NANOCON
AUTOMATIC LIQUID TEMP. REGULATOR

OIL COOLER

INSTRUCTION MANUAL

Applicable Model

- **CIL301A**
- **CIL501A**
- **CIL751A**
- **CIL1101A**
- **CIL1501A**
- **CIL2201A**

	**Thank you for choosing KWANGRIM product.**
	This instruction manual is prepared for your company's maintenance and inspection officer or service representative. Please read it carefully before using it so that you can use it properly and fully utilize it. When you're completed, please keep it in an easy-to-find location so that you can see it at any time.

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The instruction manual details how to use the product and what you should be careful about when using it. To ensure safe use and reliable product performance, be sure to understand the contents of this manual. We conduct continuous research and development to maintain the safety and quality of our products, and design changes can be made without notice, and specifications may be added, deleted, or functional changes. Therefore, please understand that the contents of this manual are written so that the pictures and photos in the booklet can be different from the product.

In order to maintain the performance of the product and prevent the life of the product, inspect and repair it at the designated time.

In the event of a problem caused by maintenance by a company or business operator other than our designated service, we shall not be responsible for it.

1. For Safety

Please read this section carefully.

This [1. For Safety] describes the precautions to be taken to prevent risks and property damage to customers who use this unit as well as others.

The meaning of the symbol in the text is as follows:



DANGER: This content must be observed by the user. Special attention is required to users as they are concerned about extremely dangerous situations that could result in death or serious injury.



WARNING: This content must be observed by the user. If it is not implemented in the same way as the contents, it may result in a potentially dangerous situation that could result in death or serious injury.



CAUTION: Please make sure to check if it requires the customer's attention while using the unit and follow the contents. If you do not follow the instructions, it may cause personal injury or damage to the unit.

1-1 Dangerous factors



FORCED

〈Transport, Moving〉

When moving using a shipping hook on the body of the unit, work with safety precautions to maintain the balance of the body while moving.

When using the forklift, insert the fork out enough to the back of the unit and moving in stable condition.



PROHIBITION

〈Wiring work〉

The person in charge of inspection of the maintenance and the service manager (who has expertise) should access the power lines and signal lines at the input side.

Use wiring materials that can be used with voltage and current specified in the unit specification for the input side power lines and signal lines.

Be sure to work on the protective earth wire for the power line on the input side.

Make sure that the electrical power is turn off before start the wiring.



FOECED

〈Operation & Inspection〉

Do not spray water directly on the unit. Please use the right size for the fuse.

Do not place screws, fuses, tools, etc. on top of the unit. If it falls inside through a hole in the exhaust window, it is dangerous and the unit can be damaged.

When opening the control box cover for inspection or repair, turn off the main power . After disconnecting power, do not work for at least a few minutes until the high voltage charger is discharged.

DANGER



FORCED

〈Do not use other than specification〉

Do not use for any purpose other than the specifications listed in the specification and catalog.

1-2 Warning point

WARNING



PROHIBITION

〈Transport, Moving〉

With the Reserve Tank type, the liquid contained in the tnak may overflow during transport. Please empty liquid in the tank before moving.

〈Installation〉

When installing this device, secure it firmly to the designated location or ground.



PROHIBITION



FORCED

〈Operation & Inspection〉

If there is a problem with the unit, please stop the operation immediately.

When removing the cover for inspection or repair, make sure to stop operation.

After removing the cover, take care not to contact with exposed internal components (such as fan, piping surface and compressor surface of the frozen circuit). Risk of injury.

Do not touch the Heater casing surface as it may cause burns.

If the refrigerant leaks from the refrigeration circuit, it may adversely affect the human body, so ventilate it to allow fresh air to flow in.

1-3 Precautions



FORCED

〈Transport, Moving〉

When moving to a moving caster attached under the unit, be careful not to fall while checking the road surface in the direction of moving.

〈Power〉

Be sure to stop the operation of the unit in case of an emergency stop situation.

If you do not use the unit for a long time, turn off the power of the unit.

WARNING



PROHIBITION

〈 Installation Environment 〉

Do not use in temperature and humidity conditions outside the range of use.
Normal functionality cannot be guaranteed if installed in an atmospheric environment with a large distribution of oil mist and liquid.

〈Operation & Inspection〉



FORCED

Do not leave any items that may interfere with the absorption or exhaust of the unit.
Keep your face away from the hot air from the exhaust while operating.
Be careful not to slip if an oil leak occurs while operating the unit.
To maintain the stable performance of the unit, clean the front air filter regularly.
Please refer to the contents of 7-2 Inspection and Cleaning of Each Part.

〈Purpose〉

The CIL series can only be used to cool and control the temperature of the spindle and the hydraulic unit operating oil.
(For main spindle cooling, operating oil, temperature control of lubricating oil, ball-screw cooling, Linear motor cooling)



PURPOSE

Do not use metal chips or other materials for intermingling purposes.
(Do not use water, water soluble/non-water soluble coolant, antifreeze, distilled water, discharge processing liquid, etc.)

The above case is excluded from unit warranty because of the potential for material damage to the unit and machine tool.

The standard specification for this unit is an aluminum condenser. If a grinding machine is installed near your unit installation site, it is not recommended because corrosion may occur due to the solution mist distributed in the atmosphere.
Alternative condensers of cupper material can be applied to the location (optional).

2. General precautions

Ambient Conditions | Liquid Used

2-1 Range of use

(1) Since this unit has a built-in refrigerator, the oil temperature setting and control range are acceptable. Use within the range of Figure 2-1. (5 ~ 45 ℃)

(2) The humidity range is 20 to 90% RH and must not be condensation.

(3) Please use it in an area below 1000 m above sea level.

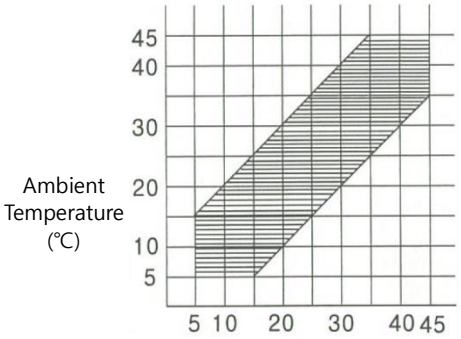
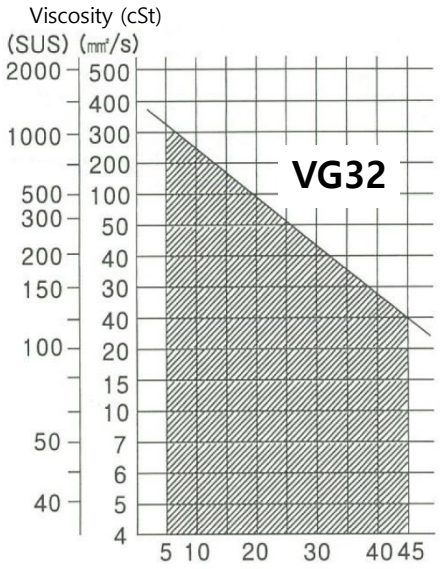


Figure 2-1. Range of use

2-2 Usable liquid

(1) This unit is an oil cooler for abrasion resistant operating oil and for spindle cooling.
Do not use cutting oil (liquid), grinding oil (liquid), water, kerosene, gasoline, medicinal liquids, food liquids, etc..

(2) Temperature & viscosity management of used oil
See also change in viscosity due to oil temperature change in Figure 2-2.



DANGER	
FORCED	Use of liquids other than the recommended specifications may result in serious failure and will be excluded warranty. Use recommended liquid.

Low viscosity oil (VG 02~10) has good heat exchange efficiency, which can help reduce heat displacement during processing. High viscosity oil (VG 32~68) causes poor heat exchange efficiency and reduces cooling. In particular, the suction resistance may rise during the winter, causing abnormal noise, over-current generation and motor damage in the oil PUMP. **[VG 32 (32cSt at 40℃) increases viscosity by more than 200 cSt below 5℃ of room temperature]**

CAUTION

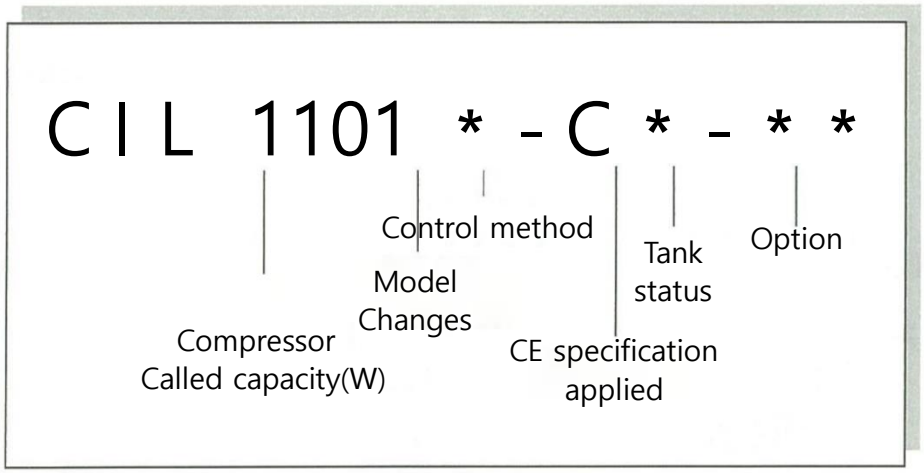
FORCED

This unit uses eco-friendly refrigerants for refrigerated circuits.
When discarding the unit, request or return it to our company for the recovery of refrigerant to dispose of it after collecting the refrigerant.
Please refer to page 26 (9-1 contact information).

3. Model and Specification

Fluid used Spec Exterior

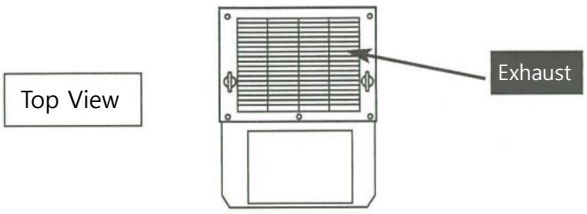
3-1 Model Type



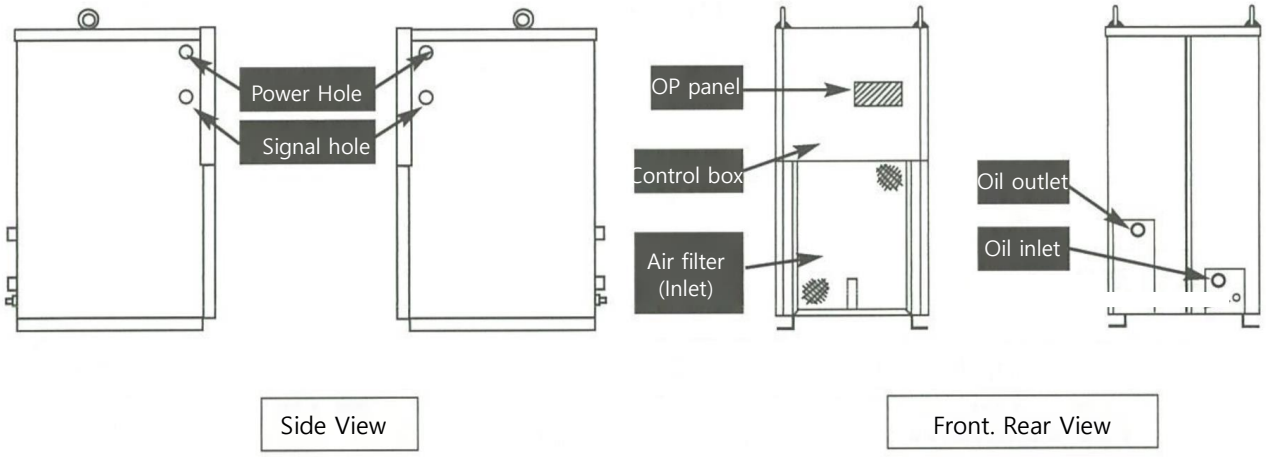
3-2 Specification Table

Item	CIL301A*	CIL501A*	CIL751A*	CIL1101A*	CIL1501A*	CIL2201A*	CIL3800A*
Dimension (W*D*H)	350 x 450 x 675	350 x 450 x 675	350 x 450 x 825	380 x 475 x 935	445 x 510 x 950	570 x 575 x 1130	730 x 870 x 1455
Usage temperature	STANDARD : 5 ~ 45℃ / OPTION : H ⇒ For high temperature((5~50℃)						
External color	STANDARD : BLACK / OPTION : pre-order consultation needed						
Cooling capacity (60 / 50 Hz)	1160 / 1390 W	1520 / 1800 W	2900 / 3480 W	3820 / 4500 W	4830 / 5810 W	8820 / 10500 W	13600 / 16300 W
Compressor capacity	595W	595W	920W	1390W	2475W	3450W	5460W
Refrigerant	R-407C		R-410A			R-407C	
Condenser	STANDARD : Air cooling(ALUMINUM CONDENSER) / OPTION : Air cooling(CU PIPE+ALUMINUM PIN CONDENSER)						
FAN MOTOR	100W	100W	200W	100W x 2	100W x 2	200W x 2	200W x 2
Heat exchanger	Plate Cooler						
Circulating oil	12.6 / 15.1(L/min)		18/ 21.6(L/min)	24.3 / 29.1(L/min)	30 / 36(L/min)	39 / 46.8(L/min)	78 / 93.6(L/min)
Max. pressure	0.5 Mpa (약 5kgf/㎠)				0.6 / 0.5 Mpa	0.7 / 0.5Mpa	0.7 / 0.5 Mpa
Temp. control	±0.1℃ ~ 0.2℃ (Does not include transient deviation)						
Power	STANDARD : AC200V 50/60Hz, AC220V 60Hz / OPTION : pre-order consultation needed						
Power capacity	6.5A / 2.5KWA	8.0A / 3.1KVA	14.0A / 5.4KVA	15.0A / 5.8KVA	19.0A / 7.3KVA	22.0A / 8.4KVA	27A / 10.4KVA
Temp. controller	DIGITAL PID Controlled Controller						

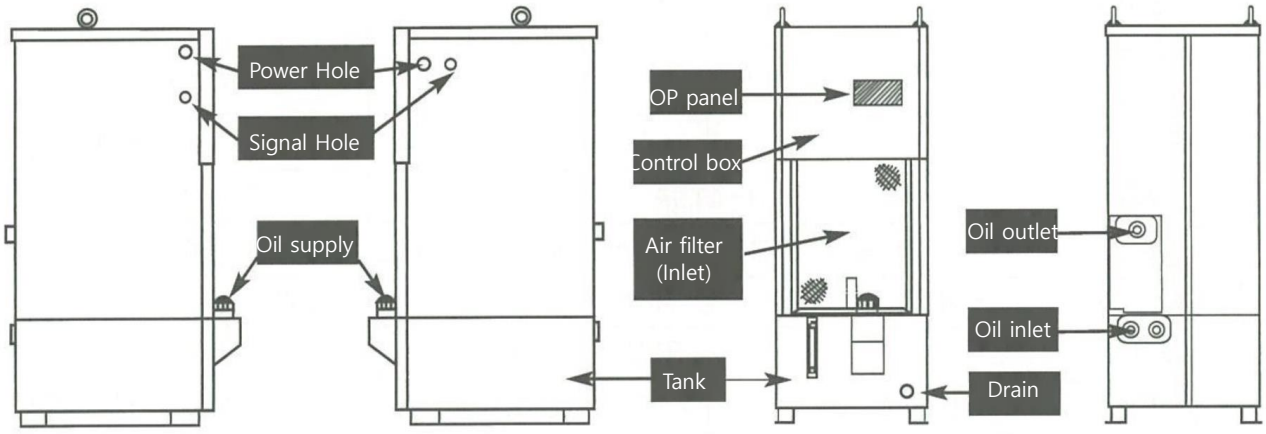
3-3 External appeareance



☐ **Without tank**



☐ **With tank**



4. Installation

Location Piping Oiling Wiring

4-1 Installation place

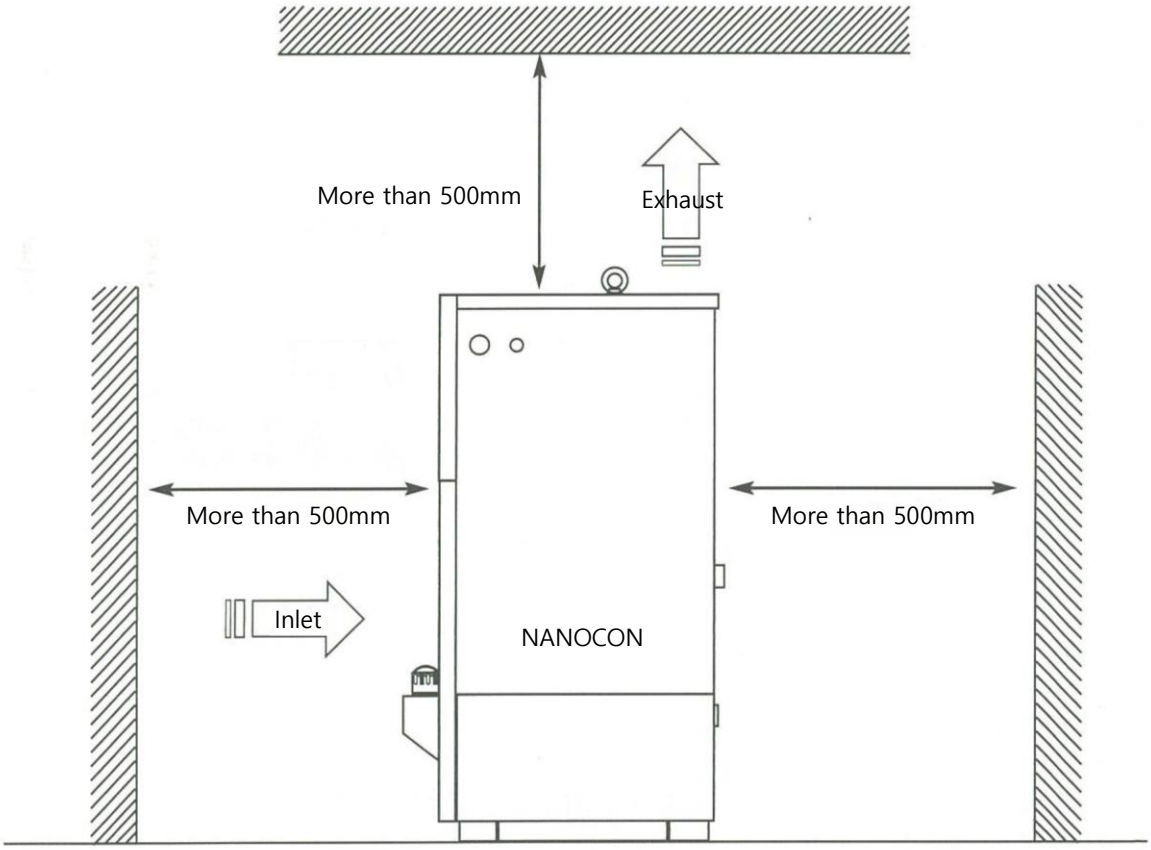
(1) Install it in a horizontal flat place away from direct sunlight and there is no vibration.

(2) This unit air from the inlet through the condenser. Place the unit in a cool and clean air flows.

(3) The absorption and exhaust vent of this unit may also affect cooling capability.
For the convenience of inspection, repair and secure at least 500mm of clearance in the inlet port and exhaust.

(4) Install the unit in a place with good air circulation and dry spot.

(5) Install the exhaust air in a place where there is no risk of recirculating and re-entering the air inlet port side.



Horizontal flat floor

CAUTION

FORCED

Do not tilt forward, backward, left and right at more than 40 degrees when transporting or moving the unit. Tilt or lay down the unit more than necessary may cause the refrigerator to fail. Also, avoid strong shocks or vibrations. Refrigerant causes leakage.

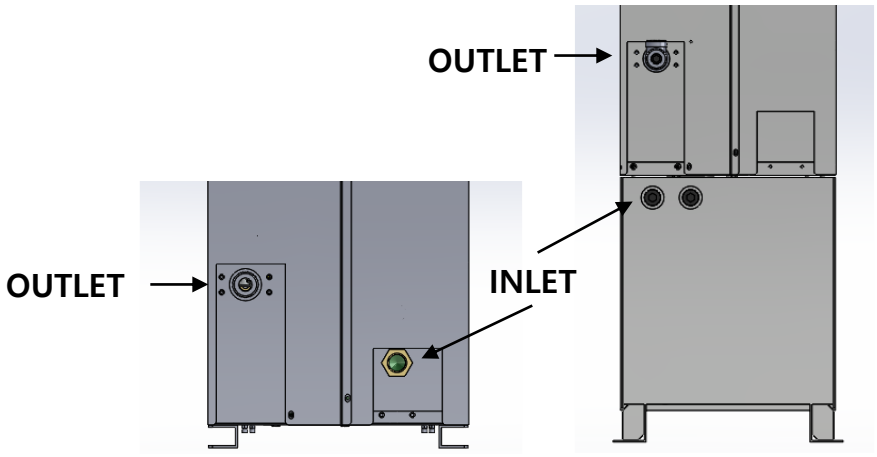
4-2 Piping connection

The gear type Trochoid Pump is applied to this device.
Please refer to the following information when working on plumbing.

(1) Please use the connection piping specification above the pipe diameter specification in Table 4-1.
(2) Use not more than 0.03 MPa for inlet pressure and not more than 0.35 MPa for outlet pressure.
(When full relief: 0.5 MPa)
(3) Be sure to install a 100 to 150 mesh suction filter on the inlet side.
(The tank type cooler is fitted as standard when assembled.)
(4) Please make sure there is no oil leak in the connection piping immediately after initial operation..
(5) Please make sure that the pipes are unfastened and air is not mixed after operation..
(In the event of air being mixed into the suction pipe, noise and pump damage during operation due to the cavitation phenomenon. Do not allow AIR to be mixed into the pump while operation)

Table 4-1 Pipe diameter

Type		CIL301	CIL501	CIL751	CIL1101	CIL1501	CIL2201	CIL3800
Pipe diameter	Inlet pipe	RC 1/2"		RC 3/4"			RC 1"	
	Outlet pipe	RC 1/2"			RC 3/4"		RC 1"	



4-3 Fill cooling oil

For the type with the tank equipped fill recommended oil into the tank to maintain proper oil level through the air breather. (See Table 4-2 Flow Rate)

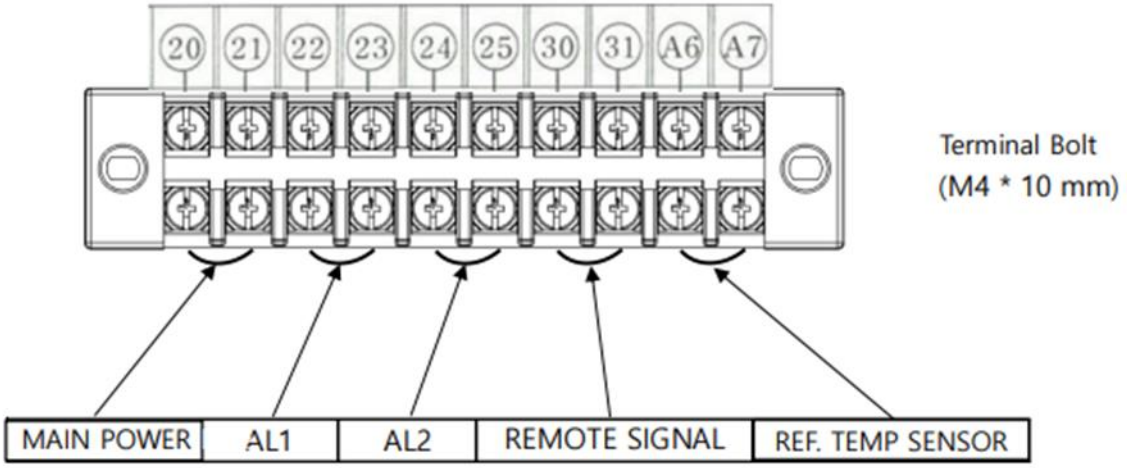
Table 4-2 Oil capacity

Type	CIL301	CIL501	CIL751	CIL1101	CIL1501	CIL2201	CIL3800
When max oil level (H-Level) Tank capacity [L]	20	20	CT : 20 DT : 40	40	60	120	175
Cooler internal capacity [L]	0.5		1		1.5	2	2.5

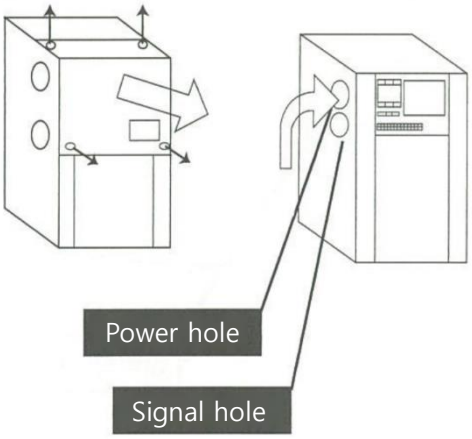
4-4 Wiring connection







(1) Power connection

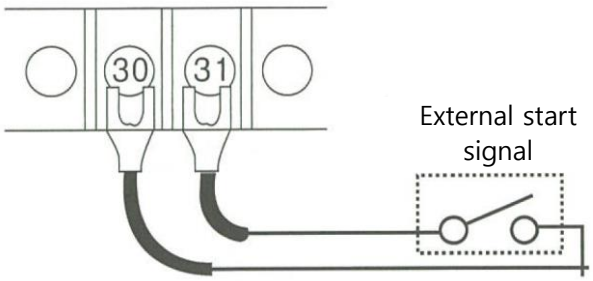


1) Remove the electrical cover and check the location of the main power wiring shown above..
2) Refer to the specification table to check the rated power capacity and wire the appropriate size to the power line.
3) Refer to the above and connect the power line(R, S, T) to the primary side (L1, L2, L3) of the N.F.B..

● This unit has a reverse phase detection function, so the "ALPH" will flash on the display window if the main power wiring is incorrect.
Please make sure that the wiring on the R(L1), S(L2), and T(L3) of the 3-phase power is not correct.

(2) When starting by an external signal

Connect the external start signal to the terminal. If the terminals 30 and 31 are shorted, the operation will begin.



CAUTION

FORCED

The minimum adaptation of single-pole single-handed operation S/W or A-contact the operation command is issued shall meet DC24V, 20mA.

(3) When using to the alarm output contact

When using the alarm output terminals, connect to signal terminal. Please refer to the 「5-4-3 Alerm Setting Method」.

CAUTION

FORCED

Contact capacity is as follows:
Resistance load DC30V, 3A minimum adaptation must meet DC10V, 5mA.
Make sure to apply the Surge Killer when connecting to the induced load.

(4) Equip Machine conditioning Sensor(Optional)

The machine-conditioning sensor is an" R1/8 Male" type.

Install the sensor the bed or column on the machine in the appropriate location..

Connect the wiring to the temperature sensor terminal at the signal hole of the unit side..

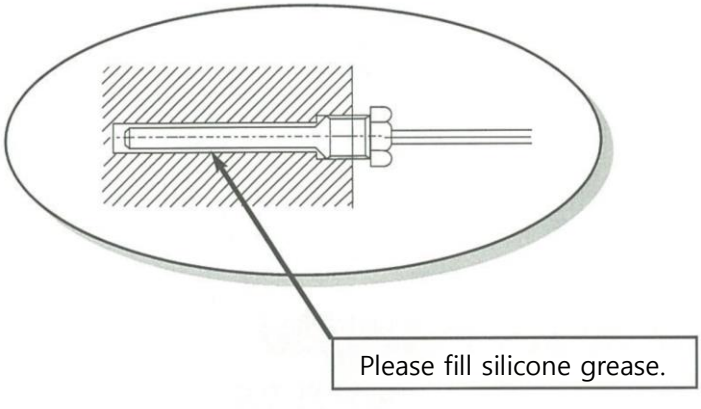
Refer to the electrical circuit diagrams for the wiring number of the terminal stand.. (A6, A7)

The ambient temperature sensor is applied to the standard specification.

CAUTION

FORCED

Be careful when installing the ambient temperature sensor and the machine-conditioning sensor to avoid noise, direct sunlight, hot air from the cooler, and serve temp. changes place.
Insert silicone grease into the sensor so that there is no air left in the hole.



4-5 Error Signal Chart

ERROR content transmits OM (Main Out) signals and auxiliary ALARM signals (AL1 and AL2) as specified in the system preference and operation parameter settings.

OM Signal transmission

Operation	Setting	Contact	Poewr OFF	Power ON	Run	Alarm	Reset
Not use	0	ON					
		OFF					
Normal ON	1	ON					
		OFF					
Normal OFF	2	ON					
		OFF					
Run ON	3	ON					
		OFF					
Run OFF	4	ON					
		OFF					

AL 1, 2 Signal transmission

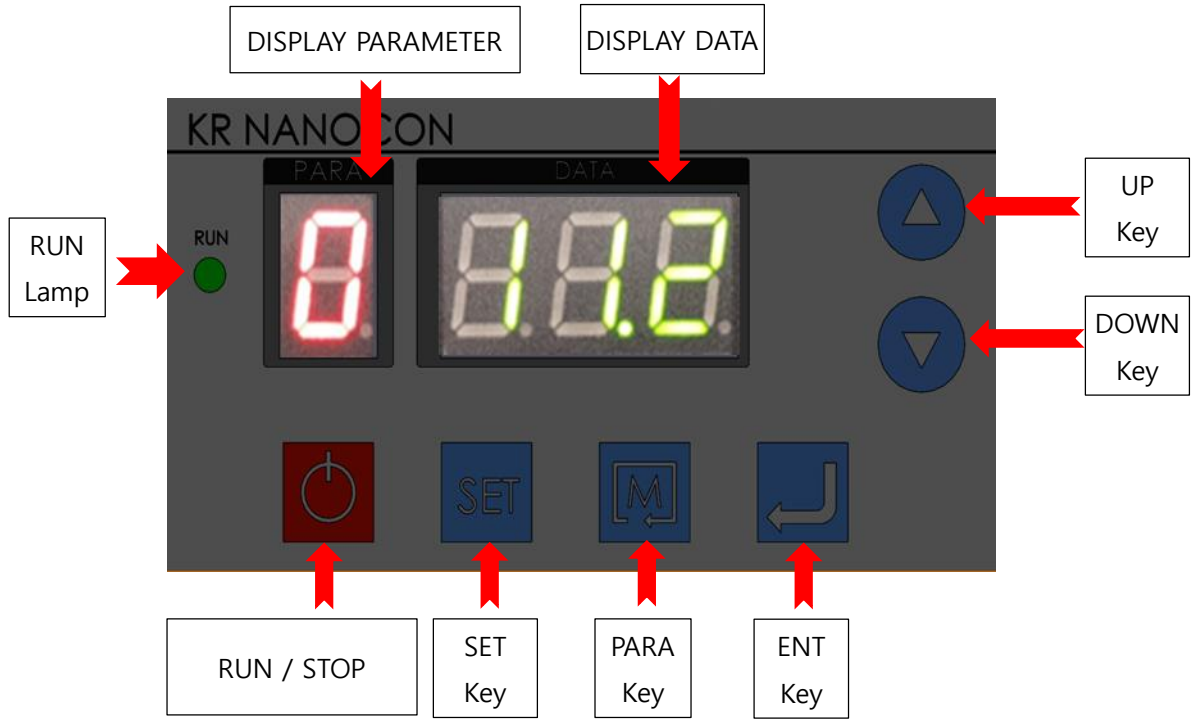
Operation	Setting	Contact	Alarm normal			Alarm 1.2 error		
			Power ON	Run	Stop	Power ON	Run	Stop
Not use	0							
Over control fluid upper limit ON	1							
Below control fluid lower limit ON	2							
Other than control fluid limit ON	3							
Filter cleaning	4							
Over control fluid upper limit OFF	5							
Below control fluid lower limit OFF	6							
Other than control fluid limit OFF	7							

5 How to operate the Controller

·Panel Parameter setting.Start

Up Maintenance

5-1 Operation Panel details



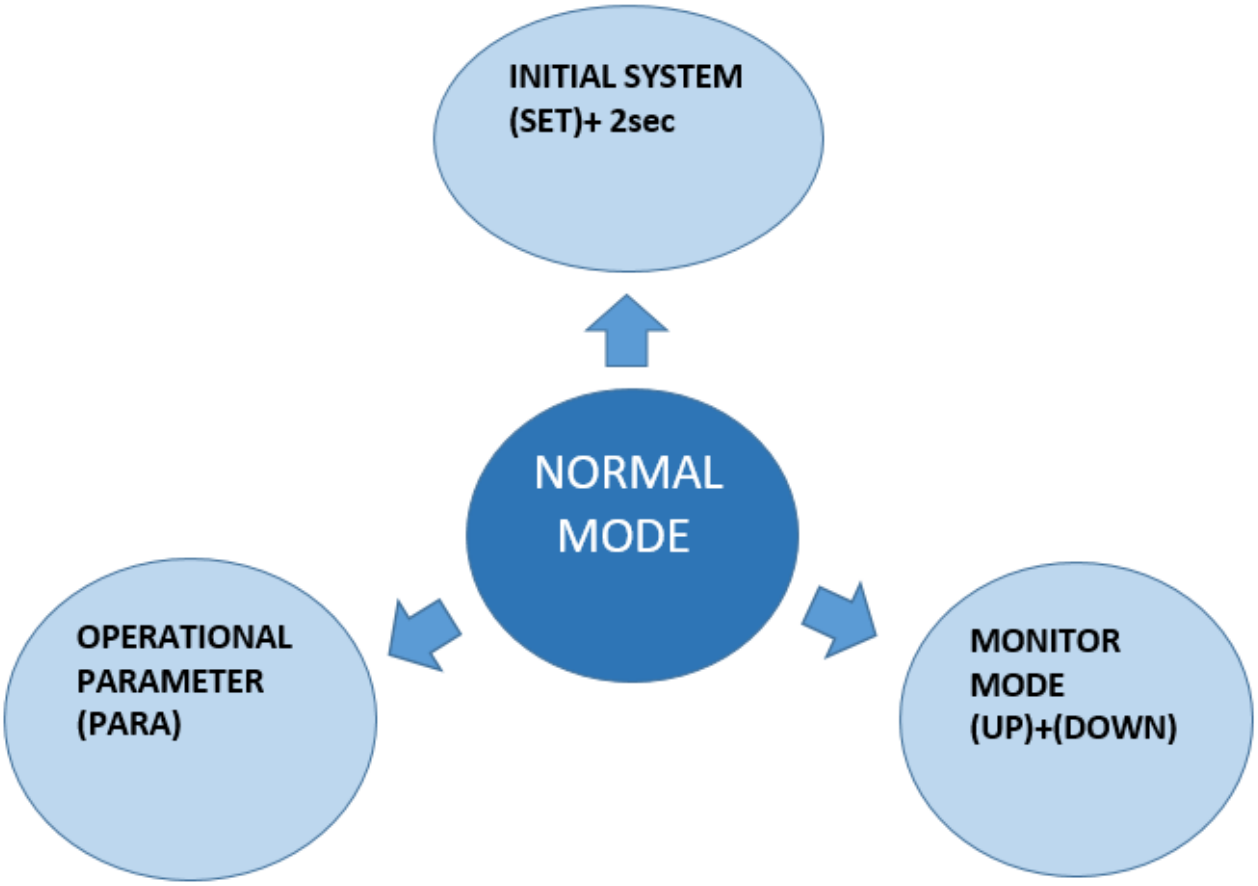
Key display	Major function	Special function
① RUN/STOP key	Cooler On/Off (Start/Stop) Key	
② SET key	Escape without saving from setup	
③ PARA key	Move to next mode without saving in setup state Or display control temperature	
④ ENT key	Data seve key	
⑤ UP Key	Data set keys for parameters and data. Each goes down the display item by one item to the next step.	
⑥ DOWN kEY	Data set keys for parameters and data. Each goes down the display item by one item to the next step.	
⑦ RUN LAMP	Lights ON during normal operation, light out when stopped, or alarms are generated. Flashes for 2 seconds when power ON, display Software Ver.	
⑧ PARAMETER display	Red LED in the left even segment. Display parameter symbol/number	
⑨ DATA display	Green or Red LED in the right seven segment. Displays the date corresponding to the parameter.	

5-2 How to set parameters

The display of the DISPLAY window during operation or during operation shows the oil temperature according to the control mode selection stored in "SET" mode. (Normal mode conditions)

Based on the NORMAL mode, the top three modes (UNIQUE / SET / INPUT) are set and stored according to the characteristics of the customer and the unit when the it is shipped. **Please make sure that you understand the contents of "Settings for each mode" thoroughly, as the wrong settings due to random operation can lead to poor performance, quality and durability of the productt.**

The lower three modes (Monitor / Scheduled Operation / Key Lock) can be set and used according to the user's purpose.



5-3 Setting for each mode

1) SET mode (System initial setting) (How to enter : Press SET for 2sec)

Para	Item name	Initial	Unit	Range	Explanation
0	Select Control mode	3	1	1~4	"SET" mode
1	Constant Temp. control in put	25℃	0.1℃	5~50℃	Set constant IN LET temperature
2	Constant Temp. control out put	25℃	0.1℃	5~50℃	Set constant OUT LET temperature
3	Set follow-up temp. in put	3℃	0.1℃	-10~10℃	Set follow-up IN LET temperature
4	Set follow-up temp. out put	3℃	0.1℃	-10~10℃	Set follow-up OUT LET temperature
5	Set AL1	15.0	0.1℃	0.0~15.0	Set AL1 upper/lower alarm Offset
6	Set AL2	15.0	0.1℃	0.0~15.0	Set AL2 upper/lower alarm Offset
7	Scheduled operation	0	1min	1~9990	Set schedule time 0 : Not used scheduled operation

2) SET Operational parameter (How to enter : Press SET for PARA)

Para	Item name	Initial	Unit	Range	Explanation
0	Start mode	1	1	0~6	0 : Single, 1 : Dual , 2 : singel stpe, 3 : dual step, 4 : No valve, 5 : E VER, 6 : J VER
1	PID cycle	0.2sec	0.1sec	0.1~99.9	PID motion cycle
2	Comp OFF setting	-0.5℃	0.1℃	-5~0℃	Comp ON setting temp
3	Comp off delay time	120sec	1sec	1~999	Comp off delay time (When COMP OFF, TIMER is activated)
4	Comp stop time	120sec	1sec	1~999	Starts when the output remains at 100% for 120 seconds
5	Comp stop choice	1	1	0,1	0 : Do not use, 1: use
6	Assist heater setting	-2.0℃	0.1℃	-5~5℃	control temperature + Assist heater setting
7	Assist heater deviation	-0.5℃	0.1℃	-5~5℃	Heater on setting
8	Control oil low temp	4℃	0.1℃	0~55℃	Control oil low ("L" display)
9	Control oil high temp	51℃	0.1℃	0~55℃	Control oil high ("H" display)
A	Remote mode	1	1	0~2	0 : off, 1 : disp + remote, 2 : remote
B	Filter alarm	200	1hour	0~9990	A shows 1000 => "100" and increases and decreases by 10
C	OM alarm	1	1	0~4	Full alarm output
D	AL1 alarm	7	1	0~7	AL1 alarm output
E	AL2 alarm	4	1	0~7	AL2 alarm output
F	Select Reverse Imaging	1	1	0,1	0 : not used, 1 : used
G	AL4 Select Input	1	1	1,2	0 : Always check for errors 1 : Check for errors while driving

3) KEY LOCK mode

This unit equipped KEY LOCK function to prevent damage to users, such as malfunctioning of mechanical devices, processing thermal displacement, and safety accidents due to incorrect settings by non-experts.
To Enable/Disable, press (△+▽) for 2 seconds..
In the activation state, the period of the PARA window is illuminated as shown in the picture on the right below, and the MODE button does not work. (Only monitor mode is allowed.)





Scheduled operation start

This feature enables automatic operation at the time set by the user sets.
It can be used to shorten the warm-up time before full operation of the equipment.

- Display method : When you start the scheduled operation, mark "t" in the PARA box.
- The DATA window displays the time remaining until the start of the operation.
- To Enable?Disable: Press RUN/STOP + MODE for 2 seconds.
- The scheduled operation function can be set under the conditions below.
  a. The oil cooler has been powered up and its operation has stopped..
  b. When the scheduled operation time is set in paragraph 7 of SET mode (not "0").



(Display status after completion of scheduled operation settings)

- When the scheduled operation time is released, it returns to the standby state.
- Cancel scheduled operation: Press and release the RUN/STOP switch to return to normal state..
- The minimum unit of scheduled operation setting is "minutes".
  For the above picture

5-4 Key Use (By control method)

5-4-1 Description of constant, follow-up and base temperature

1) What is constant temperature control??

When controlling the temperature of the oil, it is controlled by the "setting temperature".
For example, if you want to control the oil temperature to 25.0℃.
When set to "25.0", the temperature is controlled with a target of 25.0℃..

2) What is follow-up temperature control?

When controlling the temperature of the oil, follow the temperature change of the sensor and control it. The temperature sensor has a room temperature sensor detects ambient temperature (standard specification) and an optional machine-conditioning sensor that is assembled on the main body of the machine..

3) Base temperature of control

You can choose between Supply Temperature (Out) leaving the cooler and Return Temperature (In) returning to the cooler on the load side..

★ For constant control, the temperature of the selected part during In or Out is the reference.

★ For follow-up control, you can select In/Out temperature based on the temperature of the room temperature sensor or the machine-conditioning sensor.

5-4-2 How to change settings

When entering the running status to operate the wquipment, it is displayed as follows according to the data set in the system default setting (item 0 control mode).

(The code display unit displays the set control method, and the data display unit displays the current control temperature.)

Control type	Explanation	Display
Constant inlet control	It corresponds to unit 1 from Para 0 of the system preference item.	
Constant exhaust control	It corresponds to unit 2 from Para 0 of the system preference item.	
Follow-up inlet control	It corresponds to unit 3 from Para 0 of the system preference item.	
Follow-up exhaust control	It corresponds to unit 4 from Para 0 of the system preference item.	

6. Operation

6-1 Operation

1) Automatic interlock operation by external start signal, (REMOTE RUN)

a. Set the “PARA A” to "1" in "2nd Unique Mode Settings" of "5-3 Each Mode".

b. When short-circuited 30 and 31 terminals by REMOTE SIGNAL, the controller's RUN lamp turns on and the cooler starts to operate.

2) Manual operation by the RUN/STOP button.

a. Set the “PARA A” to "0" in "2nd Unique Mode Settings" of "5-3 Each Mode"..

b. b. Press the RUN/STOP button on the operation panel to turn on the controller's RUN LAMP and the cooler starts to operation.

2) Scheduled operation

a. a. Refer to "7) Scheduled Operation START" in "5-3 Settings by Each Mode".

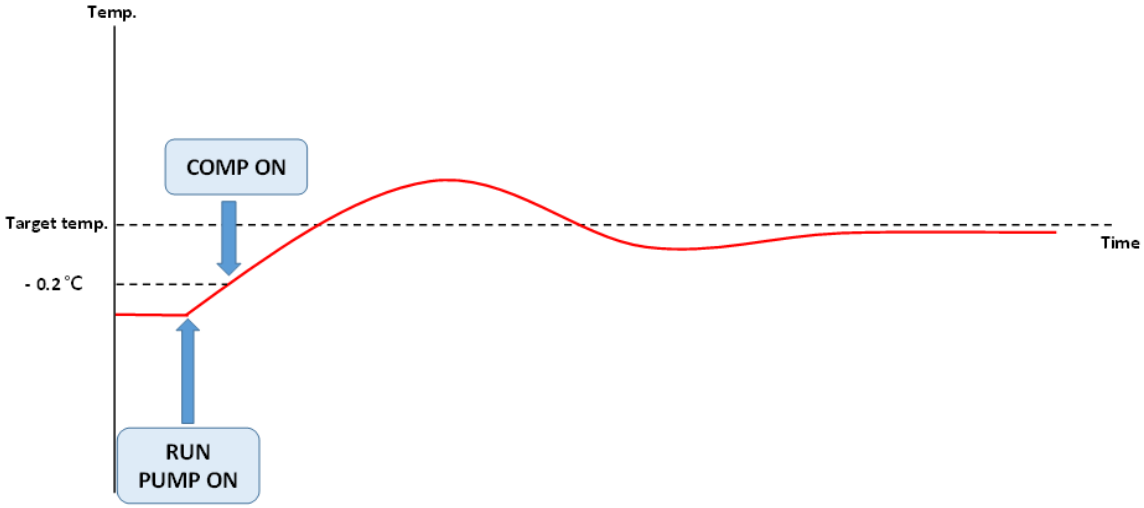
6-2 Confirmation of operating conditions

1) Order of operation

① When the RUN LAMP is turned on, the oil circulation motor pump starts..

② The compressor remains on when the oil temperature reaches the target temperature (-0.2℃), and the controller adjusts the amount of progress on each expansion valve to control the PID at the target temperature.

If there is no thermal load or extremely low thermal or light load conditions are maintained for a long time, the operation may be stopped by compressor shutdown conditions.



2) Check operation status through MONITOR mode

This unit is equipped with a monitor mode to show the current operating conditions.

① Enter to Monitor mode



(▲ / ▼ Button)

② Display information of the Monitor mode

Para	Name	Minimum unit	Display range	Explanation
0	Control temperature	0.1 ℃	-5.0~50	Display selected sensor temperature
1	Room temperature	0.1 ℃	-10~55	Room temperature display
3	IN side temp.	0.1 ℃	-10~55	IN temperature display
4	OUT side temp.	0.1 ℃	-10~55	OUT temperature display
5	STEP display	0.1 ℃	-10~10	Display selected step temperature
6	Filter time	1 hour	0~9990	Displays the cumulative time of the filter.
7	Schedule time settings	1 min	0~9990	Run schedule time display
8	HOT V/V Pulse	1 pulse	Low~High	HOT V/V pulse show location status
9	Frozen output(%)	0.1%	0~100%	Frozen output(%) of HOT V/V
A	COOL V/V Pulse	1 pulse	Low~High	COOL V/V pulse show location status

..

③ Operation method: After entering the Monitor mode, you can check the data for each item with the UP/DOWN button.

④ Return to running mode : Press RUN/STOP button

★ In item 7 (FILTER TIMER), you can initialize the Timer cumulative time value to 0 by pressing the MODE button for more than 2 sec. Even in the case of an error, it's initialized and the error is resolved.

6-3 STOP

1) Stop by external signal

a. When the terminal number 30 and 31 are opened by REMOTE signal, the controller's RUN LAMP is goes out and the cooler stops.

b. Stop by RUN/STOP key

Press the RUN/STOP key on the control panel to turn off and the RUN LAMP is go out, and the cooler stops.

6-4 Operationl precautions

1) Do not operate with the cover off of the unit. Internal rotating fan blades can cause injury or electrical shock, malfunction of the unit, and poor performance.

2) Do not insert tools or hands in the exhaust vent hole.

3) Do not place bolts, washers, nuts, Hughes, tools, etc. on top of this unit. It can get inside of the unit and cause damage to the unit.

4) Do not place any objects in the exhaust vent hole at the top of the unit.

5) Hot air is emitted through the exhaust vent during running, please be careful not to get close to your face.

6) Do not step on top of the unit.

7) Do not disassemble the cover or remove the pipe while running.

8) Do not use the front air filter separately. Contamination of the condenser can be accelerated causing cooler performance degradation.

9) In case of the TANK type cooler, make sure to fill the level gauge of the TANK with the H-Level before operating. Depending on the machine type, oil may overflow when the operation is stopped in case of additional refill the cooling oil to H-Level during operation.

10) Use the oil specified specification (spindle coolant VG02-10 and abrasion resistant hydraulic operating oil VG 32) in the TANK. The replacement oil cycle may vary depending on the environment, but please replace it with new oil after one or two/year after drain all of the oil.

6-5 Precautions for Long Time Stopped

(1) Be sure to turn off the main power supply to the unit.
(2) Please be careful not to let dirt, dust, or water get inside the unit.
(3) Protect the surface of the condenser from oil mist, dirt, and dust.
(4) Be sure to clean oil stains inside and outside of the unit.

7. Maintenance · Inspection

Caution Cleaning the parts Long-term non-operation

7-1 Maintenance and Inspection Precautions

(1) When removing covers for inspection and repair, turn off the power supply of the unitt.

(2) Perform inspection during operation with a person with expertise.

(3) Do not press the operation button randomly to prevent incorrect data from being saved..

7-2 Cleaning

(1) Cleaning Air Filter

The air filter is a component that filters out dirt and dust from the air drawn from the front. (Small amount of dust or mist oil passes through.)

Due to the accumulation of dirt, dust, and oil mist in the air filter, air circulation is not smooth, cooling capacity is reduced and normal operation is difficult. Check every day before starting work, and make sure to clean air filter when "FIL" appears on the DISPLAY window.

After cleaning, press and hold the "ENT" button for 2 seconds to reset and initialized cleaning time.

Please conduct regular inspections and cleaning for stable operation of the unit for a long time. (Minimum 1-2 times/Month) / (Resilient inspection according to user environmental conditions)

(2) Condenser cleaning

Clean the Condenser with an air gun or a soft brush. Make sure that the aluminum fins are not crushed or damaged during cleaning..

Special care must be taken as bending or damaging aluminum fins with metal brushes can reduce unit life and reduce performance..

(3) Cleaning Reserve Tank

Drain all the oil inside the Reserve Tank once a year, and if necessary, wipe off any dusts inside and then replace them with clean oil.

(4) Check the oil level gauge (For tank type only)

Be sure to check that the level gauge of the oil tank is always at an appropriate level (H-Levle or above middle level between H and L-Level) before starting operation every day.

(5) Check pipe line

Be sure to check the oil leak on the oil pipe circulation line connected to this unit and the machine tool before starting work every day.

If any leaks are found, please contact your facility maintenance manager or our service representative immediately for inspection or repair.

	CAUTION
PROHIBIT	Do not spray water directly on the cooler. There's a risk of electric shock, and it's a cause of failure..

8. TROUBLE SHOOTING

In case of alarm Malfunction

Without alarm

8-1 When an alarm occurs

■ Turn off the power off the unit depending on the failure or error, and use it after resolving the cause of the unit.

No.	Display	Alarm details	Check point	Countermeasure
1	CO.E	High pressure switch operation for refrigerant	Is the pan spinning normally?	Fan fuse open circuit, check for poor contact and replace fan motor if the contact is normal
			Isn't the air filter and condenser at the front very contaminated?	Clean the front air filter and the condenser See "cleaning video" on the Kwangrim homepage www. Kwangrim.com
2	PU.E	Pump motor Over-current	Use the oil specification of specified oil type?	Use the appropriate oil. (See page 4)
			Is the piping specification of the specified applied?	Please use the appropriate pipe. (See page 8)
			Isn't the ambient temperature too low or the oil viscosity too high?	(See page 4)
			Is there no clogged of the suction side Suction Filter of the pump?	Cleaning or exchanging the suction filter Oil change in tank

No.	Display	Alarm details	Check point	Countermeasure
3	FL.E	Flow switch operation	Is the liquid circulation normal?	Check pump for normal operation
				Check the clogged of the suction filter
			Is the oil level inside the tank (H-Level) enough?	Fill the tank with oil if not enough.
				Check if there's any oil leakage.
4	HE.E	Heater operation	Is the liquid circulation normal?	Supplying additional fluid to the tank
			Is the surface clean?	Remove debris
5	AL 61	IN sensor poor contact or open circuit	Is the sensor connected at the designated location of the PCB control panel? Lightly pull or shake the connector to ensure there is no loosen contact	Repair sensor for poor contact or replace parts
6	AL 62	OUT sensor poor contact or open circuit		
7	AL 63	Poor contact of the atmospheric temperature, machine connection sensor or disconnection		
8	ALEP	DATA setting error	DATA setting error	Check the DATA settings
9	ALPH	Wiring main power to reverse phase	Is the wiring of the main power incorrectly connected?	Check the R(L1), S(L2), and T(L3) wired to the N.F.B. 1 and 2 side
10	ALPC	Wiring main power to open phase	Is the wiring of the main power incorrectly connected?	Check the R(L1), S(L2), and T(L3) wired to the N.F.B.

No.	Display	Alarm details	Check point	Countermeasure
▣ **Below is an warning function that does not stop the unit, but only outputs a warning message on the DISPLAY window.**				
11	**FIL**	"AL2" Air filter cleaning alarm	Isn't the air filter and condenser at the front very contaminated?	After cleaning the filter, press the ENT button for 2 seconds to initialize
12	**"H"**	Hight limit temperature alarm,	Is there any leakage of refrigerant?	Contact to Kwangrim service
13	**"L"**	Low limit temperature alarm,	Is there no clogged of the suction side Suction Filter of the pump?	Cleaning or exchanging the suction filter Oil change in tank
14	**current temperature flashing**	temperature alarm(Low)	Is there no clogged of the suction side Suction Filter of the pump?	Cleaning or exchanging the suction filter Oil change in tank
15	**current temperature flashing**	temperature alarm(Hight)	Is there any leakage of refrigerant?	Contact to Kwangrim service

8-2 Poor operation without alarm

■ Turn off the power supply of this unit according to the contents of the failure or error, and use it after resolving the cause of the unit.

Failure, Error	Cause	Countermeasure
Does not display a message on the DISPLAY window, and the unit does not work.	Abnormal voltage supply	Check the voltage between the main power (R, S, T) connected to the unit and check for missing wiring
	Fuse open circuit on PCB board	Check fuse in board, replace if blown
	Poor or open wiring	Ensure that there are no contact defects or open circuits at each wiring connection.
There's a loud pump noise.	OIL pipe suction resistance is high. Air is being mixed into the pipe line. Increase of oil viscosity in winter Pump has failed	Improve to large diameter and short piping length Check the oil used is the proper oil? Refer to "2-2 Usage Amount" of 2. General Precautions Make sure the pump is drawing air.
Abnormal oil temperature control	OIL thermostat or temperature sensor failure	Replace with a new onet. Adjust the parameter settings.
Lack of cooling capacity	Thermal load too large	Verify specifications to ensure parts are appropriate.
	Decrease in oil circulation	Reduced oil circulation leads to poor heat exchange and lower cooling efficiency.
	Low refrigerant, refrigerant leakage.	Detected of cooling capability before each protective device is operated due to lack of refrigerant.
	Electronic expansion valve poor operation	Replace the electronic expansion valve with a new one.
	Condenser, air filter contamination	Contamination of condenser and air filter results in poor heat exchange, reducing cooling capacity. Periodic cleaning and management.

9. About After-sales Service

Contact point When contacting

9-1 Contact information

If there is any problem or inconvenience while using the product, please contact below and register the service.

- **Address : 61-12, 269 Beon-gil, Bonsan-ro, Jinyeong-eub, Gimhae-si Gyeonsangnam-do, South Korea**
- **TEL : +82-55-716-1099**
- **FAX : +82-55-716-1098**

9-2 Service application via E-mail

When applying for the service via e-mail, please send a brief description of the product's manufacturing history (see below manufacturing nameplate), a brief description of the failure, and a reference photo of the problem to the email below.

E-mail address : cooler@kwangrim.com

