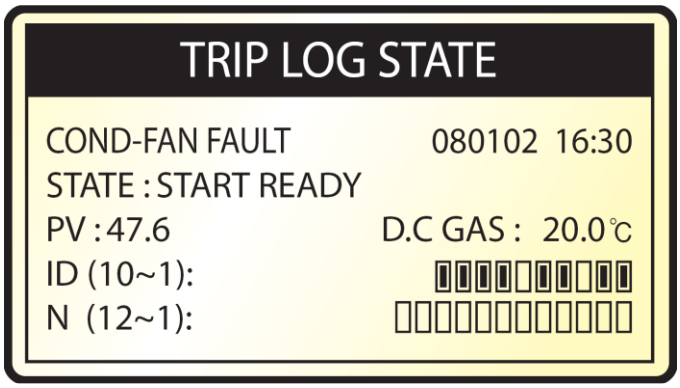
7) TRIP LOG

Item	Date	Time	Occur/Reset	Event
1	YY/MM/DD	HH:MM	(X)	The Name of Trip Alarm #1
2	YY/MM/DD	HH:MM	(X)	The Name of Trip Alarm #2
3	YY/MM/DD	HH:MM	(X)	The Name of Trip Alarm #3
4	YY/MM/DD	HH:MM	(X)	The Name of Trip Alarm #4
5	YY/MM/DD	HH:MM	(X)	The Name of Trip Alarm #5
⋮	⋮	⋮	⋮	⋮
160	YY/MM/DD	HH:MM	(X)	The Name of Trip Alarm #160

※ It is not possible to modify or erase background.

① If Trip Alarm occur (cancel), event date and the name of trip alarm is saved in nonvolatile memory.
② Maximum is 160, it is deleted and saved previous events over 160 events.
③ When occurring, date, time, event (trip alarm) are recorded, when canceling, 'X' is showed next to time.
④ If press [Menu], Last message is located.
⑤ If press [Enter], Operation state, Pressure, Outlet Temp, Inlet Temp, Discharge gas temp are showed.





8) Trip & Alarm

Item	Description	unit	step	Min	max	default	View	Access
400	Pump(Fan) Interlock Delay	Sec.	1	0	999	0	USER1	SVC1
401	Pump(Fan) Interlock Hold	Sec.	1	0	999	1	USER1	SVC1
402	Discharge Gas Over Temp	°C	1	0	175	105	USER1	SVC1
403	Freezing Protection Temp	°C	0.1	-55.0	90.0	2.0	USER1	SVC1
404	Low Temp Alarm	°C	0.1	-55.0	90.0	5.0	USER1	SVC1
405	Low Load Protection Time	Min.	1	0	50	0	USER1	SVC1
406	Low Press. Sensing Delay	Sec.	1	0	999	30	USER1	SVC1
407	Low Press. Sensing Hold	Sec.	1	0	999	1	USER1	SVC1
408	Oil Level Sensing Delay	Sec.	1	0	999	60	USER1	SVC1
409	Oil Level Sensing Hold	Sec.	1	0	999	0	USER1	SVC1
410	Condenser Fault Use	-	YES / NO			NO	USER1	SVC1
411	Chiller Mode	-	YES / NO			YES	USER1	SVC1

1) Pump (Fan) Interlock Fault Sensing
   - ◆ Pump (Fan) Interlock Delay: ID9 input starts to sense after time delay from pump (fan) starting. (If you set up as “0” sec., it senses even in a state of pump (fan) stop.) For example, in case of flow switch, it inputs delayed time.
   - ◆ Pump (Fan) Interlock Hold: ID9 input must be off during sensing time, it can sense as fault. (If you set up as “0” sec., fault function will not be used.)
2) Discharge Gas Overheating Temp set
   When the temperature of discharge gas is higher than overheat set-up value, the compressor is automatically off due to occurring of discharge gas overheating fault. Please push reset button in terms of 5℃ lower than overheat setup value.
3) Freezing Protection Temp Set
   When the O temp. is lower than freezing set-up temp., the compressor is tripped. (Manual reset)
4) Low Temp Alarm Set
   When the present temp. is lower than low temp., the compressor is stopped automatically. (Automatic reset)
5) Low Load Protection Time
   It prevents the compressor from operating for a long time with low load condition. When the compressor continuously operates more than set-up time with decrease condition, it is automatically stopped.
6) Low Press. Fault Sensing
   - ◆ Low Press. Sensing Delay Time: ID3, ID7 input starts to sense after time delay from compressor starting. (If you set up as “0” sec., it senses even in a state of Compressor stop.)
   - ◆ Low Press. Sensing Hold Time: ID3, ID7 input must be off during sensing hold time, it can sense as low press fault. (If you set up as “0” sec., fault function will not be used.)
7) Oil Level Fault Sensing
   - ◆ Oil Level Sensing Delay: ID4, ID8 input starts to sense after time delay from compressor starting. (If you set up as “0” sec., it senses even in a state of Compressor stop.)
   - ◆ Oil Level Sensing Hold: ID4, ID8 input must be off during sensing hold time, it can sense as low press fault. (If you set up as “0” sec., fault function will not be used.)
8) ID4,ID8 Function set-up: Oil Level Switch or Condenser fault Input or Overheat Protection(INT) Selective Input
   - ◆ In case of using oil level switch input:
     Oil level sensing hold – set up as “more than 1 sec.” Condenser Fault use – set up as “No”.
   - ◆ In case of using condenser fault input:
     Oil level sensing hold – set up as “0 sec.” Condenser alarm use – set up as “Yes”
   - ◆ In case of using overheat protection (INT) input:
     Oil level sensing hold – set up as “0 sec.” Condenser alarm use – set up as “NO”.
9) Chiller Mode
   - ◆ When chiller mode is in “Yes”, Freezing protection trip function and freezing protection sense are always working.
   - ◆ When chiller mode is in “No”, Freezing protection trip function and freezing protection sense are only working under operation(start).

9) EXTENTION

Item	Description	Unit	Step	Min	Max	Default	View	Access
500	Running Mode Select	-	Local/Rem/Sch			Local	SVC1	SVC2
501	External Set Point	-	OFF,B1,B2,B3,B4,B5			OFF	SVC1	SVC2
502	Control Source Select	-	OUT,IN,B4,B5,P-B4,P-B5			OUT	SVC1	SVC2
503	Capacity Increase Time	Sec.	0.1	0.0	60.0	3.0	SVC1	SVC1
504	Capacity Increase Interval	Sec.	0.1	0.0	60.0	27.0	SVC1	SVC1
505	Capacity Decrease Time	Sec.	0.1	0.0	60.0	3.0	SVC1	SVC1
506	Capacity Decrease Interval	Sec.	0.1	0.0	60.0	27.0	SVC1	SVC1
507	Comp. Start Delay Time	Sec.	1	0	600	5	SVC1	SVC1
508	Comp. Restart Guard Time	Min.	1	0	30	5	SVC1	SVC1
509	Comp. Step interval Time	Sec.	1	0	600	10	SVC1	SVC1
510	Capacity Unload Prestart	Sec.	1	0	600	20	SVC1	SVC2
511	Capacity Unload End	Sec.	1	0	600	15	SVC1	SVC1
512	Pump(Fan) Start Delay	Sec.	1	0	600	5	SVC1	SVC1
513	Pump(Fan) Stop Delay	Min.	1	0	30	0	SVC1	SVC1
516	YDelta/PW Change Time	Sec.	0.1	0.5	20.0	5.0	SVC1	SVC1
517	Pump-Down Time	Sec.	1	0	240	0	SVC1	SVC1
521	System ID Set **	-	1	1	128	1	SVC1	SVC1
522	Local ID Set **	-	1	1	128	1	SVC1	SVC1
523	System Baudrate Set **	-	48,96,192,384			96	SVC1	SVC1
524	Local Baudrate Set **	-				96	SVC1	SVC1

**It is displayed in case of installation of communication function.

1) Operation Mode Set: Local\(by keypad on Controller), Remote (by digital input ID10), Schedule (by schedule set)
2) External Set Point

data	Remark	unit	data	remark	unit
OFF	Off		B4	B4,4~20mA	℃/bar
B1	B1,NTC	℃	B5	B5,4~20mA	℃/bar
B2	B2,NTC	℃			
B3	B3,NTC	℃			

3) Control Source Select

data	remark	unit	data	remark	unit
OUT	Outlet temp sensor(B3,NTC)	℃	P-B4	Pressure Sensor(B4, 4~20mA)	Bar
IN	Inlet temp sensor(B4,NTC)	℃	P-B5	Pressure Sensor(B5, 4~20mA)	Bar
B4	B4,4~20mA	℃			
B5	B5,4~20mA	℃			

4) Capacity Increase (Decrease) Time: Set up operation time of capacity increase (decrease) control valve.
5) Capacity Increase (Decrease) Interval: Set up interval time of capacity increase (decrease) control valve.
6) Comp. Start Delay Time: Set up the time until main liquid solenoid valve operated.
7) Comp. Restart Guard Time: Comp. can be restarted after the passage of the setup time from Comp. off.
8) Comp. Step Delay Time: The delay time between Comp. steps when Comp. is under operation.
9) Capacity Unload Presstart: Set up the time from capacity control valve is under operation to main SOL valve is open.
10) Capacity Unload End: Set up the time from Comp. is on to capacity control valve is terminated to starting operation.
11) Pump(Fan) Start Delay: Set up the time of circulation pump(fan) operation delay.
12) Pump(Fan) Stop Delay: Set up the time of circulation pump(fan) start delay.

10) CONFIGURE – Compressor Type Set

※ Please change the setup value after exactly understanding the specification of the equipment.
(Otherwise, compressor cannot be worked properly.)

※ It is possible to set up the equipment when it is completely stopped.

Item	Description	Unit	Step	Min	Max	Default	View	Access
601	Comp Manufacture Select	Roltec, Bitzer, Fusheng, Hanbell, Ref, default				default	SVC1	SVC1
602	Comp #1 Use	YES / NO				YES	SVC1	SVC1
603	Comp #2 Use					YES	SVC1	SVC1
606	Comp Rotation Mode	OFF / NORMAL / TIME / ONOFF / OFF-R				OFF	USER1	SVC2
607	Comp. Interlock Start Mode	YES / NO				NO	USER1	SVC2
608	Capacity Decrease Control					YES	USER1	SVC2
612	Comp Start Method	Direct / Y-Delta / P-Winding				Y/D	USER1	SVC2
613	Inlet Temp Sensor Use	NO / YES				YES	USER1	SVC2
614	Outlet Temp Sensor Use					YES	USER1	SVC2
615	Discharge Gas Temp Use					YES	USER1	SVC2
616	Capacity Start SOL Use					NO	USER1	SVC2
617	Liquid Injection SOL Use					YES	USER1	SVC2
618	Capacity INC SOL Type	NO / NC (Normal Open / Normal Close)				NC	SVC 1	SVC2
619	Capacity DEC SOL Type					NC	SVC 1	SVC2
620	Capacity Start SOL Type					NC	SVC 1	SVC2
621	Capacity Start Method	1. INC:OFF DEC:OFF 2. INC:OFF DEC:ON 3. INC:ON DEC:OFF 4. INC:ON DEC:ON (On state: On/Off Operate)				1	SVC 1	SVC2
622	Capacity Increase Method					3	SVC 1	SVC2
623	Capacity Decrease Method					2	SVC 1	SVC2
624	Capacity Steady Method					1	SVC 1	SVC2

1) Comp. Maker Select: Select maker Roltec, Bitzer, Fusheng, Hanbell, Hitachi, Refcomp, Etc
2) Comp #1 ~ #2 Unit Select: Set up for use / no use per each compressor
3) Comp Rotation Mode:
   OFF: Start from Comp #1 unit → #2 Comp in order (There is no rotation operation).
   NORMAL: Rotate operation when all compressor are turned on and off.
   TIME: Start from the compressor which has shorter operation time
   ONOFF: Start from the compressor which has less operation cycle
   OFF-R: Start from #2 → #1 compressor in order (There is no rotation operation).
4) Comp. Interlock Start Mode: ON (In case of 2 step operation start, 1~2 step start)
5) L.Injection SOL Use: OFF: No use of liquid injection valve. ON: Use of liquid injection valve
6) Capacity INC/DEC/Start SOL Type: Select valve type (Normal Open or Normal Close Type)
7) Capacity Control Method: Select valve composition for capacity control operation, such as start/increase/decrease/steady
8) Capacity decrease control:
   OFF :Capacity steady operation is performed when capacity decrease operation required.

11) CALIBRATION

Item	Description	Unit	Step	Min	Max	Default	View	Access
700	Inlet Temp Correct	°C	1	-20.0	+20.0	0.0	USER 1	USER 1
701	Outlet Temp Correct	°C	1	-20.0	+20.0	0.0	USER 1	USER 1
702	Control Press Correct	Bar	1	-10.0	+10.0	0.0	USER 1	USER 1
703	D.C Gas Temp#1 Correct	°C	1	-20.0	+20.0	0.0	USER 1	USER 1
704	D.C Gas Temp#2 Correct	°C	1	-20.0	+20.0	0.0	USER 1	USER 1

1) Inlet Temp Correct: Input the correction value of inlet temperature sensor
2) Outlet Temp Correct: Input the correction value of outlet temperature. sensor
3) Control Press Correct: Input the correction value of controlled pressure sensor

4) D.C Gas Temp#1,#2 Correct: Input the correction value of discharge gas temp. sensor for #01, #02 unit

12) FACTORY SET

※ This is the set mode when delivered thus, please understand exactly and then, changes it.

Item	Description	Units	Step	Min	Max	Default	View	Access
900	SELF TEST		NO / YES			NO	USER1	SVC3
901	LOG CLEAR		NO / YES			NO	USER1	SVC3
902	INFO CLEAR		NO / YES			NO	USER1	SVC3
903	B1 INPUT		Only View			-	USER1	-
904	B2 INPUT					-	USER1	-
905	B3 INPUT					-	USER1	-
906	B4 INPUT					-	USER1	-
907	B5 INPUT					-	USER1	-
908	B4 4mA		1	0	1023	280	USER1	SVC3
909	B4 20mA					997	USER1	SVC3
910	B5 4mA					280	USER1	SVC3
911	B5 20mA					997	USER1	SVC3
912	Y1 4mA		1	0	9999	810	USER1	SVC3
913	Y1 20mA					3510	USER1	SVC3
914	Y2 4mA					810	USER1	SVC3
915	Y2 20mA					3510	USER1	SVC3
916	Y3 4mA					810	USER1	SVC3
917	Y3 20mA					3510	USER1	SVC3
918	ADC FILTER		1	1	256	16	USER1	SVC3
919	DAC FILTER		1	1	256	16	USER1	SVC3

This product has a digital control function in terms of a digital input/output function. When customer wants the change something, please contact to [Dotech,inc] Company.

1) SELF TEST: It is set 'ON', when taking test or delivered.
2) LOG CLEAR: Use to delete Trip Warning Background.
3) INFO CLEAR: Use to delete Operation (running hour and on/off times) Background.
4) Bn 4mA: Analog Input(4mA)
5) Bn 20mA: Analog Input (20mA)
6) Yn 4mA: A constant of change Analog signal (4mA)
7) Yn 20mA: A constant of change Analog signal (20mA)

13) System Date/Time

Date/Time is used for a report of system information by trip/state report and schedule operation. Thus, it is necessary for a trouble or an abnormal condition. Please set Date/Time.

1) Put menu button once on the main display, see the display to set access code.
2) Put menu button once again, see the display to set the Date/Time like below
3) Set Date/Time with controlling up/down and enter button, then put [cancel] button for returning to main display
4) The day of a week will be set automatically
5) If ":" between hour and minute does not flicker, set all once again.

<Date/Time set>

5. Install Process

1) Install Place

Please set this product up in the place mentioning below.

⊙ Low temperature change or normal temperature
⊙ No corrosiveness gas
⊙ No low and high humidity
⊙ Low machinery vibration
⊙ Low dirt or smoke
⊙ Low effect from an electrical noise
⊙ No effect from a strong magnetic field

2) Install Process

⊙ Set up within a slop of fifteen degrees
⊙ Use a steel plate over 2mm as panel
⊙ Do not set up by force
⊙ Fasten the product with an included screw

3) Direction for the case of no line

⊙ Please use the shield cable for between control board and sensor to prevent a noise
⊙ Keep Input/Output Line away over 30cm from Power Line and do not put same lines together
⊙ Set fuse apart to protect the product from overvoltage
⊙ For a high safety, connect parallel Serge Observer to Magnet Coil
⊙ For a high safety, use noise filter