

OIL COOLER INSTRUCTION HANDBOOK

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Read the instruction manual carefully before proceeding with start-up, operation, maintenance, or any other jobs on the machine

1. GENERALITY

KO type industrial oil coolers are available in various sizes with cooling capacities ranging up to 26.8 kW, computed on the following operating conditions:

- outlet oil temperature: +28°C.

- ambient temperature: +28°C.

WARNING

The oil returning loop plays an important role in heat exchanging process, as it also affect the temperature in the evaporator. In other words, the oil temperature is a key variable in cooling system. We suggest the temperature of the returning oil should be no higher than +40°C.

1.1 Operating Range

KAUKAN oil coolers are designed to meet the demand from industrial applications. Their recommended operation conditions are:

Outlet oil temperature control range: min. +5°C max. +45°C

Air ambient temperature: min. -10°C max. +45°C

WARNING: For working condition out of the above ranges, please contact.

1.2 Important warnings

WARNING

Please follow all the instructions listed in this manual. Pay attention to those safety concern and special clauses. The manufacturer will decline the claims for damage caused by improper usage or failing to follow the instruction.

1. Only certified engineers who receive sufficient training and fully understand can operate this cooler.
2. When installing or servicing the cooler, engineer must follow all the instructions, check and conform to the specifications according to the machine labels. Take all the safety measures to prevent injure.
3. Reserve ample space for air flow and heat expelling. Do not remove, modify or bypass heat expelling devices.
4. Temperature in hydraulic circuit and electric components are with highly potential danger. Pay extra caution to when installing or servicing the unit.
5. Before inputting the main power, check and ensure that the power source (voltage/frequency) must correspond to name plate shown on the cooler unit.
6. This machine is designed for a working period of ten years, from the date of manufacture. At the end of the period, the machine has to be retired. Please refer to manual for retiring procedure. If you intend to extend the period, the cooler must go through a complete inspection by the manufacturer.
8. Failing to follow the instructions or any modification without explicit authorization will be recognized as the immediate termination of the warranty.

DANGER

Make sure to disconnect the power supply before every operation of servicing on the unit.

2. INSTALLATION

2.1 *Transportation*

WARNING

Decide the method of lifting based on the weight shown on the label. The hanger/carrier should be securely stable. No tilting is allowed .

Upon receiving the cooler, check if there is any damage caused during the transportation.

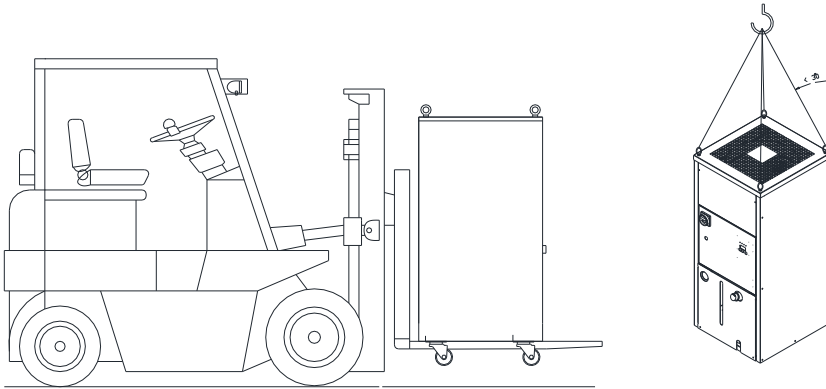
Check the weight of the cooler unit before moving. The unloading/carrying equipment should be with greater capacity than the cooler itself.

Do not tilt the oil cooler more than 30 degrees. A sudden jolt could damage the internal parts.

Avoid lifting from single point.

While transportation, keep attention to the balance of machine.

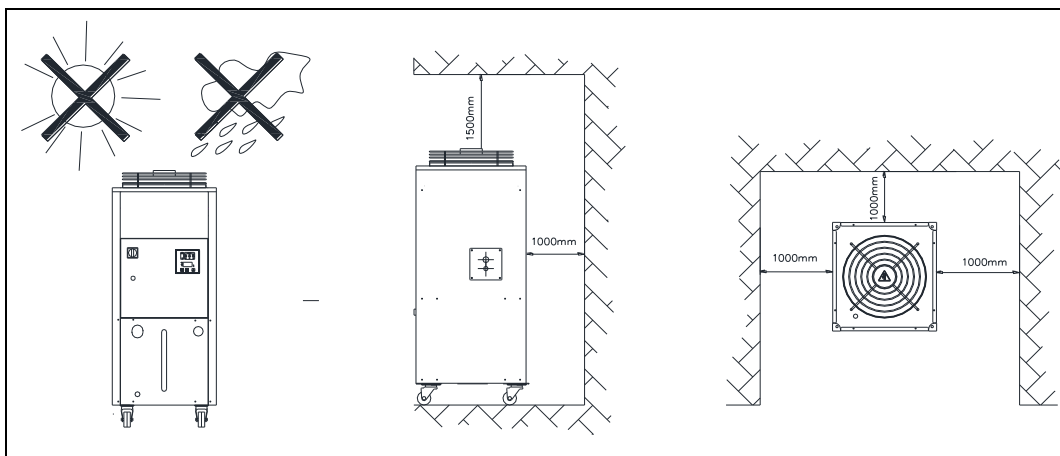
Do not lay down the unit, turn it upside down, or incline it to more than 15 degrees.



2.2 *Installation Location*

It is necessary to reserve a space bigger than the cooler dimension, as to ensure a sufficient air supply to the condenser.

If the oil cooler is located on a carrier, please make sure the carrier is strong enough to withstand the weight of the oil cooler. Please also ensure a free and ample air flow around the oil cooler.



When the cooler is not in operation in winter time, provide necessary protection against possible damage from the low temperature to the internal components.

Not mounted wheels of the oil cooler, are mounted holder, its size can refer to the oil cooler Specifications and Dimensions diagram, please use the M6 screws, fixed torque shall be 25 kgf.cm.

2.3 Piping

WARNING

No flammable material is allowed.

The oil inlet and outlet are located at the back of the oil cooler, location varied by models.

It is highly recommended to apply a mechanical filter before the inlet. The filter should be removable for an easy inspection or service.

The cooling oil loop must be perfectly sealed and watertight. And the looping system should conform to conventional standards for pumping system, in particular:

1. Pipes must withstand pressure up to 15 bar, in proper diameter as to lessen pressure;
2. Pipes must be in high insulation and anti-condensation material, with at least 20 mm thickness;
3. To prevent leaking resulted from vibration, use flexible pipes. The piping between systems should be in parallel;
4. Fit automatic air-vent valves at the topmost points of the system and discharge valves at the lowest point;
5. In/outlet diameter size, because different models have different size, use the (pt) based. Size as below

Model	In/Out size
KO-4	1/2" pt
KO-6,8,12	3/4" pt
KO-18,2K,3K	1" pt
KO-4K,5K	1 1/4" pt

2.4 Wiring (refer to the electrical diagram on the specification manual)

WARNING

Make sure to disconnect the power supply before every operation of servicing on the unit.

The main power supply to the cooler is achieved by means of a 4-wire cable {3 phase (L1, L2, L3) + ground wire (E)}, passing through cable clamp and connected the terminal block. It is recommended to add a safety measure, like circuit breaker valve or automatic cut-off switch. All components should calibrate and conform with the condition in the area of installation.

The table below shows, under different voltages, with cable no longer than 15 meters, the recommended wire cross-section of the main power supply cable and current for breakers. For cables longer than 15 meters, the wire cross-section of the main power cable will need to be increased in order to prevent excessive voltage drop.

3 PHASE AC220V

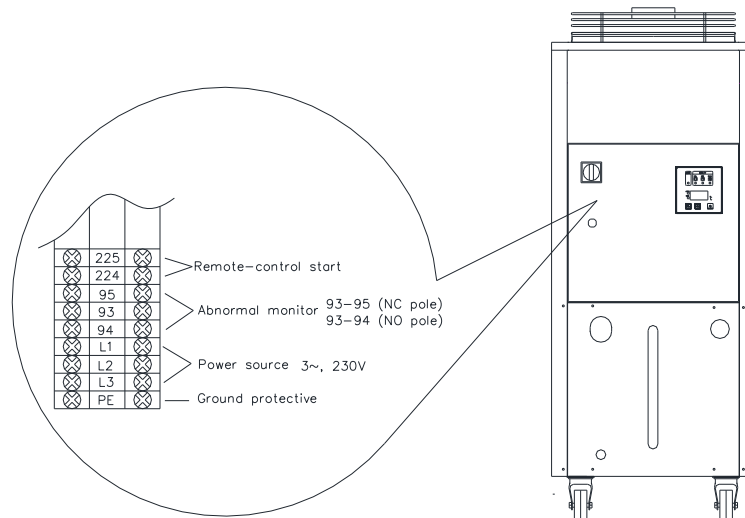
MODEL	WIRE CROSS SECTION	AUTOMATIC BREAKER
KO-4	18 AWG	7
KO-6	16 AWG	7.5
KO-8	16 AWG	8
KO-12	14 AWG	10
KO-18	14 AWG	12
KO-2K	14 AWG	12.75

MODEL	WIRE CROSS SECTION	AUTOMATIC BREAKER
KO-3K	12 AWG	16.5
KO-4,5K	10 AWG	35

WARNING

The table above is designed based on a KAUKAN standard cooler. For special requirement, please adopt the proper power cables and breakers according to the cooler running current which is shown on the test report.

Central Alarm System: KO type oil cooler equips an auxiliary alarm function, which may be used as a sound or visible signal, or connected to central control system. This contact is drawn for the machine with 3 points [#93, 94, 95 see the electrical drawing].

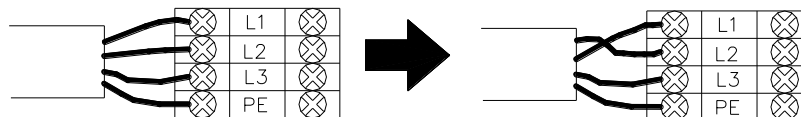


2.5 Reverse Phase

WARNING

Make sure to disconnect the power supply before every operation of servicing on the unit.

When the main power is connected, an alarm (E01) shown on the control panel indicates a reverse phase. Change and reconnect the wires of any 2 wires of main power cable.



3.START-UP PROCEDURE

3.1 Preliminary Inspection

Check the followings:

- The main power voltage and frequency correspond to the values stamped on the cooler's name panel.
- The oil pipes are rightly and securely connected.
- The on-off valves (if installed) are opened.

3.2 Filling Oil Tank ("T" type)

Follow the standard procedures below to fill in oil:

- 1) Remove the front cover (with SUPPLY label).
- 2) Remove the oil cap from the tank.
- 3) Fill oil into the tank. The oil level should not exceed the limit of the gauge.
- 4) Place back the oil cap.
- 5) Place back the cover.

3.3 Starting

1. Turn on the main power t by the main switch (TS) or remote control.
2. Set the desired temperature on the panel.

WARNING

The temperature indicated on the panel is either the room or oil temperature, measured by "R1" or "R2" probe.

1. The Differential Temperature Control function:

It takes 8 seconds for control unit to confirm the temperature setting after setting.

- a.) Press (ON/OFF) button. The light at the position of (LIQUID) will be on. The value shown on the panel refers to the oil temperature.
- b.) Press (▲) or (▼) once and hold until the values starts blinking. The value now is between **-15 ~ 15**.
- c.) Press (▲) or (▼) buttons to adjust the value that you want.
- d.) The value "0" indicates that the oil temperature is set to be same as the ambient temperature.
- e.) The value "+"**1~15** indicates that the oil temperature is set 1~15 degree Celsius higher than the ambient temperature.
- f.) The "-"**1~15** indicates that the oil temperature is set 1~15 degree Celsius lower than the ambient temperature.
- g.) After setting the temperature, press (ON/OFF) button to store the setting and return to the normal operation.

2. The Fixed Temperature Control function:

It takes 8 seconds for control unit to confirm the temperature setting after setting.

- a.) Press (ON/OFF) button. The light at the position of (LIQUID) will be on. The value shown on the panel refers to the oil temperature.



- b.) Press (▲) or (▼) once and hold until the values starts blinking. The value now is between 5 ~ 45.
- c.) Press (▲) or (▼) buttons to adjust the value that you want.
- d.) After setting the temperature, press (ON/OFF) button to store the setting and return to the normal operation.

WARNING

In the beginning of the first run, the flow switch (OPSL) might temporarily fail due to air bubbles into the circuit. Release all air from the circuit.

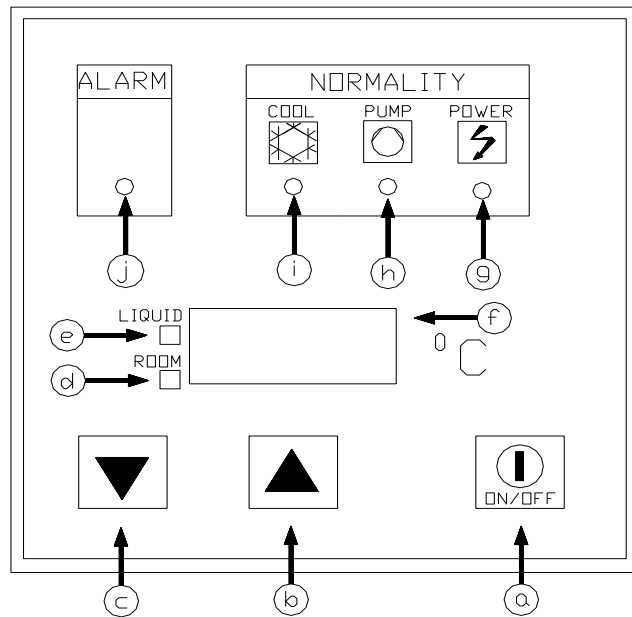
3.4 Stopping

To stop the oil cooler, press (ON/OFF) button, or cut off the main power supply by remote-controlled function.

INFORMATION

Fail to follow the instructions will be disqualified for any warranty claim.

4. CONTROL PANEL



4.1 Description & Function

- a) **(ON/OFF)** button:
 - 1.) To start or to stop the cooler in the TEST model [only applicable to manufacturer].
 - 2.) To show oil or room temperature.
 - 3.) To store the setting of temperature or parameter.
 - 4.) To select the parameter item in parameter setting mode.
- b) **(▲)** button:
 - 1.) To set the value incrementally.
 - 2.) To enter the setting mode for oil temperature (press and hold for 5 sec).
 - 3.) To enter the setting mode for parameter. (when first turn on the main power, and the display panel shows “on”, press and hold for 5 sec)
- c) **(▼)** button:
 - 1.) To set the value decrementally.
 - 2.) To enter the setting mode for oil temperature (press and hold for 5 sec).
 - 3.) To enter the setting mode for parameter. (when first turn on the main power, and the display panel shows “on”, press and hold for 5 sec)
- d) **(ROOM)** indicator (green):

When the indicator light is on, the value shown on the panel indicates the room temperature (Differential Temperature Control) or target temperature (Fixed Temperature Control). You may switch the display by pressing the **(ON/OFF)** button.
- e) **(LIQUID)** indicator (green):

When the indicator light is on, the value shown on the panel indicates the oil temperature.
- f) **DISPLAY** (orange):
 - 1.) To show the value of oil temperature or room temperature.
 - 2.) To show the alarm code.

3.) To show the parameter value or item.

g) (**POWER**) indicator (green):

When the indicator light is on, it indicates a normal power supply.

h) (**PUMP**) indicator lamp (green):

When the indicator light is on, it indicates a normal pump operation.

i) (**COOL**) indicator (green):

When the indicator light is on, it indicates the compressor is running normally.

j) (**ALARM**) indicator (red):

When the indicator light is on, it indicates an error in the operation. Please see the display panel for the error code.

4.2 Setting Parameter

To set parameter:

- 1) When you first turn on the main power, and the display shows “**on**”, press (**▲**) or (**▼**) once and hold for 5 sec.
You are in the parameter setting mode when the display shows (**par**).
- 2) Pressing the (**▲**) or (**▼**) once more to go into the parameter item [the display will show such as (P01)].
- 3) Select the parameter item by pressing (**▲**) or (**▼**) button.
- 4) Press (**ON/OFF**) button to go into the parameter item. The display will then shows the parameter value.
- 5) Set the parameter value by pressing (**▲**) or (**▼**) button.
- 6) Press (**ON/OFF**) button to store the setting value.
- 7) Turn off the main power to leave the parameter setting mode.

WARNING

Before you modify the parameter, make sure to consult a certified engineer.

For the meaning of parameter, please refer to the enclosed instruction manual of the instrument.

5. GENERAL INFORMATION

5.1 Cooling efficiency

High cooling efficiency can be achieved if with :

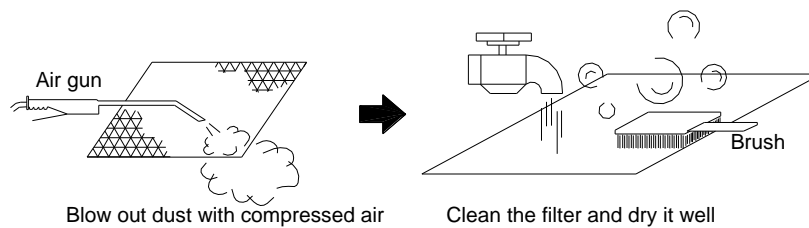
- a) As high as possible oil temperature, under the machinery requirements permit.
- b) A sufficient oil flow (by proper pipe).
- c) Lower working environment.
- d) Sufficient and free air flow.

5.2 Air filters

The air filter keeps the inside of the chiller and the condenser fins clean. It also helps to ensure the cooling efficiency and to prolong the machine lifetime.

We strongly suggest you clean the filter regularly and change it when necessary.

Never run the cooler without air filter.



6. TROUBLE SHOOTING

Check the table below for description of error codes. When you contact us or agent, please provide the following information: (1) model [on the nameplate], (2) condition of the cooler [as much detail as possible].

Item	Condition	Cause	Remedy
1	The main power is detected, but no light is on.	<ol style="list-style-type: none"> 1) PCB is damaged. 2) The power supply (SMCC-233B) is damaged. 3) The transformer is damaged [no 10 VDC detected on (30A, 31A)] 	<ol style="list-style-type: none"> 1) Replace the PCB. 2) Replace the power supply (SMCC-223B). 3) Replace the transformer.
2	Alarm light is on, the display shows (E01).	<ol style="list-style-type: none"> 1) Main power is connected to the reverse phase. 2) Missing phase on the main power [one of three phases]. 3) Main power is out of working rang $\pm 10\%$. 	<ol style="list-style-type: none"> 1) Invert any two phases from the cable. 2) Make sure the main power is normal and check cable is securely connected to the terminal. 3) Checked the main power input.
3	Alarm light is on, the display shows (E02).	<ol style="list-style-type: none"> 1) Pump motor overloads and triggers thermal relay [QFP] . 2) Unable to reset the thermal relay (QFP). 3) Pump motor fails. [Check the resistance on the U3, V3, and W3 with ground. Refer to the test report for the standard]. 	<ol style="list-style-type: none"> 1) Reset the thermal relay (QFP). Compare the current adsorption of the motor with the setting of the thermal relay (QFP) after reset. Refer to the test report for the setting values. 2) Replace the thermal relay (QFP). 3) Replace the motor
4	Alarm light is on, the display shows (E03).	<ol style="list-style-type: none"> 1) Compressor overloads and triggers thermal relay [QFC]. 2) Unable to reset the thermal relay (QFC). 3) Compressor fails. [Check the resistance on the U1, V1, and W1 with ground. Refer to the test report for standard]. 	<ol style="list-style-type: none"> 1) Reset the thermal relay (QFC). Compare the current adsorption of the motor with the setting of the thermal relay (QFC) after reset. Refer to the test report for the setting values. 2) Replace the thermal relay (QFC). 3) Replace the compressor.
5	Alarm light is on, the display shows (E04).	<ol style="list-style-type: none"> 1) Operating temperature exceeds range (over $+45^{\circ}\text{C}$). 2) The air filter is dirty. 3) The fan motor is mal-functional. 4) The condenser is clogged. 5) The refrigerant pressure switch (S63H) is damaged. (Check #13, 16. When the main power is off, the resistance should be 0) 	<ol style="list-style-type: none"> 1) Press the reset button (red) after the temperature goes lower than $+45^{\circ}\text{C}$. 2) Clear the filter. Press reset button. 3) Replace the motor. 4) Clean the condenser. Press reset. 5) Replace refrigerant pressure switch.

Item	Condition	Cause	Remedy
6	Alarm light is on, the display shows (E05).	<ol style="list-style-type: none"> 1) The input piping is loose. 2) Input/output pipings are wrongly connected. 3) Oil level is low. 4) Pump coupling or motor shaft is damaged 5) Pump pressure adjustment is mal-functional. 6) Oil pressure switch is mal-functional.(Check #16, 17. When the main power is off, the resistance should be 1) 7) Hoses or liquid filter is clogged. 8) Pump pressure is too high.(If a high pressure switch is installed) 	<ol style="list-style-type: none"> 1) Check and tighten if loose. 2) Reconnect and tighten. 3) Add in oil to proper level. 4) Replace the pump or motor. 5) Clean the adjust valve. Replace if necessary. 6) Replace the switch. 7) Clear the hoses, replace the oil filter (if there is one). 8) Lower the pump pressure setting or check if the oil circuit is clear.
7	Alarm light was on, the display show (E07).	<ol style="list-style-type: none"> 1) Low refrigerant level (possible leakage). 2) The refrigerant pressure switch (S63I) is mal-functional [check #16, 19 in the S63L. When the main power is off, the resistance should be 0.] 	<ol style="list-style-type: none"> 1) Check the refrigerant pressure. Fix the leakage if there is any. As a certified engineer to refill the refrigerant. 2) Replaced the switch.
8	Alarm light is on, the display shows (E08).	<ol style="list-style-type: none"> 1) The oil circuit is clogged or the piping is loose. 2) The oil flowing switch (FL) is mal-functional [check #19, 20 in the FL. When the main power is off, the resistance should be 0.] 	<ol style="list-style-type: none"> 1) Clean the oil circuit or tighten the loose piping. 2) Replace the switch
9	Alarm light is on, the display shows (E09).	The oil temperature sensor is mal-functional.	Replace the sensor.
10	Alarm light is on, the display shows (E10).	The room temperature sensor is mal-functional.	Replace the sensor.
11	Alarm light is on, the display shows (E11).	Oil temperature goes over + 45 °C.	Consult with a certified engineer for a cooler with bigger cooling capacity.
12	Alarm light is on, the display shows (E12).	Oil temperature does not decrease 1°C during two hours while the compressor operating.	<ol style="list-style-type: none"> 1) Check the refrigerant level. 2) Consult with a certified engineer for a cooler with bigger cooling capacity.
13	Alarm light is off, the display shows (SEr).	Remind the user to do service, it can be closed by parameter.	Press any two buttons from (▲) (▼) & (ON/OFF). Complete the periodical service.

WARNING

Before adding the refrigerant, you must consult a certified engineer and be sure to use the correct type of refrigerant (shown on the nameplate).

7. SERVICE & MAINTENANCE

DANGER

Make sure to disconnect the power supply before every operation of servicing on the unit.

Compressor discharge pipe [copper tube with insulation] can be dangerous with high temperature. Be very careful when operating around.

WARNING

All operations described in this chapter **MUST BE DONE BY WELL-TRAINED ENGINEERS ONLY**. Any mis-operation or improper practice/setting could lead to a severe damage to the cooler and injuries to operators.

After service and maintenance, restore and tighten all the covers.

7.1 Weekly Service

Check the oil level. Fix the leakage if there is any.

7.2 Monthly Service

1. Check the air filter and condenser. Clean or replace if needed.
2. Check the electric wiring. Inspect the motor running conditions. Check and re-tighten all screws.
3. Check the mechanical parts: Clean the interior of the oil cooler. Check and re-tighten all screws and hose clamps.
Fix the oil leakage if there is any.
4. Check the refrigerant circuit: in the event of any gas leakage, traces of oil will be found.
5. Check if there is any oil leakage in the gas circuit.

If the oil cooler has to be stopped for a long period, you **MUST** empty oil from all the pipes, tank and heat exchanger. Failing to do so can result to a severe damage to the cooler.

Before re-starting the oil cooler after the long stop, we advise you check the pump impeller first.

Use a screwdriver to rotate the pump-motor shaft. If rotating does not go freely or smoothly, manually repeat the rotation to eliminate the resistance by slipping the impeller on the case. If after few trials the resistance does not disappear, it is suggested to disassemble the pump and clean it or replace with a new one.

7.3 Repair Refrigerant Circuit [only by a certified engineer]

In case of a repairing need in refrigerant circuit, you must follow the instructions:

- Check the refrigerant circuit. Fix the leakage if there is any.
- Vacuum and dry the refrigerant circuit.
- Fill in the correct type of refrigerant.

WARNING

If the system should be discharged, retrieve the refrigerant with proper instruments.

7.4 Check Refrigerant Leakage

Fill in the system ONLY with anhydrous nitrogen, using a 15-bar gas bottle with a pressure reducing valve. Apply bubble water to check the leakage. If a leakage is detected, discharge the circuit. Then weld with proper alloys to repair the leakage.

7.5 Fill Up The Refrigerant

- Use tube with 1/4 SAE terminals to connect refrigerant gas bottle to the compressor. Release a little refrigerant gas first in order to evacuate the air in the connecting piping.
- Before filling refrigerant into the system, if there is a solenoid valve control (220V A/C), please activate the solenoid valve (SEV).
- Reverse the refrigerant gas bottle. Feed into the circuit with liquid refrigerant until 75% of required amount [indicated on the name plate]
- Turn on the oil cooler and activate the compressor. Connect the refrigerant gas bottle to the compressor suction line charging valve and complete the filling by keeping the refrigerant bottle in normal vertical position, until no bubble appears on the liquid level visor.

7.6 Environment Protection

No matter what type of refrigerant your cooler carries, it is forbidden to release it into the atmosphere. For this reason, you should follow the regulation to recycle the cooler the end of the operating life.

WARNING

A particular care is recommended during service operation in order to reduce the refrigerant loss as much as possible.

8. RETIRING THE OIL COOLER

Must follow the location law to do the retiring.

Once the cooler reaches its life time and is ready for retirement, please follow the following procedures:

- The refrigerant has to be collected by trained people and sent to proper collecting center.
- The lubricants and oils have to be collected and sent to proper collecting center.
- The frame and components have to be disassembled and sorted, particularly copper and aluminum, and then recycled accordingly.

Please help to recycle and reuse for a better environmental.