AIRCOOL CHILLER

MEDICOOL/CH.11P3R407C (50Hz)
&
MEDICOOL/CH.11P4R407C (60Hz)

User Manual

(Revision 06)

AIRSYS

Product Information

GEHC P/N	Type	Description	Power Supply
5332778	MEDICOOL/CH.11P3R407C	11kw Water Chiller 50Hz	380/400/415V/50Hz
5346827	MEDICOOL/CH.11P4R407C	11kw Water Chiller 60Hz	460/480V/60Hz

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Revision History

Revision	Changing Description	Date
01	Initial release	2010/03/23
02	Re-write section 4	2010/04/19
03	1, Add note and diagnose description in AL13 in Alarm list in Section 8.1 for compressor internal thermo protection trigged; 2, Add requirements for item 15 in maintenance list in Section 10.4 3, Add new alarm codes, AL10, AL20, AL21, AL27, AL29, AL30 in Section 8.1; 4, Revised electric diagram in Section 10.2; 5, Change pictures in Fig 8, Section 2.5; 6, Replace piping diagram in section 10.2; 7, Add pump curve in Appendix;	2010/10/28
04	1, Change "Fig.- 13, Outdoor Piping/Hose Connection for Cooling Type B" to "Fig.- 13, Outdoor Piping/Hose Connection for Cooling Type C"; 2, Add task for "Fill tank of chiller with glycol" and add remark for leak reparation of customer made piping in Table-6, Installation responsibility; 3, Add "The distance may be extended to 60m by using 1" ID pipe" in warning page, item 5, and section 3.3.1.	2011/7/25
05	1, Table-2 change "Flexible hose kit (3/4 inch (20 mm) hose barbs , 3/4 inch quick disconnect fittings(male), 30.5 m (100 ft) lengths of 3/4 inch (20 mm) flexible rubber hose)" to "Kit (3/4 inch (20 mm) hose barbs , 3/4 inch ball valve)", and change "1/2"—3/4" adapter) 2pcs" to "30.5 m (100 ft) lengths of 3/4 inch (20 mm) flexible rubber hose 1 pcs" 2, change "quick disconnect" to "ball valve" 3, Chapter 4.1 table change "Flexible hose kit (3/4 inch (20 mm) hose barbs , 3/4 inch quick disconnect fittings(male), 30.5 m (100 ft) lengths of 3/4 inch (20 mm) flexible rubber hose)" to "Kit (3/4 inch (20 mm) hose barbs , 3/4 inch ball valve)", and change "1/2"—3/4" adapter) 2pcs" to "30.5 m (100 ft) lengths of 3/4 inch (20 mm) flexible rubber hose 1 pcs" 4, Change "Fig.- 1 Quick disconnection coupling " to "Fig.- 2 Ball valve coupling" 5, Delete chapter 4.4 "Push center stud of coolant supply's quick dis-connector (Fig.-24) until coolant comes out, then release the stud." and "Fig.- 3 Pump air bleeding" 6, Replace Fig.- 4 label the coolant loop	2012/09/01
06	1, Change Circuit Diagram. 2, Update alarm list. 3, Add date sheet.	2013/01/09

Symbols used on the water chiller

Symbol	Meaning	Symbol	Meaning
	Danger This symbol is particularly relevant to safety.		Live components, risk of electric shock
	High Skilled Operation, Technician Only!		Caution
	THIS SIDE UP shows the orientation of the unit		NO HOOKS don't use hooks to lift the packed unit
	FRAGILE handle with care		KEEP AWAY FROM HEAT the unit must be kept away from heat sources
	PROTECT AGAINST MOISTURE The package unit must be stored in a dry place		DO NOT STACK

A ***'NOTE'*** is used to call particular attention to a step of a procedure, which, if not strictly followed, could result in damage to, or destruction of equipment.

Warning labels

Equipment lives even with door open. To operate obey the safety rules.

Do not open. Skilled technicians only can enter the electric panel.

Do not start the compressor before pre-heating the oil (see instructions).

Handle gently, avoid vibration, shocking when installation.

Risk of electric shock. Disconnect power before servicing unit.

Hot surface. Do not touch.

Please read the manual before installation and operation!

ALWAYS GET HELP FROM QUALIFIED REFRIGERATION SERVICE ENGINEERS TO ACCESS THE CHILLER WHEN MALFUNCTION IS FOUND!

Important considerations before installation and operation:

1. This manual provides guidance for chiller type MEDICOOL/CH.11P3R407C (50Hz) and MEDICOOL/CH.11P4R407C (60Hz).

⚠ **Before power cable connection, make sure local power supply meets the voltage/frequency requirements on the nameplate!**

The power supply cable should be provided by customer.

⚠ **It is recommended the main power fuse connected to the chiller should be equipped with 25A.**

2. Pump can't work with voltage out of the scale for more than 30min, especially when the voltage exceeds the up limit (456V50Hz or 528V60Hz). Always keep the voltage within the range.

3. The machine can be operating at ambient temperature between **-30**ºC**(-22°F)~43**ºC**(109°F)**. If coolant outlet set point is 20ºC~25ºC, the upper limit of ambient temperature can be 48ºC(118°F). And the altitude of the site for installation should not exceed 2,438 m (8,000 ft) . Chiller may report high pressure alarm and stop working if condition is out of spec.

⚠ ***Note:*** **Max. allowable temperatures may be reduced for high altitude operation by a factor of 6.4**ºC **per 1000m.**

4. The elevation of the chiller installed above the MRI should NOT greater than 30 m (100ft). The elevation the chiller installed below the MRI should NOT greater than 3 m (10ft).

5. Keep piping distance from chiller to operating room less than 30m to avoid additional pressure drop which may cause low flow rate. The distance may be extended to 60m by using 1" ID pipe. Order 100m cable in Option list (refer to Section 7) for remote controller if 30m cable is not enough.

6. Chiller installed near sea shore may cause corrosion on machine cover and pipe lines inside chiller because of salt fog. To minimize the corrosion, we recommend the chiller should be installed 10 km away from sea shore.

7. **Never power on the machine without coolant or use the pump to drain the unit, it will damage the pump immediately!** Follow the instruction in this manual or attached with unit to bleed air out of pump before the first start-up and for unit start-up which is stored without coolant for a long time.

8. **The rubber hose is supposed to be used for indoor connection only.** Pipe used for outdoor should be provided by customer. For unit installed outdoor, we recommend copper pipe and adequate temperature insulation for coolant pipe lines from unit into building.

9. Follow Section 3 of pre-installation instructions for appropriate installation. Chiller and/or any components on chiller damaged of inappropriate installation or misoperation described in this manual will be out of scope of warranty.

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1. Unpacking

1.1. Open the package

The unit is packed and transported in two special cases. The main package dimension of the unit is 1180 x860 x 1490 mm^3, gross weight is around 355kg (782pound). The package dimension of loose parts kit is 703x703x772 mm^3, gross weight is around 178.5kg (394pound).

1. Visual checks the package for any damage during transportation. Contact forwarder, GEHC or AIRSYS as soon as possible if any damage is found. Use a pry bar to open top cover of the crate, remove and place it in an area clear of the uncrating area. (Fig.-1).

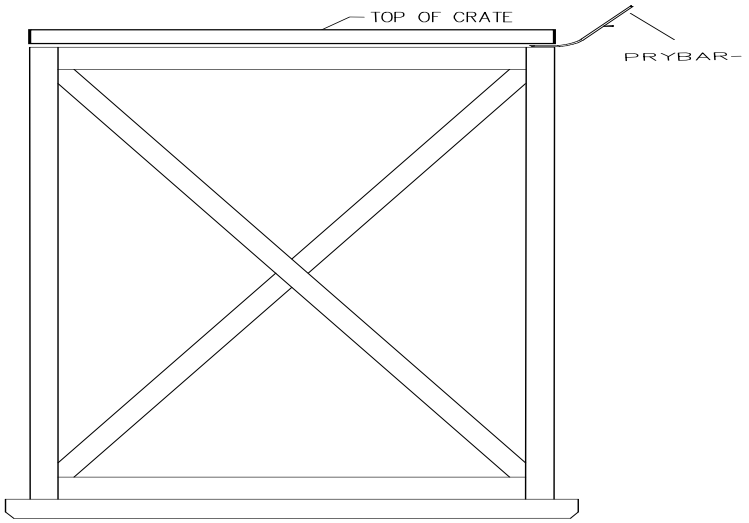


Fig.- 1 Remove top of the crate

2. Use a pry bar, carefully remove the plate of crate around the unit, and place in an area clear of the uncrating area. (Fig.- 2)

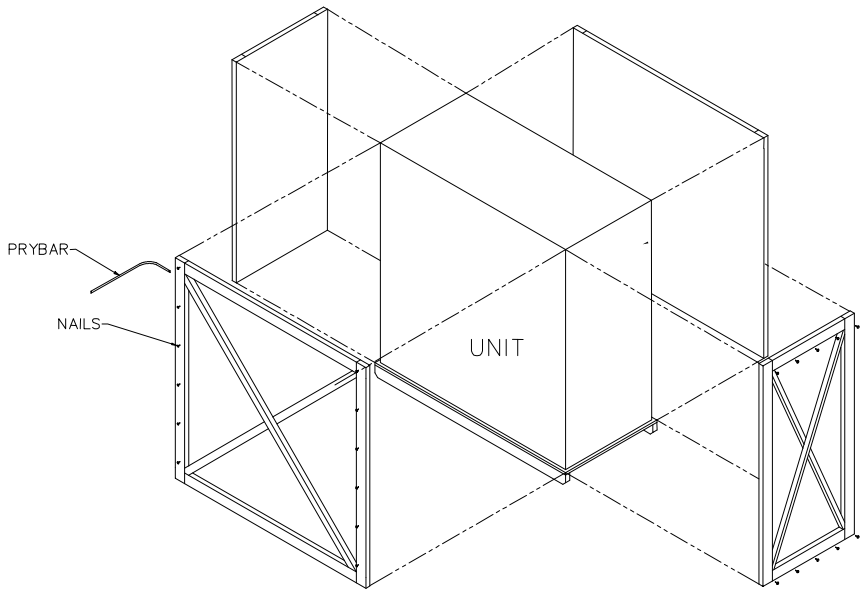


Fig.- 2 Remove other parts of the crate

3. CAREFULLY remove plastic protector.

4. Visual checks the equipment for any damage during transportation. Contact forwarder, GEHC or AIRSYS as soon as possible if any damage is found. AIRSYS can be reached by the information in second page in the manual.

5. **When the unit is for indoor purpose**, loose bolts between support bracket and chiller at bottom (remove the bracket) to use caster to move the chiller, refer to Fig.-3.

When the unit is for outdoor purpose, loose bolts between support brackets and bottom of crate and mount the unit on the concrete or rooftop, refers to Fig.-3.

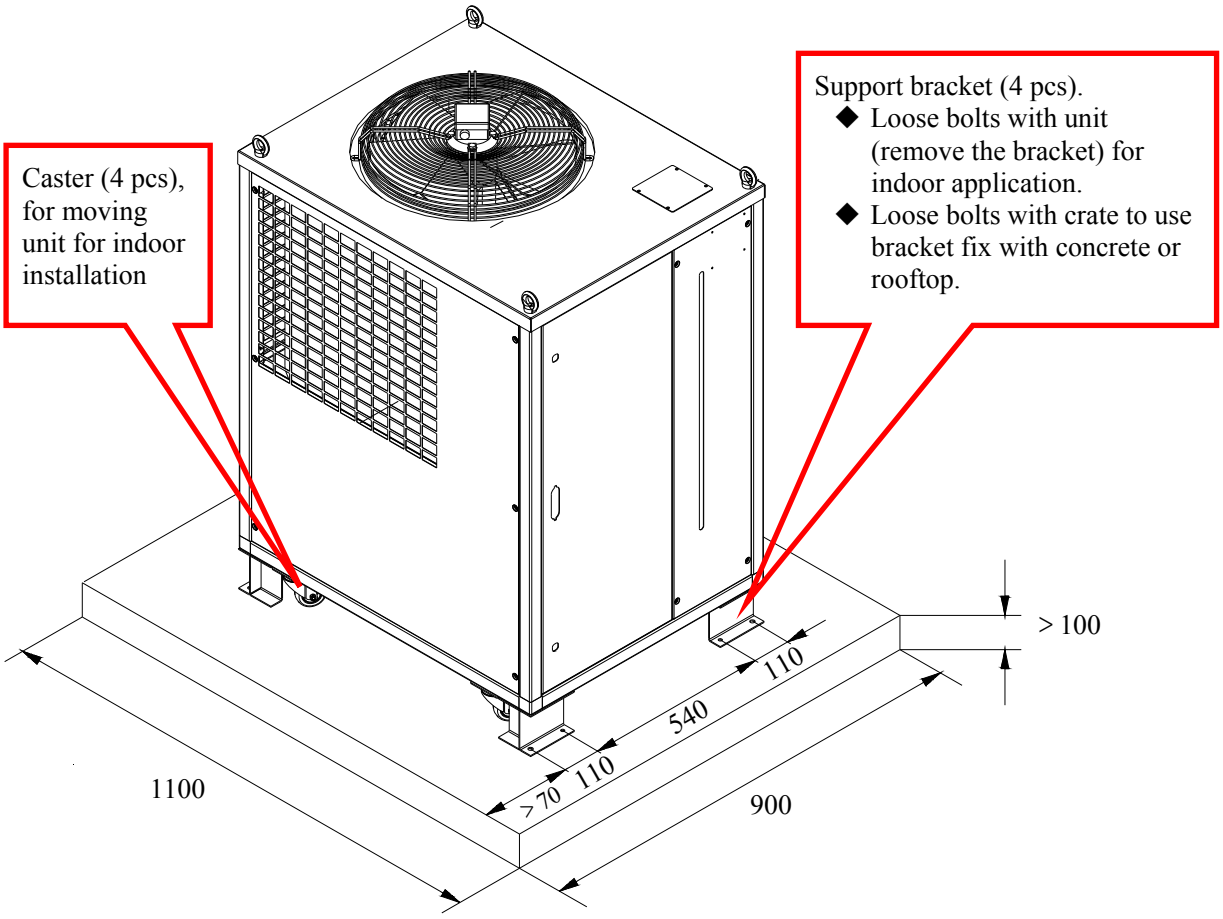


Fig.- 3 Mounting holes of unit and dimension of the concrete foundation for chiller installation (Unit: mm)

6. Use forklift truck to move unit to place where the chiller to be installed. Refer to Fig.-4.

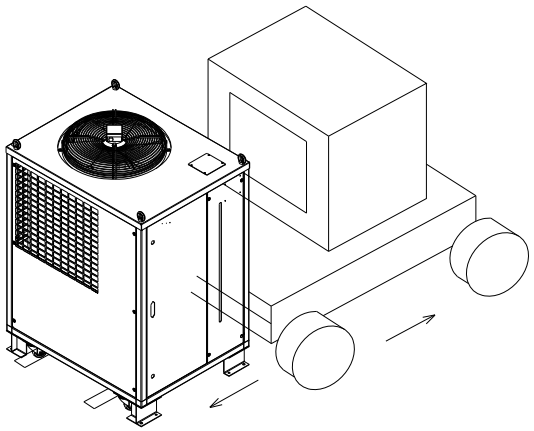


Fig.- 4 Unit lifting

7. If chiller is going to be installed on rooftop, prepare two lifting straps (Max. load >1000kg) with hooks at both of ends, approximately 2 m (79 inches) long to lift the unit. Let the hook pass through the lift-ring on top of unit, as the Fig.-5, and make sure unit is balance.

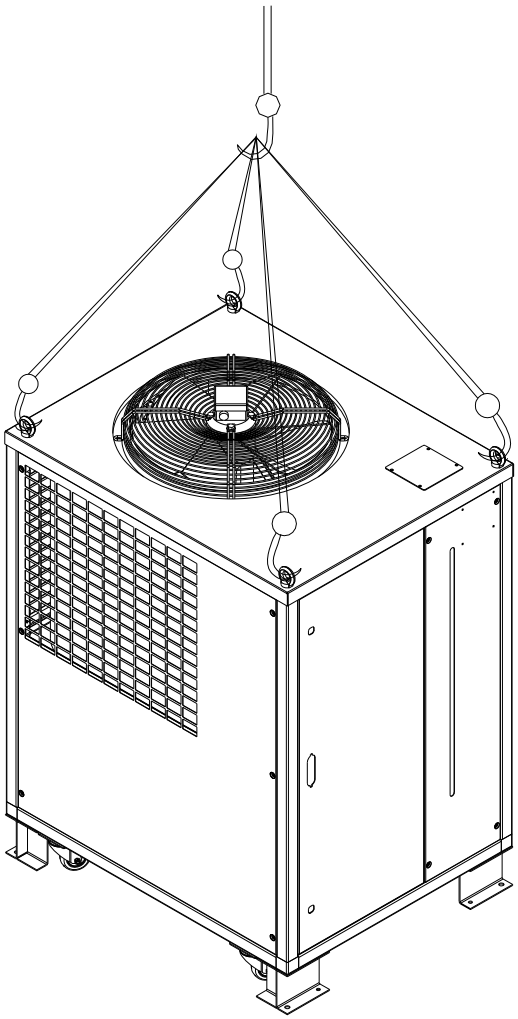


Fig.- 5 Move chiller on rooftop

8. Before move the unit to working place, try to lift the unit a little to see whether the two straps need to be adjusted to balance the unit from toppled over.

Keep the carton and all packing materials until the unit is completely assembled and working properly. Set up and run the unit immediately to confirm proper operation. If the unit is damaged or does not operate properly, contact the company who deliver the unit to your place, and file a damage claim. Inform GEHC or to whom your unit was purchased.

1.2. Package Contents of Main Box & Accessory Box

S/N	Item	Quantity	Check & Mark
1	11kW Water Chiller, MEDICOOL/CH.11P3R407C or MEDICOOL/CH.11P4R407C	1	□
2	Key for front door	2	□
3	User Manual	1	□
4	Certificate of conformity	1	□
5	Packing list of unit box	1	□

Table- 1 Packing list of unit box

S/N	Item	Quantity	Check & Mark
1	Hose clamps, 3/4inch (20 mm)	4	□
2	Kit (3/4 inch (20 mm) hose barbs , 3/4 inch ball valve)	2	□
3	Remote controller with bracket	1	□
4	Control cable from remote control panel to chiller, 30.5m.	1	□
5	20 liter 50/50 Mixture of propylene glycol and de-ionized water with additive of rust inhibitor and yellow dye	4	□
6	Plastic funnel(Max:φ175 Minφ35,height 22 volume 300ml)	1	□
7	Pipe-type terminals, 1.5mm^2 (2.33X10-3 in^2)	6	□
8	Pipe-type terminals, 1.0mm^2 (1.55X10-3 in^2),	6	□
9	Pipe-type terminals, 6.0mm^2 (9.3X10-3 in^2)	6	□
10	Rubber hose, 12.7mm (1/2”), 5m	2	□
11	30.5 m (100 ft) lengths of 3/4 inch (20 mm) flexible rubber hose	1	□
12	Teflon tape 20m x 25mm x 0.1mm	1	□
13	Label	1 set	□
14	Packing list of loose parts	1	□
15	Self-tapping screw, SST	4	□

Table- 2 Packing list of loose parts

2. General Information

2.1. Brief of the Chiller

The manual is provided for water chiller, type MEDICOOL/CH.11P3R407C (50Hz) and MEDICOOL/CH.11P4R407C (60Hz), which is different in power supply, 380/400/415 VAC@ 50 Hz and 460/480 VAC@ 60 Hz, as shown in Table-1, Product information.

GEHC P/N	Type	Description	Power Supply
5332778	MEDICOOL/CH.11P3R407C	11kw Water Chiller 50Hz	380/400/415V/50Hz
5346827	MEDICOOL/CH.11P4R407C	11kw Water Chiller 60Hz	460/480V/60Hz

Table- 3 Product information

The MEDICOOL/CH.11P3R407C/ MEDICOOL/CH.11P4R407C water chiller is a single-loop device, of which provides 7~23.1 Lpm (1.8~6.1 Gpm) of temperature constant coolant for medical equipment, or any process/machine requiring temperature control.

It contains a refrigeration unit, coolant reservoir and pump, integrated together with in a shelter that allows the unit to be operated indoors or outdoors. It has a microprocessor controller. The chiller also provides a remote control panel that allows the user to control the chiller wherever it is located, indoors or outdoors. The remote control panel allows the user to turn the chiller on/off, monitor coolant outlet/inlet temperature, set temperature, check alarm, etc. The refrigeration system is able to provide cooling as needed under precise temperature control, as well as greater temperature stability and long life of compressor. In general, this chiller has been designed for long life and easy to use.

Environmental conditions:

- Non-operating:

Ambient Temperature: -34°C (-29.2°F) ~ +55°C (131°F)

Altitude: 120m (400 ft) below to 3,352m (11,000 ft) above sea level

Magnetic Field: 30 Gauss

- Operating:

Ambient Temperature: -30°C (-22°F) ~ +43°C (109°F), coolant outlet setting point 15°C (59°F)~25°C(77°F);

-30°C (-22°F) ~ +48°C (118°F), coolant outlet setting point 20°C (68°F)~25°C(77°F);

Altitude: 30m (100 ft) below to 2,438m (8,000 ft) above sea level

(Max. allowable temperatures may be reduced for high altitude operation by a factor of 6.4°C per 1000m.);

Elevation above MRI: less than 30 m (100 ft);

Elevation below MRI: less than 3m (10 ft);

Magnetic Field: 30 Gauss

NOTE: **If the unit is in place where ambient temperature is near limited temperature -34°C or 55°C, the unit will be started up only after it has been staying in normal temperature for 24 hours.**

2.2. Specifications

ITEMS	UNITS	SPECIFICATIONS	
		MEDICOOL/CH.11P3R407C 50Hz	MEDICOOL/CH.11P4R407C 60Hz
Cooling Capacity*	kW	11.0	12.6
Set Point (default)	°C (°F)	20°C (68°F)	
Set Point Range	°C (°F)	15°C ~ 25°C (59°F ~ 77°F)	
Temperature Control Accuracy	°C (°F)	±1.0°C (1.8°F)	
Noise	dB(A)	68.0	70.5
Refrigerant		R407C	
Refrigerant Charge	kg	6.8+0.2	
Power Supply Voltage**	Rated	3~-380/400/415V	3~-460/480V
	Scale	±10%	±10%
Total Input Power (peak)	kVA	7.0	8.0
Total Input Power (continuous)	kVA	5.0	6.2
Total Current ***	A	11	13.2
Air Heat load at 7kw	kW(BTU/hr)	15.2(55600)	16.8(61440)
Air Heat load at 11kw	kW(BTU/hr)	13.8(50500)	15.4(56320)
Compressor	**set**	**1**	
Power Input	kW(HP)	3.64 (4.9)	4.30(5.8)
Current	A	6.7	7.9
Maximum Current	A	7.4	8.7
Starting Current	A	24	24
Axial Fan	**n**	**1**	
Horse Power	kW(HP)	0.3(0.4)	(0.4)0.53
Current	A	1.25	1.7
Nominal Air Flow	M^3/h	5000	6000
Refrigerant-water Heat Exchanger	**set**	**1**	
Water Flow	L/min(GPM)	7~40 adjustable	7~40 adjustable
Water Resistance	kPa	22.5@23.1	22.5@23.1
Refrigerant Circuits	**set**	**1**	
Capacity Control Methods		EEV	
Water Pump	**set**	**1**	
Head	m	65.0	68.0
Power Input	kW(HP)	2.45 (3.29)	2.99 (4.00)
Current	A	3.0	2.5
Coolant		50/50 mixture of propylene glycol and de-ionized water solution, with additive of rust inhibitor and yellow dye	
Water Tank Content	L(gal)	33(8.7)	
Dimension			
Length	mm(inch)	1075(43.32)	
Width	mm(inch)	805(31.70)	
Height	mm(inch)	1415(55.71)	
Net Weight	kg(pound)	315(695)	
Weight of Unit when Filled	kg(pound)	360(804)	

*- *rated conditions: ambient temperature: 43°C (109.4°F); supply coolant temperature: 20°C (68°F); return coolant temperature: 25°C (77°F)*

**- *Pump can't work with voltage out of the scale for a long time (more than 30min), especially when the voltage exceeds the up limit(456V50Hz or 528V60Hz). Always keep the voltage within the range.*

***- *We recommend the main power fuse connected to the chiller should be equipped with 25A。*

Table- 4 Specifications

2.3. Diagram of Unit and Dimensions

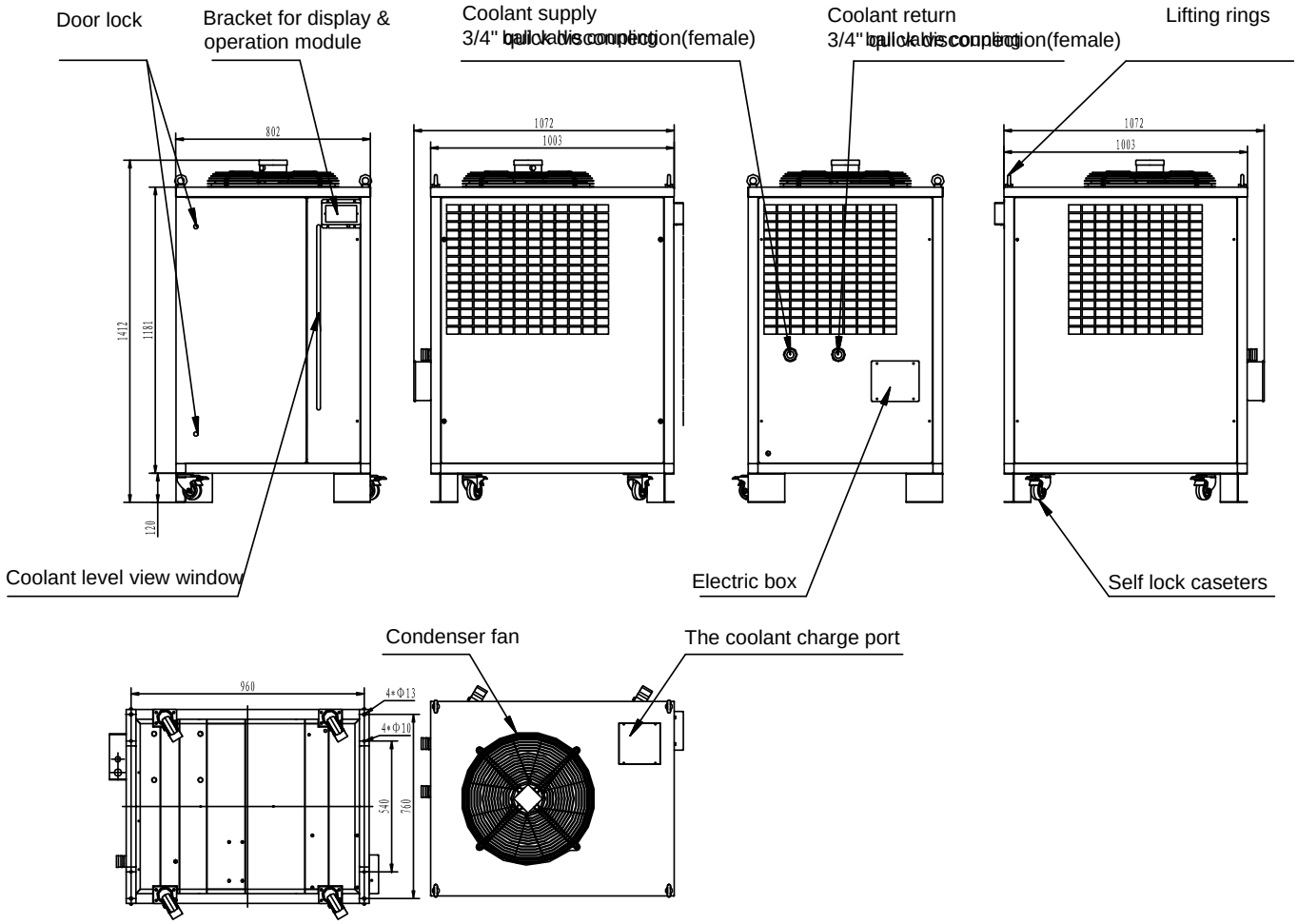


Fig.- 6 Overall dimension (Unit: mm)

2.4. Remote Control Panel

The chiller is operated via the remote control panel.

The control panel has a LCD display and six keys, as the below Fig.-7.

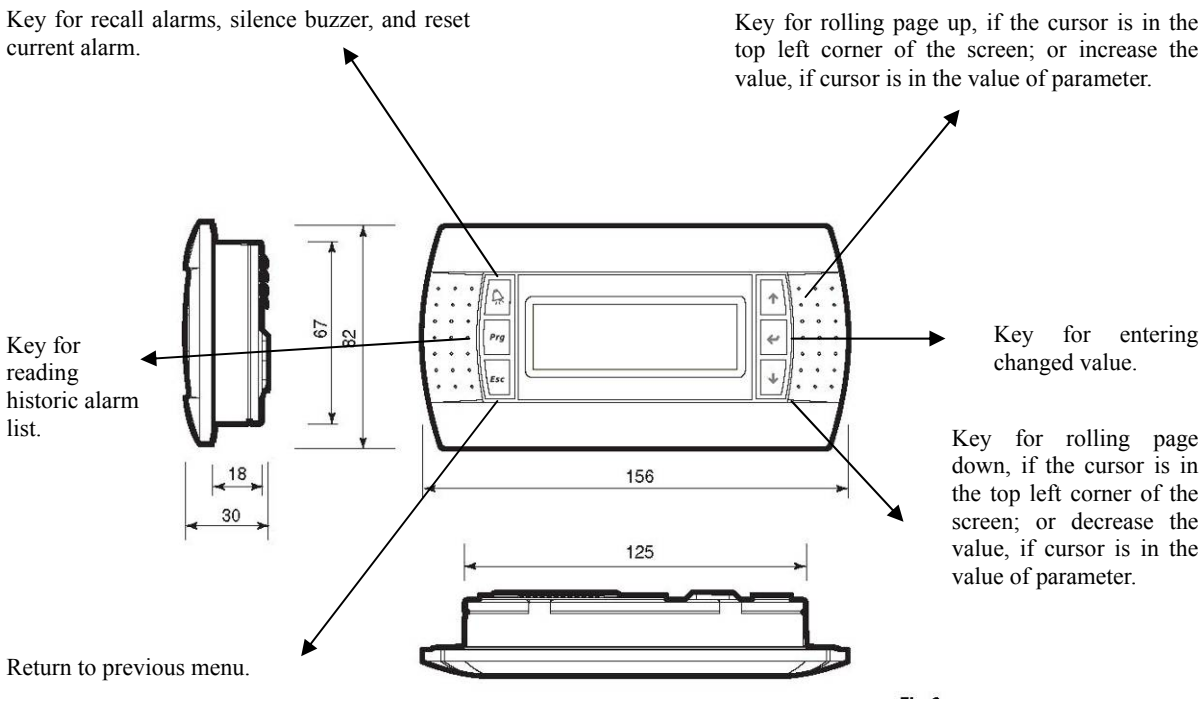


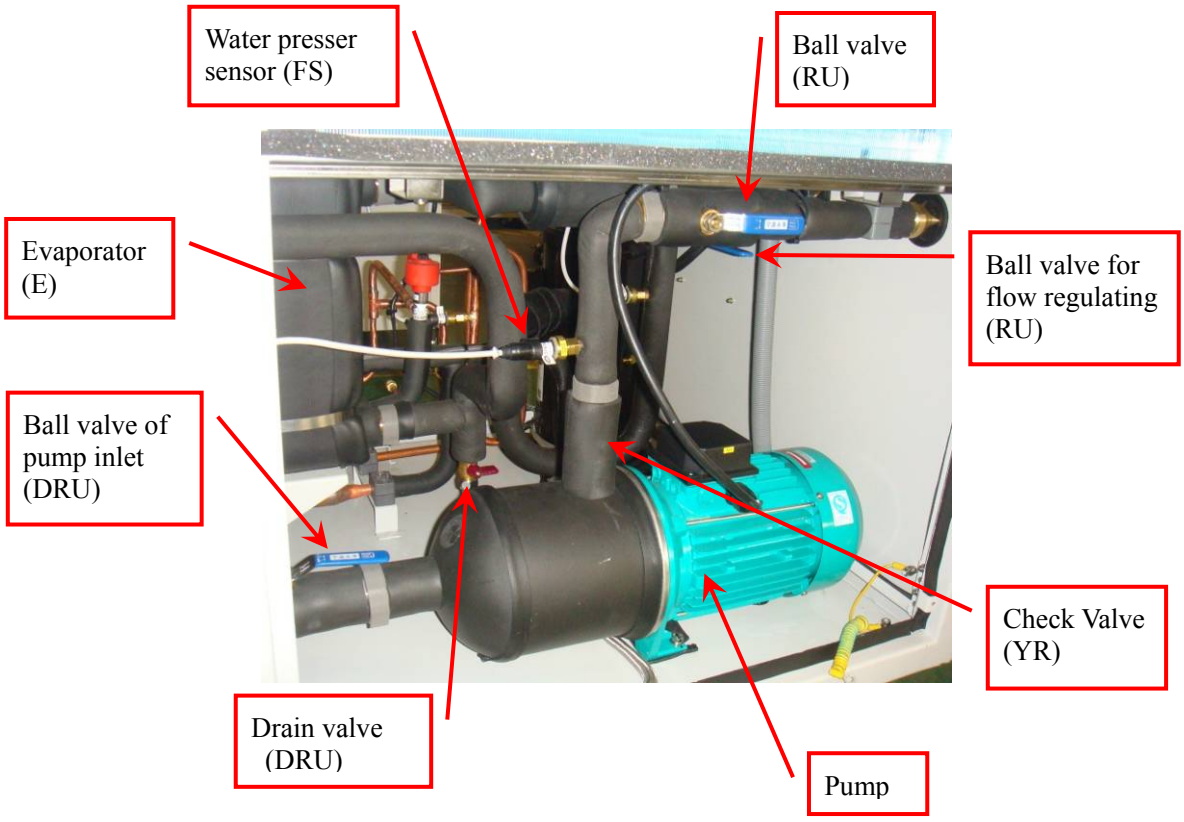
Fig.- 7 Remote controller description (unit: mm)

To start up or stop the unit, press “Esc"+"Enter” keys for 5 seconds.

The function of the keys is as following:

Button	Description
ALARM	Key for recall alarms, silence buzzer, and reset current alarm
UP	Key for rolling page up, if the cursor is in the top left corner of the screen, or increase the value, if cursor is in the value of parameter.
DOWN	Key for rolling page down, if the cursor is in the top left corner of the screen, or increase the value, if cursor is in the value of parameter the value.
ENTER	Key for entering changed value.
PRG	Key for entering historic alarm list
ESC	Return to previous menu.
ESC+ENTER	Pressed at the same time for about 5 seconds to switch the unit On/Off.

2.5. Major Components



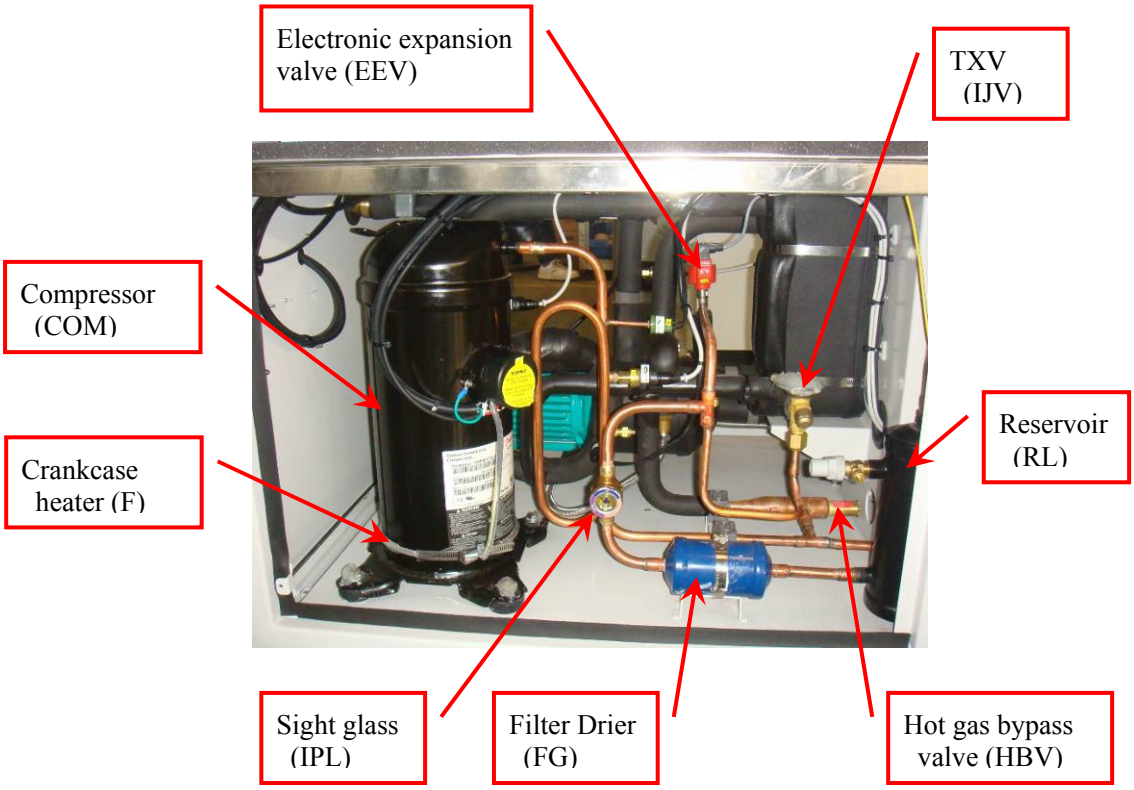


Fig.- 8 Major components

2.6. Service and Technical Support

Customer satisfaction is our highest priority. Please contact us immediately for technical assistance whenever you have questions or concerns. We can be reached by information listed in Table-5.

We could also be reached via email: Callcenter@air-sys.com.

Please address information listed below before you call service or technical support,

– Model and Serial Number (getting from rating plate, e.g. CG02116001)
– Date of purchase and your purchase order number
– Suppliers' order number or invoice number
– A summary of your problem

Region	Address	Tel	Fax/Email
North America	GE Healthcare 3200N, Grandview Blvd, Waukesha, WI 53188	+1 800 437 1171	N/A
Europe & Mideast Countries	The Competitive Advantage Italy 27100 Pavia Via Sacco 7	+39 382 303 990	Roberto@caciolli.191.it
India	India Service Center	+91 33 2251 7220	+91 22 6645 9287 cc-india@air-sys.com
China & all other Countries	AIRSYS No.28, East LuGu St., Shijingshan Dist. Beijing P.R.China 100040	+86 10 400 820 5515 +86 10 6865 6161	+86 10 6865 2453 Callcenter@air-sys.com

Table- 5 Customer Service Information

3. Preparation for Installation

3.1. Installation Responsibility

Task	Customer	GE Service	Chiller Service
Unload Chiller from truck	√		
Move chiller to equipment room or outdoor concrete pad and mount in accordance with local code	√		
Connect customer-supplied power cable from field power supply or MDP to Chiller	√		
Install water lines to chiller, and no leaks	√		
Install remote controller and cable in Operation Room; and connect remote controller cable to chiller.	√		
Fill tank of chiller with glycol	√		
Start chiller, refill glycol into coolant loop			√
Verify proper phase rotation and no leaks	√*		√
Perform final Inspection of chiller and verify proper operation			√
Attach labels			√
Fulfill Start-up report			√
Installation verification		√	√

*: perform leak reparation when leak is found on piping between chiller and MRI.
Table- 6 Installation responsibility

NOTE: It is the customer's responsibility to choose the correct wire size according to line length, insulation type, wire routing and to comply with any local code requirements.

3.2. Material to be supplied by customer for installation

1. Power cable

2. Piping material (including pipe, joints, valve, etc.) for outdoor installation pipe connection.

Note: Copper pipe is recommended to be used for outdoor piping material. For other piping material, including pipe, joints and valves etc., for outdoor connection should meet requirements listed below:

a) Working temperature: -30ºC~90 ºC ;

b) Working pressure: >=1.6MPa;

c) Material should be propylene glycol (50%) resistant.

3.3. Installation Requirements

The chiller can be installed indoors, outdoors or on rooftop according to your field condition. You should mount the chiller following the manual. Any other mounting functions should be discussed with the AIRSYS or field engineers.

3.3.1. Distance & Height of the Location

NOTE: The piping distance from chiller to operating room should be less than 30m to avoid additional pressure drop which may cause low flow rate. The distance may be extended to 60m by using 1" ID pipe. The elevation of the chiller installed above the MRI should be not greater than 30 m (98ft). The elevation the chiller installed below the MRI should be not greater than 3 m (9.8ft).

3.3.2. Airflow Considerations

The air inlets are at the right, left and rear side of chiller. The air outlet is on the top of the chiller. Airflow flow in and out of the unit will affect cooling performance. The minimum clearance of machine is required when you plan the installation. The minimum service clearance is shown as in Fig.-9, Fig.-10 and Fig.-11.

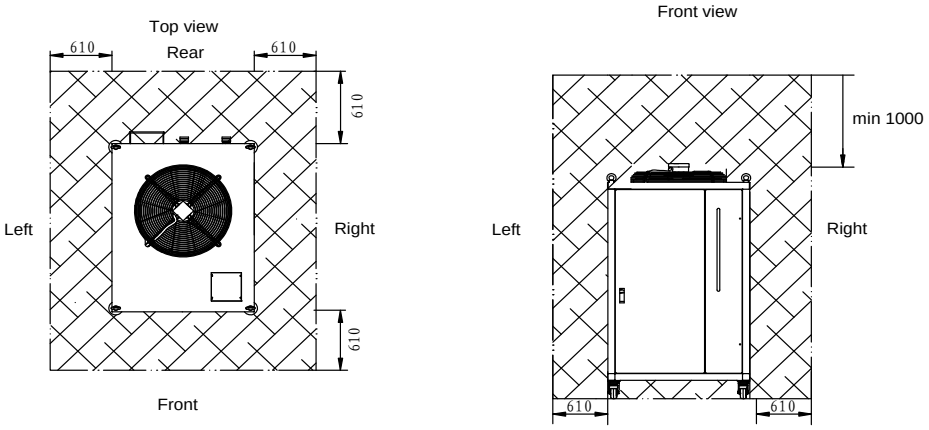


Fig.- 9 Service clearance for single unit (unit: mm)

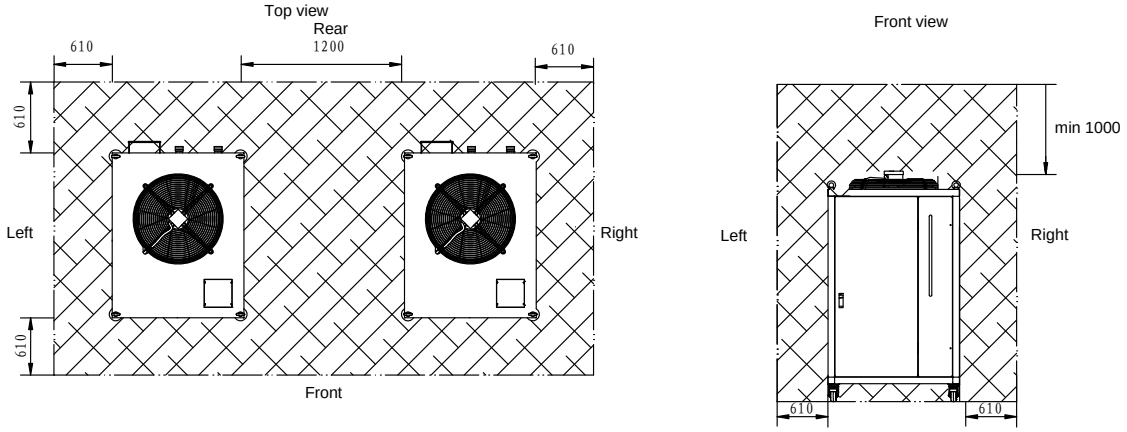


Fig.- 10 Service clearances for two or more units (recommended; unit: mm)

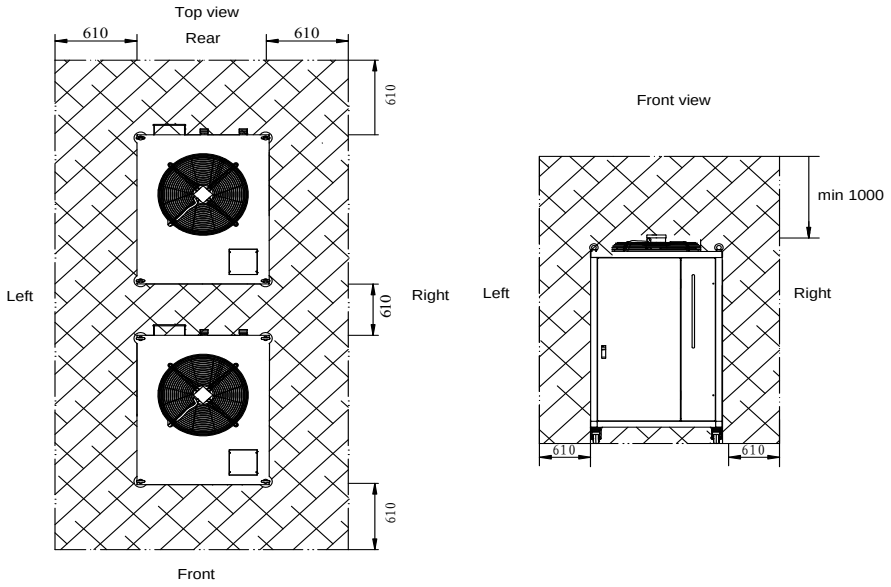


Fig.- 11 Service clearance for two or more units (unit: mm)

3.3.3. Weather Considerations

The chiller can work through most of climates, snowing, raining, strong winding, etc. But in area where often encounter extreme heavy snowing, down pouring, season wind, etc, it is wise to install anti-climate shields by customer.

3.3.4. Power Requirements

The power distribution panel should be placed as closer as it could to the chiller. The customer can choose the power cables according to the below table.

ITEM	P/N	Description	REQUIREMENTS
Wire (customer supplied)	5332778	11kw Water Chiller 50Hz	The maximum wire size is 6 AWG (16 mm^2)
	5346827	11kw Water Chiller 60Hz	
Power Consumption	5332778	11kw Water Chiller 50Hz	8.8/5.0KVA (maximum/continuous)
	5346827	11kw Water Chiller 60Hz	10.9/6.2KVA (maximum/continuous)
Voltage Requirements	5332778	11kw Water Chiller 50Hz	380/400/415 VAC(+/-10%)@ 50 Hz(+/-3)
	5346827	11kw Water Chiller 60Hz	460/480 VAC(+/-10%)@ 60 Hz(+/-3)

Table- 7 Power requirement

NOTE: **Check nameplate of the chiller and confirm the local power supply matches requirements on chiller.**

3.3.5. Concrete ground requirement:

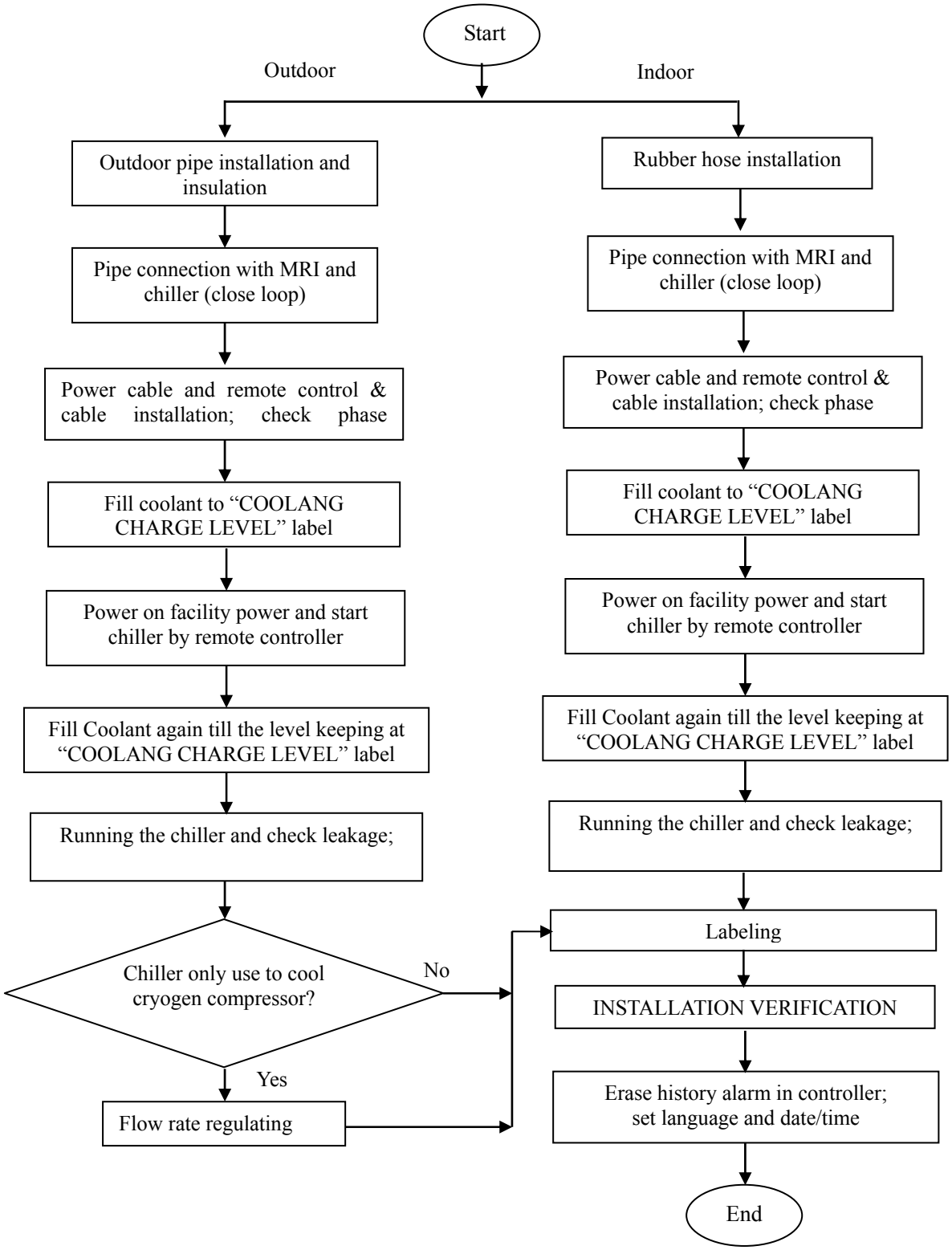
Concrete ground used for mounting the unit should be a level surface, which is 1/300 cm max allowed and be properly supported to prevent sedimentation. A concrete made area of 110.0cm (43 in) x90.0cm (35 in) at strength of minimum 17.23MPa (2500 psi), 4 inches thickness recommended, is needed to place the chiller. Refer to Fig.-3 for concrete dimension.

NOTE: **The concrete footing should meet or exceed the local code requirements.**

NOTE: **8 bolts (M12, provided by customer) are needed to fix the chiller, and local code should be followed.**

4. Installation

Follow process diagram below and instruction and requirements in this section to finish installation and start-up the chiller.



4.1. Pipe Connections

Material that may be used during installation for coolant pipe like hose barbs, ball valve couplings, hose adapters and hose are supplied with the chiller. They can be found in the accessory box.

It is recommended that the coolant loop to be finished by chiller service provider or well trained people. Please following requirements list below when you plan the path of pipe line between chiller and MRI.

Material attached with unit for pipe connection:

S/N	Description	Qty	Remark
1	Hose clamps, 3/4inch (20 mm)	4 pcs	Attached with chiller in accessory box
2	Kit (3/4 inch (20 mm) hose barbs , 3/4 inch ball valve)	2 sets	Attached with chiller in accessory box
3	Rubber hose, 12.7mm (1/2"), 5m	2 pcs	Attached with chiller in accessory box
4	30.5 m (100 ft) lengths of 3/4 inch (20 mm) flexible hose	1 pcs	Attached with chiller in accessory box
5	Teflon tape 20m x 25mm x 0.1mm	1 pcs	Attached with chiller in accessory box
6	Label	1 set	Attached with chiller in accessory box
7	Copper pipe, ball valve, joints or other piping materials meet requirement for outdoor installation	Depends on site	Provider by customer

4.1.1. Coolant loop requirements

Note: **Rubber hose attached with chiller only can be used indoor!**

1. Copper pipe and PP-R pipe is recommended to be used for outdoor piping material. For other piping material, including pipe, joints and valves etc., and outdoor connections should meet requirements listed below:

   a) Working temperature: -30ºC~90 ºC ;

   b) Working pressure: >=1.6MPa;

   c) Material should be propylene glycol (50%) resistant.

2. All pipe installed outdoor should be insulated.

3. Outdoor piping material should be provided by customer.

4. Choose shortest way and fewer elbows when you plan the path of pipe line between chiller and MRI to avoid additional pressure losses.

5. Before use the hose pipe, check and clean the water hose thoroughly to make sure there is no metal residence or dirt inside.

6. The hose connection with the unit should be adjusted smoothly to avoid additional strain that may result in a break or crack.

7. Check leak after coolant piping is done before connecting with chiller if possible.

8. Local codes should be followed when you plan the coolant loop.

4.1.2. Configuration for chiller connecting with MRI

There are two types of configuration for chiller(s) connect with MRI as shown in Fig.-12 and Fig.-13.

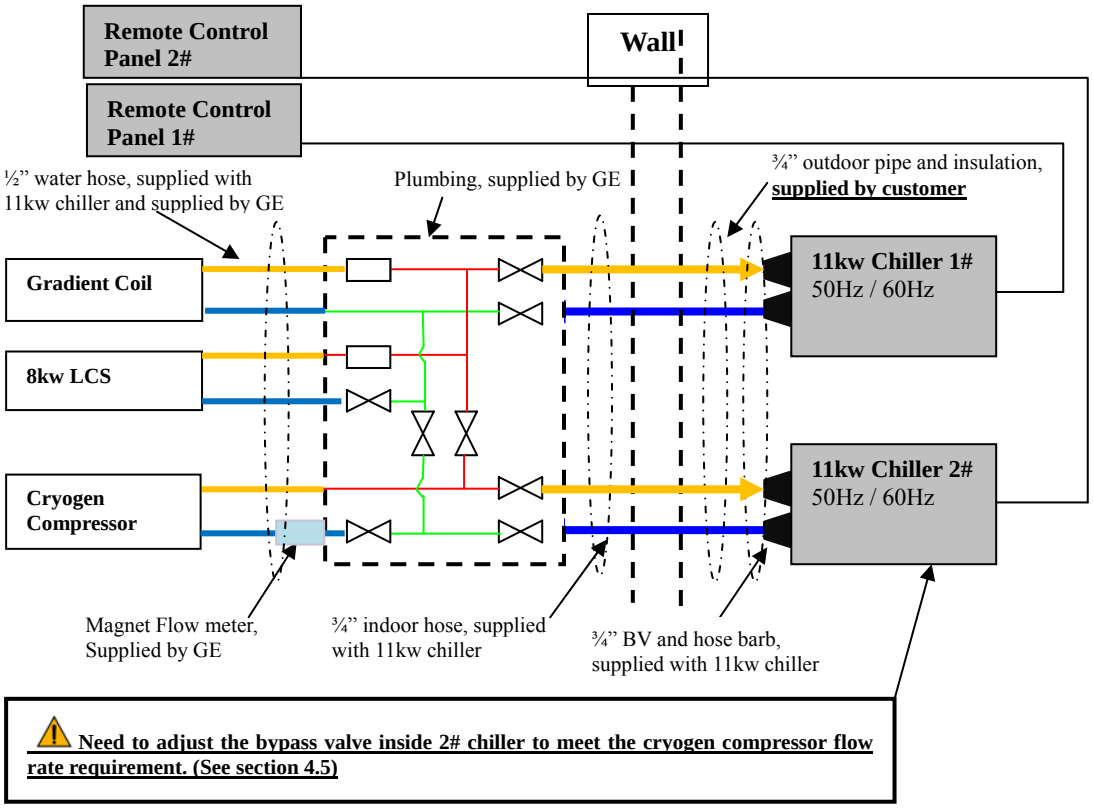


Fig.- 12 Outdoor Piping/Hose Connection for Cooling Type A

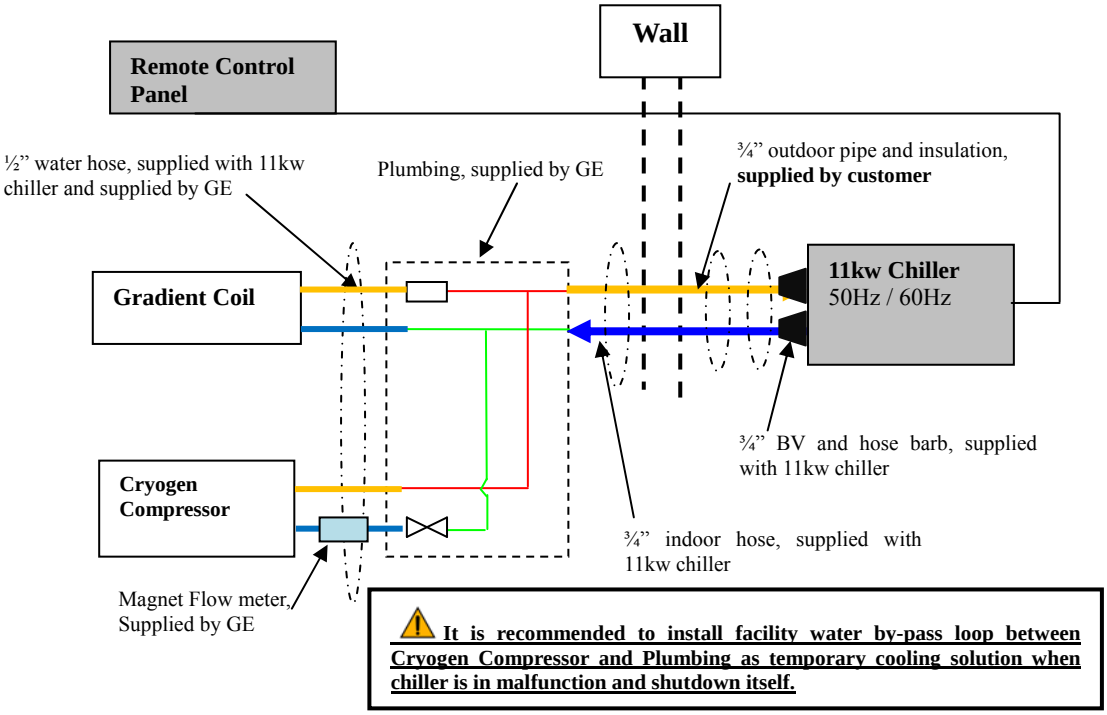


Fig.- 13 Outdoor Piping/Hose Connection for Cooling Type C

4.1.3. Coolant loop connection

(1) MRI pipe connection

Indoor connection:

a) Connect hose with indoor chiller per configuration chart Fig-12 or Fig -13;

b) Check coolant loop is connected correct; confirm all joints firmed.

Outdoor connection:

a) Connect hose with devices per configuration chart Fig-12 or Fig -13 in equipment room;

b) Plan and route pipe from chiller outdoor to equipment room. Choose shortest way and fewer elbows when you plan the path of pipe line between chiller and MRI to avoid additional pressure losses;

c) Connect outdoor pipe with loop indoor;

d) Check coolant loop is connected correct per configuration chart Fig-12 or Fig -13; confirm all connections firmed;

e) Insulate outdoor pipe;

(2) Connect hose/piping with chiller

The coolant fluid inlet (COOLANT RETURN) and outlet (COOLANT SUPPLY) connections on chiller are located on the rear side. They are 19.1mm (3/4") ball valve coupling, together with 19.1 mm (3/4") hose barb and hose clamp. Please refer to Fig.-14 to operate the quick disconnection coupling.

Fig.- 14 Ball valve coupling

4.2. Power Cable & Remote Cable Connections

Caution! Be sure that the power supply is same as power supply specification on the label. Local code should be followed when wiring the power cable!

Material preparation

S/N	Description	Qty	Remark
1	Power cable	Depends on site	Provided by customer
2	Remote cable, 30.5 m	1 pcs	Attached with chiller in accessory box
3	Pipe-type terminals, 6.0mm2 (9.3X10-3 in2)	6 pcs	Attached with chiller in accessory box

For the electric connection, the installers need to connect and firm the power cables with terminators in electric box at rear side of the unit shown as the Fig.-6 Overall dimension.

The layout of inside of electric box is shown as fig.-12. The binding posts labeled L1, L2, L3 and PE are for power wring. The binding posts labeled 45, 46 are used to connect the external alarm indicator (ring bell or flash lamp) supplied and powered by user.

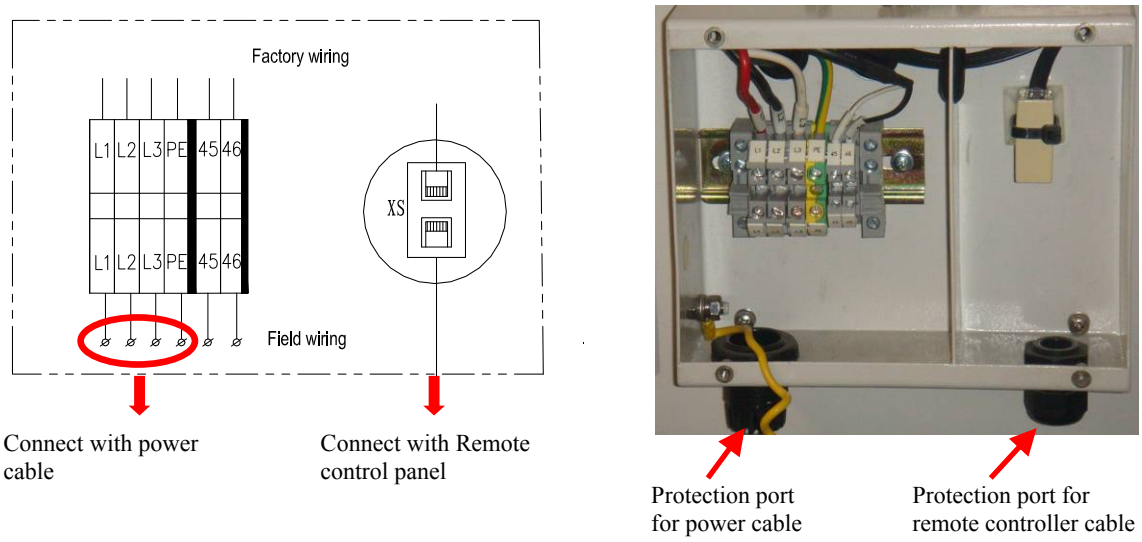


Fig.- 15 Electric box and Main power connection

Procedure:

1. Check and confirm the field power supply matches power supply description on nameplate of unit. **Make sure main power supply is cut off before wire connection!**

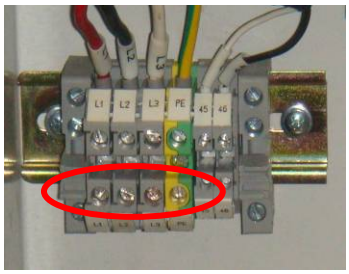


Fig.- 16 Power connection terminator

2. Connect power cable with field power; confirm all wires are firmed;

3. Wiring power cable to chiller;

4. Wiring remote controller cable from indoor to chiller;

5. Open cover of electric box and check factory connected wires/cable are firm (Refer to Fig.-6 and Fig.-13);

6. Loose right side of lock nut of protect port, let remote control cable (coming from operating room) pass through the port and insert plug into socket. Tighten the lock nut;

7. Peel insulation of power cable, 10mm; firm pipe-type terminal, 6.0mm^2 (9.3X10-3in2), on each wire (It can be found in accessory box);

8. Loose lock nut of protect port for power cable, let power cable pass through the port;

9. Loose screws of terminator, shown as Fig.-13. Insert each terminal into socket according to different phase, then

tighten the screws. Confirm all wires are firmed;

10. Mounting back the electric box cover after check power phase sequences are correct.

Note: **Skip step 3# and 6#, if the remote controller is going to be installed on chiller (refer to section 4.3.1).**

4.3. Remote Control Panel Installation

Remote control panel can be installed on chiller or in operating room. The cable for remote controller installed in operating room enclosed with chiller is 30.5 m (100ft) long.

4.3.1. Install the remote controller on chiller (for indoor installation)

Material preparation

S/N	Description	Qty	Remark
1	Remote controller and its bracket	1set	Attached with chiller in accessory box
2	Key for front door of chiller	2 pcs	Attached with chiller

Procedure:

1. Open front door of chiller with key attached with unit.

2. Switch the door lock to “off” position, shown as Fig.-17.

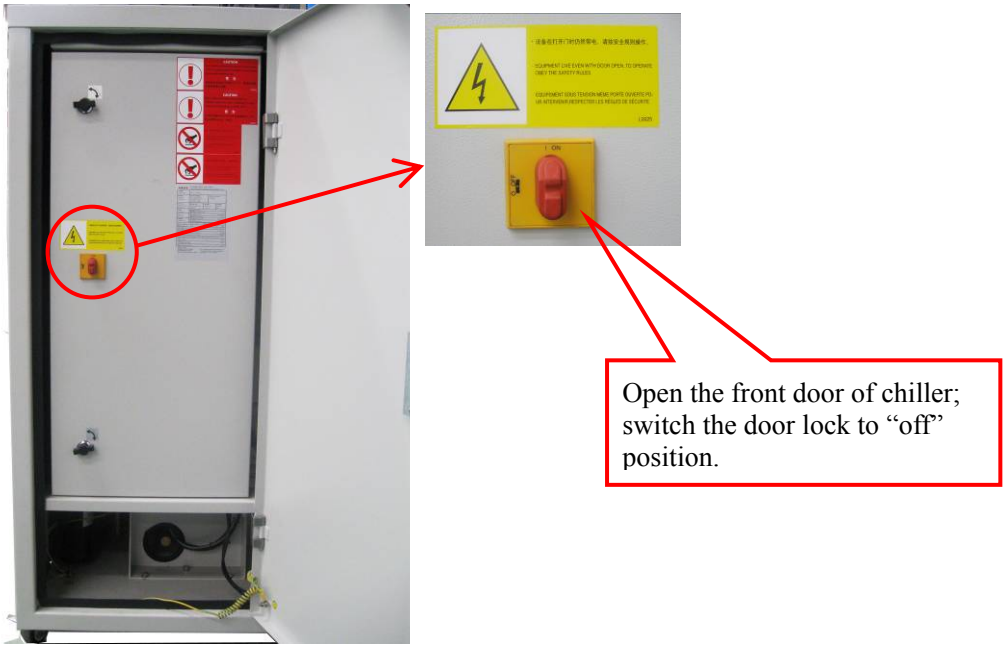


Fig.- 17 Door lock switch

3. Open the door of electric control box. Pull out the plug of cable shown as in Fig.18.

4. Plug in the cable for on-chiller remote installation, shown as in Fig.-18.

Fig.- 18 Remote controller cable connecting with controller

5. Close the door of electric control box, switch the door lock to “on” position, then close and lock the front door of chiller.

6. Remove cover at position of on-chiller remote installation, shown as in Fig.-19. The remote controller cable is behind the cover.

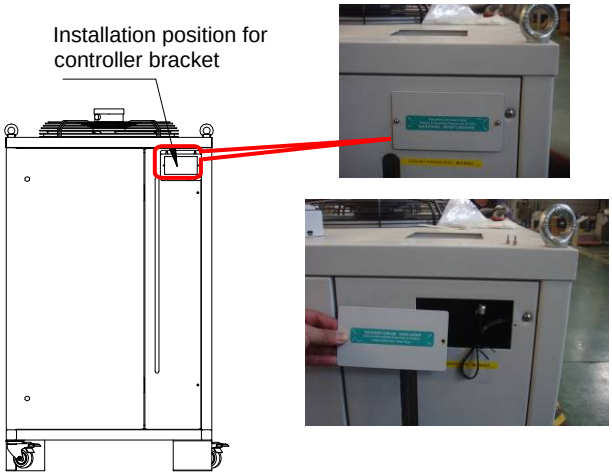


Fig.- 19 Install remote controller on chiller

7. Remove the remote controller from bracket, shown as Fig.-20.

Fig.- 20 Remove remote controller from bracket

8. Plug in cable to remote controller, shown as Fig.-21.

Fig.- 21 Cable connecting with remote controller

9. Then fix the remote controller onto place as shown in Fig.-22.

Fig.- 22 Fix remote controller on chiller

4.3.2. Install remote controller indoor (chiller outdoor installation)

It is customer's responsibility to install remote control panel and cable in operation room.

A 30m (100ft) long cable can be found in accessory box. If the distance from chiller to operating room greater than 30m (100ft), you can order 100m-long-cable from us.

Follow steps in section 4.2 to connect cable with chiller. Use bracket to install the remote controller indoor.

Leave adequate clearance around the bracket for cable connection and operating as shown in Fig.-23.

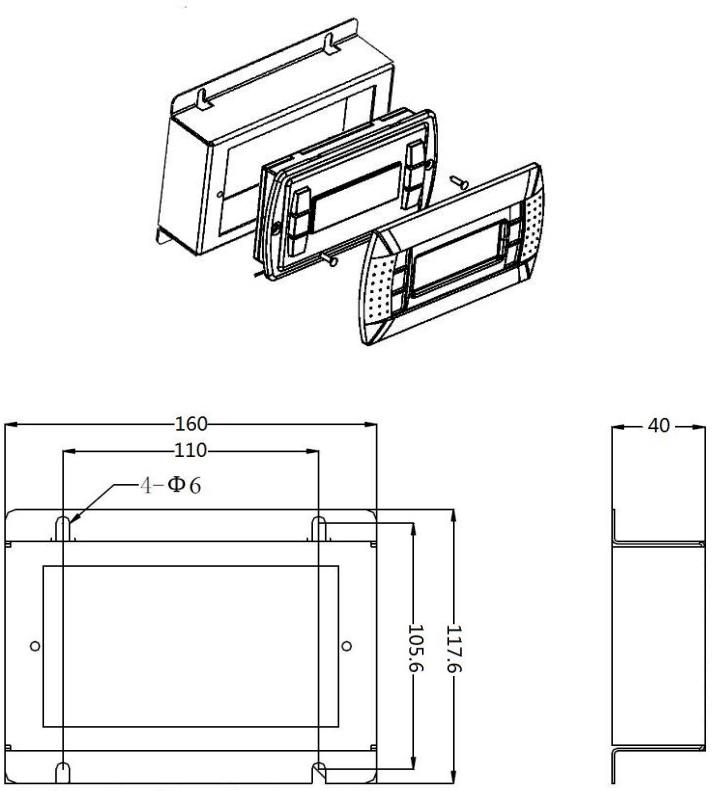


Fig.- 23 Dimension of remote control mounting bracket (unit: mm)

4.4. Coolant Fill, Chiller Power On and Leakage Check

There is 80L glycol shipped with unit in accessory box as well as funnel may use in following steps. The provided glycol is 50/50 mixture with additive of rust inhibitor and dye in yellow.

Material preparation

S/N	Description	Qty	Remark
1	50/50 Mixture of propylene glycol, 20L	4 pcs	Attached with chiller in accessory box
2	Plastic funnel	1 pcs	Attached with chiller in accessory box

Note: Main power supply should be available when you fill coolant.

Procedure of adding coolant:

1, Screw off cover of coolant charge port (refer to Fig.-8), put funnel in the coolant charge port. Fill the reservoir with coolant attached with unit. When coolant level reaches "COOLANT CHARGE LEVEL" label, remove the funnel and keep the charge port open.

2, Check hoses and fittings and be sure no bends or crimps on the hoses.

3, Switch on main power and follow steps below to start the chiller:

(1) Make sure the main power supply to chiller is available (switch on the main power supply);

(2) Wait a few seconds, the screen of the remote controller will display as Fig.-24 after the main power supply is available.

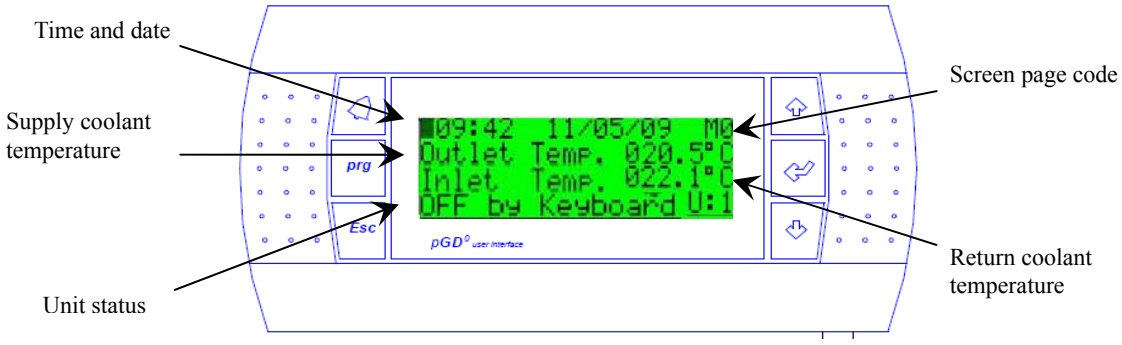


Fig.- 24 Start-up interface displayed on the controller screen when unit is powered(1)

(3) The default coolant outlet temperature setting is 20ºC. Please contact GEHC field engineer to change outlet temperature setting point if your application is different.

(4) Press the "Esc" + "Enter" keys, shown as Fig.-25, on the remote keyboard at same time, hold for 5 seconds. The chiller will be turned on, and the screen of the controller will display as Fig.-25.

(5) The chiller will start pump first after turned on, then start compressor after 3 minutes if outlet temperature is greater than set point.

NOTE: For the first start up, if ambient temperature is below 0ºC at which the unit placed more than 8 hours, to heat the lubricating oil of the compressor, you should wait for at least 2 hours before you use remote controller turn on chiller after main power supply is available.

NOTE: Wrong power phase setting will not start up the chiller without error code displayed. If the remote display did not show info like Fig.-25, please check (i) power supply is available; (ii) power supply phase sequence is correct. Contact service engineer if there is no issue found from power supply but the display shows nothing or any other info.

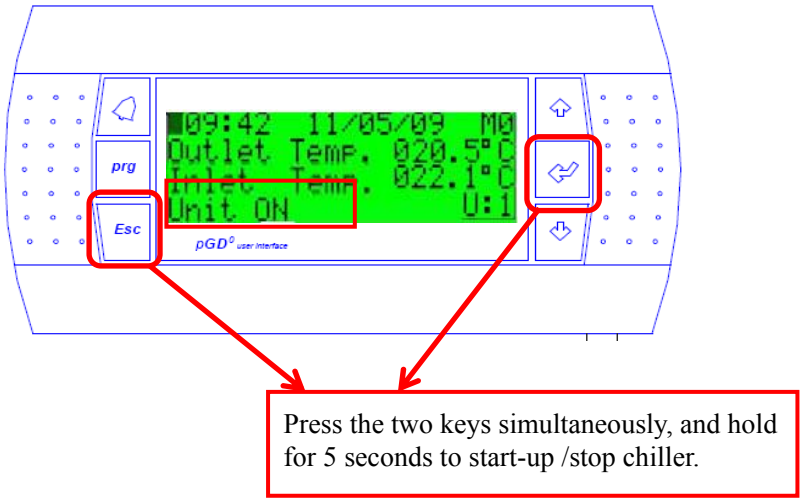


Fig.- 25 Unit-On interface displayed on the remote controller screen

4, The chiller will begin pumping coolant through the system after switched on. Meanwhile, the coolant in the reservoir will decrease as part of it fill into the system. Add coolant until the coolant level in the reservoir stops going down. (This means that your system is filled and the air has been purged out completely.)

5, Continue to fill the reservoir until coolant level reaches "**COOLANT CHARGE LEVEL**" line.

6, Running the chiller for 15 minutes, check if coolant level keeping upon "**COOLANT CHARGE LEVEL**" line, and check no leak at joints along with coolant piping system outside chiller.

7, The coolant observed from level gage should be clean. Otherwise the coolant loop need to be flushed and refilled.

NOTE: The chiller may report alarm for "Water low" during coolant filling. The alarm will be disappear when coolant reach the charge level.

Note: Important! Only use the coolant ship with the chiller. If additional coolant is needed, please order from GEHC, part number 2297672, one gallon of properly-mixed coolant.

Note: Follow instructions in MSDS to clean coolant on floor.

4.5. Flow Rate Regulating For Cooling Type A

When chiller only provide cooling for cryrogen compressor (refer to Fig.-12, chiller#2), the flow rate must regulated to be 7~10L/m.The unit is equipped with coolant by-pass system(refer to system diagram in Appendix, Fig.-8, and Fig.-15), customer can adjust coolant flow rate by regulating valve shown in the Fig.-8 according to their requirement. **The regulating valve is shut off as default factory setting.**

4.6. Label the unit

After finishing connects your closed coolant loop with chiller, and connects power cable and remote controller cable, it is service engineers' responsibility to apply labels on unit.

Material preparation

S/N	Description	Qty	Remark
1	Label	1 set	Attached with chiller in accessory box

- Label the coolant loop.

  Label the coolant loop at ends of ball valve and other ends to MRI with labels of "COOLANT SUPPLY", "COOLANT RETURN" and flow arrow labels on each hose connect to chiller, as shown in Fig.-26. The

"COOLANT RETURN" is drawing liquid into the chiller; the "COOLANT SUPPLY" is pumping cooled liquid out.

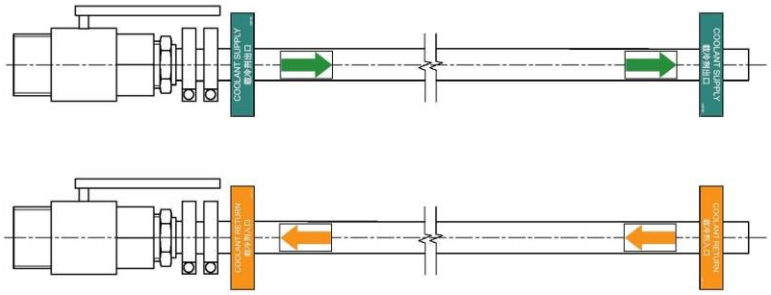


Fig.- 26 label the coolant loop

- Label the unit

Label the unit with "Cyro chiller" or "Gradient Chiller" on front door according to its application shown as Fig.-27.

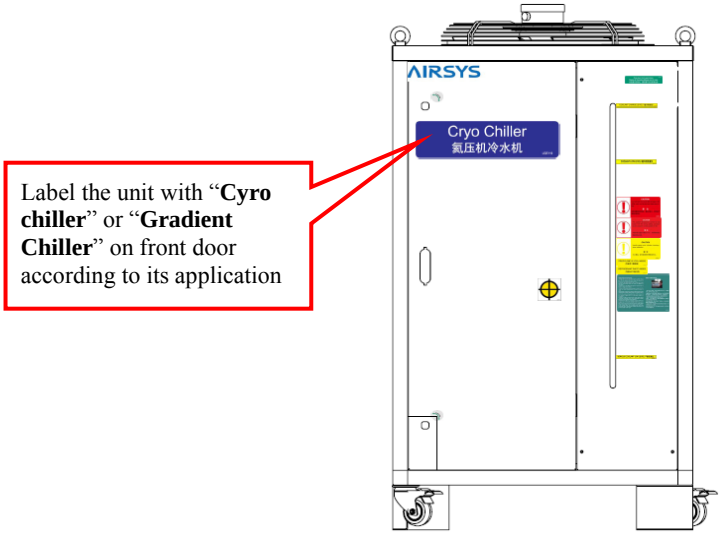


Fig.- 27 label the chiller at front door

- Label the remote controller

Label the remote controller with "Cyro chiller Control Panel" or "Gradient Chiller Control Panel" shown as Fig.-28.

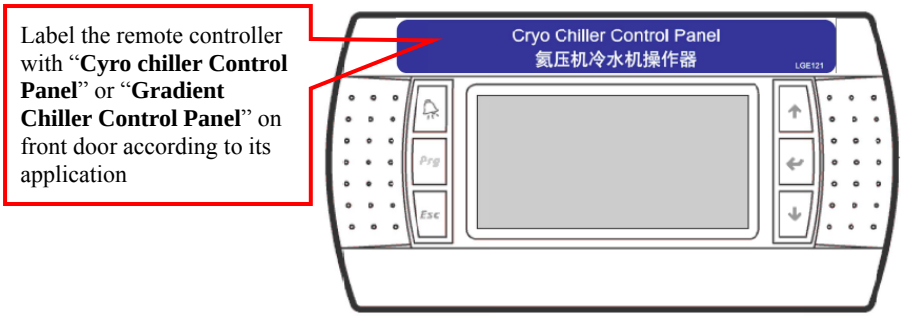


Fig.- 28 label the chiller at remote controller panel

4.7. Installation Verification

Before installation verification, it is recommended running the chiller for at least 1 hour, then check if it is working in specification, check leaks inside and outside chiller. Then finish installation report.

It is service engineers' responsibility to fulfill installation report (refer to Appendix 10.3). This report needs approval by GEHC field engineers and/or customer.

4.8. Date/time, language setting and erase history alarm(s)

After installation verification, erase history alarm(s) in controller, and if necessary, re-set date/time and language following steps below.

4.8.1. Date/time setting

Press Esc to return page "M0" → Press ↑ or ↓ to access page "M3" → Press ↵ to move cursor to "Hour" → Press ↑ or ↓ to set hour → Press ↵ to move cursor to "Date" → Press ↑ or ↓ to set date → Press ↵ to move cursor to "Day" → Press ↑ or ↓ to set day → Press Esc twice to return page "M0".

4.8.2. Language setting

Press Esc to return page "M0" → Press ↑ or ↓ to page "M2" → Press ↵ and hole for 3 seconds to access page "A0" → Press ↵ to move cursor to "Language" → Press ↑ or ↓ to set language in English or Chinese → Press Esc twice to return page "M0".

4.8.3. Erase history alarm(s)

Press " Esc " to return page "M0" → Press ↑ or ↓ to page "M2" → Press ↵ and hole for 3 seconds to access page "A0" → Press Esc to access "Main Menu Screen" → Press ↓ to move cursor to "Manufacturer" → Press ↵ to access page "C0" → Press ↵ to move cursor to "0000" → Press ↑ or ↓ to enter password → Press ↵ to confirm password and access page "C1" → Press ↑ or ↓ to move cursor to page "C6", "Erase history alarm" → Press ↵ to move cursor to "No" → Press ↑ or ↓ to change "No" to "Yes" → Press ↵ to confirm → Press Esc twice to return page "M0".

5. Operating the Chiller

After going through the previous procedures (Section 4), the chiller will keep running if there is no interruption. The display of the chiller will show info as in Fig.-25. User can stop/start the chiller through remote controller following procedure in sections below.

5.1. Stop/Start the chiller

5.1.1. Stop the chiller

Press the "Esc" + "Enter" keys on the remote keyboard, hold for 5 seconds to stop the chiller, and the screen of the controller will display as Fig.-29.

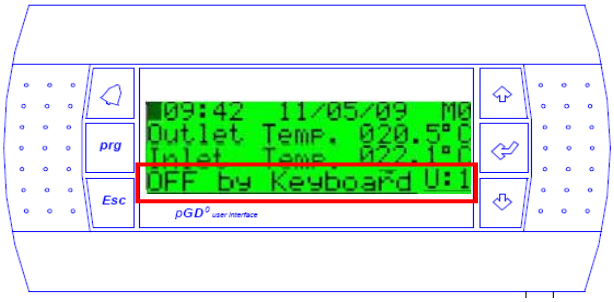


Fig.- 29 Unit-Off interface displayed on the remote controller screen

5.1.2. Start the chiller

Follow section 4.4, step 4 to start up chiller.

5.2. Parameter Setting

The controller is a fully parameter configurable device. All the parameters have been preset in the factory.

NOTE: **Only service engineers who have been well trained allowed to change these settings.**

5.3. Draining the Unit

NOTE: ***NEVER*** **drain the unit by pump. It may damage the pump seal permanently!**

When chiller is going to stop more than 1 week, it is necessory to drain coolant from unit to protect pump and coolant loop from rusting.

The unit provide drain valves to drain coolant from coolant tank and evaporator. Before this operation, turn off the unit, and follow all applicable Lock-out Tag-out procedures. Screw off the side panel, then open the drain valve (refer to Fig.-6) allowing unit to drain. A proper container is needed to keep liquid out and recycle.

Procedure to drain the unit:

1) Remove right side panel of the unit (refer to Fig.-6), the drain water pipes will be seen at the bottom of the unit, as shown in Fig.- 8.

2) Loose water drain pipe connection with evaporator (refer to Fig.-8), put the end into container, open drain valve of coolant tank, drain coolant from the tank. After coolant tank drained, shut off the drain valve.

3) Loose water drain pipe connection with tank, put the end into container, connect the other end with evaporator drain valve (refer to Fig.-8), open the valve and drain coolant from evaporator. After coolant tank drained, shut off

the drain valve, and connect the other end with tank drain valve.

4) Remount the side panel of the unit.

NOTE: Make sure the two drain valves had been shut off after coolant drained!

6. Maintenance

It is recommanded to have 2 times PM each year. Considering the site condition where chiller is installed, please contact with your service engineer to determain the times of PM for each year.

Following items listed in table in Appendix 10.4 to fulfill PM. It is service engineer's responsibility to fill the Preventive Maintenance Check List (refer to Appendix 10.4). The list should signed by GE Healthcare field engineer and/or end-user as appproval.

It is recommended to do job in list below periodically to keep the unit always in best condition.

S/N	Content of Replacement/maintenance	Recommended Frequency
1	Periodical maintenance	2 times/year
2	Condenser cleaning	2 times/year
3	Mash of Y filter cleaning	1 time/year depends on cleaning of coolant
4	Glycol replacement	1 time/2 years depends on cleaning of coolant

7. Option List

S/N	P/N	Description	Purpose
1	2041000100ROHS	Long distance cables kit for controller (default length 30m), including: 100 m cable and T card.	Used for distance between chiller and remote controller over 30m

Table- 8 Option part order information

8. Troubleshooting

The controller can perform full system self-diagnose and displays alarms in serial code accordingly. In the event of a system failure, the alarm code and its meaning will be shown on the display.

NOTE: ALWAYS GET HELP FROM QUALIFIED REFRIGERATION SERVICE ENGINEERS TO ACCESS THE CHILLER WHEN MALFUNCTION IS FOUND!

Alarm codes is sorted into prompt alarm and critical alarm. If prompt alarm occurs, the light of the alarm key will be turned on and alarm info will be displayed. And if critical alarm occurs, the "Alarm" key will be twinkling and buzzer will be trigered. Press the alarm key once to silence buzzer.

NOTE: It is wise that review all hishory alarm record in controller sorted by date/time before calling for service engineer come to site and resolve problem.

The alarm message consists of a code with the format "ALxx" (where "xx" is a 2-digit number, indicating the type of failure detected, such as: AL00, AL10, AL15….) and following its meaning, as shown in Fig-31.

"Alarm" key

Fig.- 30 Screen status when alarm reported

To check the description of alarm, follow the steps below.

1) If the alarm occurs like Fig.-30, press "alarm" key, and the screen of the controller will display as Fig.-31.

Fig.- 31 "Err" page

2) If there are other alarms, press "Down" or "Up" to inquire other alarm information.

Please refer to alarm list to understand alarm reported

If user want to know all alarm informations, press :"Prg" key to inquire "Alarm history" menu, where the alarm type, time and date were recorded.

Contact Airsys and provide site info via email, callcenter@airsys.com, to request service manual when necessory.

NOTE: When the power restored after power failure, the controller will be back to the status before the failure.

Follow instructions in MSDS to clean floor if coolant leak occurs.

NOTE: When chiller is found lack of refrigerant, the system should be vacuumed to 53pa and the vacuum should less than 133pa after keeping for 30min before reload. The quantity of refrigerant to be reloaded is 6.8+0.2kg.

8.1. Alarm list

Note: If compressor's internal thermo protection trigged, the chiller will not report alarm and temperature of coolent outlet will keep rising. It is may caused by high ambient temperature, and/or low refrigerant volume in system.

Alarm Code	Loads Shut Down	Signal	Meaning & Description	Possible Cause	Check Points	Recommend Actions
AL01	Compressor	compressor thermal switch protection	Compressor will be shut down. water pump continues to run Manual reset if trigged	Loose wire in high pressure protector	High/low pressure protector wiring	Tighten up the loose wire or reconnect the line of these terminal
				High/low pressure protector failed	Simulate the pressure to activate the protector.	Replace it with a new one
				Condenser fan failed	Measure the power input the fan, if input power is ok, the capacitance or the fan motor maybe fail.	Replace it with a new one
				Fan blocked by something.	check the fan leaves if it could rotate freely by hand	remove the things that stalled the fan leaves
AL02	Compressor Condenser Fan	Low pressure protection	Compressors and condenser fan will be shut down Active if low pressure (suction pressure) below 0.6Bar when the chiller is operating Manual reset if trigged	Refrigerant leak in refrigeration loop, compressor suction pressure is lower than the setting point 0.5bar(7.3psi)	check all the refrigeration loop	properly seal the leak point
				EEV block or failed and cause the suction pressure too low	check suction pressure when the chiller still running	replace TEV
				Blockage in refrigeration system and suction pressure too low	check suction pressure when unit still running, check if the coolant temperature is correct	replaced TEV and clean the refrigerant system
				False alarm due to the failure of high/low pressure protector switch	Simulate the pressure to activate the protector.	replace the protector if the protector fails to respond
				Loose wiring triggers the alarm	check all the line connection about this alarm according to the electrical diagram	tighten up the connection or reconnect the terminals
				Low ambient temperature	does the environment temperature drop below -30C degree(-22F)	the operating condition is outside of specified range, pls contact the Field engineer or tech support

Alarm Code	Loads Shut Down	Signal	Meaning & Description	Possible Cause	Check Points	Recommend Actions
AL03	Compressor Condenser Fan	Compressor high pressure switch alarm or condenser fan overload alarm	Compressor and fan will be shut down. water pump continues to run Manual reset if trigged	The high pressure of the refrigeration loop exceeds setting point(29bar/420.5psi)	fan speed regulator wire loose or malfunction. If so, the condenser may not be cooled properly.	fasten the loose wire and/or connections of these terminals. Replace fan speed control board if it is in malfunction
					condenser with dirt or something	clean the condenser
					The ambient temperature is higher than 43C degree(109.4F)	Contact FE, and/or order option parts for high ambient temp kit.
					Debris in sealed system clogging TEV or refrigerant filter	Clean the refrigeration sub-system and recharge the refrigerant or replace the filter if necessary
				The fan thermal protector activation	Dirty condenser	Clean the condenser
					The ambient temperature is higher than 43C degree(109.4F)	Contact FE, and/or order option parts for high ambient temp kit.
					Fan blocked by something.	Clean the fan
				Wrong fan speed/parameter setting	check the parameter in the controller	correct the wrong parameters
				The capacitor of the fan failed	Check the capacitor of the fan	Replace it with a new one
				Fan motor failed	Check motor windings	Replace it with a new one
AL3b		pressure sensor high alarm	Compressor and fan will be shut down.	The high pressure of the refrigeration loop exceeds setting point(26~28bar)	fan speed regulator wire loose or malfunction. If so, the condenser may not be cooled properly.	fasten the loose wire and/or connections of these terminals. Replace fan speed control board if it is in malfunction
					condenser with dirt or something	clean the condenser
					The ambient temperature is higher than 43C degree(109.4F)	Contact FE, and/or order option parts for high ambient temp kit.
					Debris in sealed system clogging TEV or refrigerant filter	Clean the refrigeration sub-system and recharge the refrigerant or replace the filter if necessary
AL04		water low level switch	Water level in tank below the low water level switch. Automatic reset; promote only;	Coolant leak in pipe system	every pipe joint and components in coolant loop	properly seal the leak spots
				Coolant lost for evaporation	Coolant level	Add coolant to recharge level
				loose wire between the level switch and terminal block	check wire connection of water level switch and terminal block	Tighten up the line connection
				Coolant level switch failed	coolant level switch	replaced the switch

Alarm Code	Loads Shut Down	Signal	Meaning & Description	Possible Cause	Check Points	Recommend Actions
AL05	Compressor Capacity control Condenser Fan Pump	Pump thermal switch protection	All loads will be shut down; Active if the current of pump exceed 4.5A.; and events per hour reaches the value of 3 ; need manually reset; Manual reset if trigged	Loose wire in the pump thermal protector(FR2)	Line connection in the pump thermal protector failed	tighten up the line connection
				Water pump running current exceeds the setting point of the current protector	Check pump motor windings	Replace pump with a new one
					Something stuck in the pump impeller. Check the current or the noisy of the motor when it is running	If so, remove the blockage, or replace with new
					Pump rusty	Replace the pump and clean the water loop
AL06	Compressor Capacity control Condenser Fan Pump	Serious Low water level	All loads will be shut down; need to be manually reset; Automatic reset	Coolant leak in pipe system	every pipe joint and components in coolant loop	properly seal the leak spots
				loose wire between the level switch and terminal block	check line connecting of water level switch and terminal block	Tighten up the line connection
				Coolant level switch failed	coolant level switch	replaced the switch
AL07		Probe SP3 fault (coolant outlet pressure sensor)	Triggered if pressure valve exceed -1~9.3 bar Automatic reset; promote only;	Pressure sensor SP3 failed	check pressure sensor	replace the sensor
				loose wire at the terminal block	check terminal block in electrical box	tighten up the line or reconnect the terminal block
AL08		Probe ST2 fault (coolant return temp sensor)	Triggered if the water return temperature sensor shorts or is cut off or probe limits are exceeded (-50°C.. 100°C).	loose wire at the terminal block	terminal block in electrical box	tighten up the line or reconnect the terminal block
				the temperature sensor ST2 failed	check the resistance of the sensor	replace the sensor
AL09		Probe SP2 fault (condensing pressure sensor)	Triggered if pressure valve exceed 0~34.5 bar; fan running in full speed; Automatic reset; promote only;	Pressure sensor SP2 failed	check pressure sensor	replace the sensor
				loose wire at the terminal block	check terminal block in electrical box	tighten up the line or reconnect the terminal block
AL10	Compressor Capacity control Pump Condenser Fan	Serious high coolant outlet temp	Triggered if coolant outlet temp exceeds 53C; Automatic reset	Refrigeration system problem	Check all other error codes recorded	Resolve problems according to error codes recorded, restart chiller.
				Low coolant flow rate	Check if coolant flow rate is blocked for contamination or large pressure drop of loop.	Clean loop or decrease pressure drop of loop.

Alarm Code	Loads Shut Down	Signal	Meaning & Description	Possible Cause	Check Points	Recommend Actions
				the temperature sensor ST1 failed	check the resistance of the sensor	replace the sensor
				loose wire at the terminal block	Check connection at terminal block in electrical box	tighten up the line or reconnect the terminal block
AL11		Time card	Time card malfunction; promote only;	Time card connection or battery	Connection of time card or battery	Re-connect time card or replace battery
AL12	Compressor Capacity control Pump Condenser Fan	Low coolant outlet temp	Triggered if coolant outlet temp is below -40C; Automatic reset	Low temp of coolant add to chiller	Check if temp of coolant added to chiller is below -40C	Warm up coolant
				loose wire at the terminal block	check terminal block in electrical box	tighten up the line or reconnect the terminal block
				the temperature sensor ST1 failed	check the resistance of the sensor	replace the sensor
AL13	Compressor	Coolant supply temperature is above 28C (77F).	Stops compressor; (3 times in an hour, locks and shuts down the system; needs to be reset manually)	all the other possible failure causing compressor shut off and water temperature goes up	check the alarm history to find out other alarm codes registered earlier	deal with issues corresponding to the relevant alarm code in history list and start-up again.
	Capacity control		Each time when judgment, If the temperature has the drop tendency, only prompts. Otherwise, stops the compressor.	Unit did not cool or less of capacity to cool water.	check if low pressure alarm code is recorded; if yes, then the unit didn't cool the coolant	first solve the problem according to the alarm of low pressure
					Dirty evaporator if there is no malfunction found in refrigeration system.	Flush evaporator with clean water and observe temp control, or replace evaporator if outlet temp keep raising after flushing.
	Condenser Fan			low coolant flow rate	check if there is blockage in the coolant loop and adjust flow rate if necessary	adjust or clean the coolant loop or replace the coolant filter if necessary
	Pump			EEV in malfunction	check if this is the case	replace the bad one
				ambient temperature of the chiller exceed the design range of the unit	measure the ambient the temperature of the chiller	Contact FE, and/or order option parts for high ambient temp kit.
				parameters in controller is set incorrect	check the parameter right or not	refer to the controller operating manual and set the parameters

Alarm Code	Loads Shut Down	Signal	Meaning & Description	Possible Cause	Check Points	Recommend Actions
				Compressor internal thermo protection trigged	check if compressor stopped without alarm code, and discharge temp over 120C	Discharge the whole system and recharge refrigerant to 6.8~7.0kg
AL14	Compressor Condenser Fan	Probe SP 1 fault (compressor suction pressure sensor)	Compressor will be shut down Pressure valve exceed 0~17.3 bar Automatic reset	Pressure sensor SP failed	check pressure sensor	replace the sensor
				loose wire at the terminal block	check terminal block in electrical box	tighten up the line or reconnect the terminal block
AL15	Compressor Condenser Fan	EEV driver memory failure	Compressor will be shut down Eeprom fail or disconnected Press alarm key to reset	Eeprom failed	check Eeprom	replace the Eeprom
				loose connection	check connection of Eeprom	re-connect the Eeprom
AL16	Compressor Condenser Fan	EEV driver motor failure	Compressor will be shut down Press alarm key to reset	driver motor failed	check movement of drive motor manually	replace the Eeprom
				loose connection	check connection of driver	re-connect the driver
AL17	Compressor Condenser Fan	EEV configuration incomplete	Compressor will be shut down EEV configuration incomplete Press alarm key to reset	EEV configuration incomplete	Check configuration of EEV	Re-configuration EEV
AL18	Compressor Condenser Fan	High evaporation pressure (SP1)	Compressor will be shut down High evaporation pressure Automatically reset	EEV malfunction	Check function of EEV	replace EEV
AL19	Compressor Condenser Fan	Low evaporation pressure (SP1)	Compressor will be shut down Low evaporation pressure Automatically reset	Low evaporation pressure	check if low pressure alarm code is recorded; if yes, then the unit didn't cool the coolant	solve the problem according to the alarm of low pressure
AL20	Compressor Condenser Fan	Low superheat	Compressor will be shut down Promote only; automatic reset	EEV and/or EEV control malfunction	Check EEV and/or EEV control	Replace EEV and/or EEV control
AL21	Compressor Condenser Fan	High superheat	Compressor will be shut down Promote only; automatic reset	EEV and/or EEV control malfunction	Check EEV and/or EEV control	Replace EEV and/or EEV control

Alarm Code	Loads Shut Down	Signal	Meaning & Description	Possible Cause	Check Points	Recommend Actions
AL22	Compressor Condenser Fan	EEV driver reset fault after power off	Compressor will be shut down EEV did not shut off during EEV driver power off Automatically reset	EEV did not shut off during EEV driver power off	Restore power of EEV driver	Replace EEV if alarm again
AL23	Compressor Condenser Fan	EEV driver communication failure	Compressor will be shut down loose connection of controller Press alarm key to reset	loose connection of controller	check connections of EEV driver	re-connect all terminators replace cable
AL24	Compressor Capacity control Pump Condenser Fan	Temperature sensor at coolant from outlet of evaporator (ST1)	Chiller will be shut down; Triggered if temperature sensor shorts or is cut off or probe limits are exceeded (-50°C.. 100°C). Press alarm key to reset.	loose wire at the terminal block	check terminal block in electrical box	tighten up the line or reconnect the terminal block
				the temperature sensor ST1 failed	check temperature sensor	replace the sensor
AL25	Compressor Condenser Fan	Temperature sensor (ST5) at compressor suction failure	Compressor will be shut down Triggered if temperature sensor shorts or is cut off or probe limits are exceeded (-50°C.. 100°C). Press alarm key to reset.	loose wire at the terminal block	check terminal block in electrical box	tighten up the line or reconnect the terminal block
				the temperature sensor ST5 failed	check temperature sensor	replace the sensor
AL26		Temperature sensor (ST6) of ambient temperature	Triggered if temperature sensor shorts or is cut off or probe limits are exceeded (-50°C.. 100°C). Press alarm key to reset. AL28 can't happen	loose wire at the terminal block	check terminal block in electrical box	tighten up the line or reconnect the terminal block
				the temperature sensor ST6 failed	check temperature sensor	replace the sensor
AL27	Compressor Capacity control Pump Condenser Fan	Compressor pressure differential (suction and discharge) fault	Compressor will be shut down Triggered if pressure differential less than 2 bar for 60s; manual reset;	Compressor internal thermo protection triggered	Check if compressor stopped	Recharge R407C to the system to 7kg
AL28	Compressor Capacity control Pump	ambient temperature below -31°C	Chiller will be shut down; Active if ambient	ambient temperature of the chiller exceeds the operation range	measure the ambient the temperature at the chiller	chiller can't work if ambient temp out of spec

Alarm Code	Loads Shut Down	Signal	Meaning & Description	Possible Cause	Check Points	Recommend Actions
	Condenser Fan		temperature sensor detects a value below -31°C; Automatically reset	the ambient temperature sensor failed	check temperature sensor	replace the sensor
AL29	Compressor Capacity control Pump Condenser Fan	Coolant outlet pressure high	Triggered if pressure great than 6.4 bar ; Manual reset	Coolant loop to long or blocked.	Check coolant loop	Clean coolant loop/shorten coolant loop
AL30		Coolant outlet pressure low	Triggered if pressure less than 2.0 bar ; promote only; Automatically reset	Coolant loop leak	Check coolant loop	Repair leak point

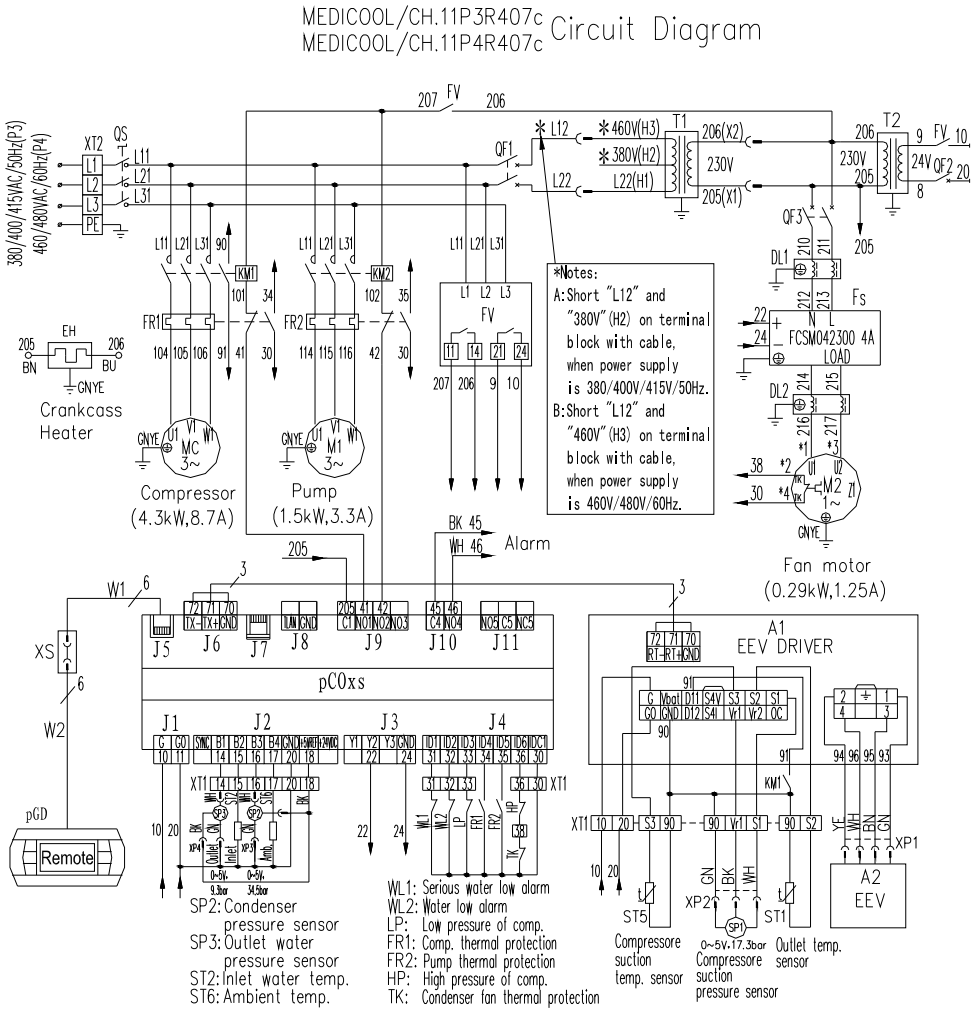
9. Limited Warranty

AIRSYS warrants each new product manufactured and sold to be free from defects in material, workmanship and construction, except for maintenance items which may be contained therein, and that when used in accordance with this owner's manual will perform to applicable specifications for a period of one year from date of shipment. AIRSYS' obligation is limited to repair or replacement, at its option, at its factory, of the defective unit or its components. AIRSYS is not responsible for products which have been subject to misuse, alteration, accident or for repairs not performed or approved by AIRSYS. Instruments must be returned properly packed with transportation charges prepaid to AIRSYS; return transportation charges will be F.O.B. factory. No parts shall be returned unless a return authorization number is received, which will be furnished by request. The foregoing warranty constitutes AIRSYS sole liability, and is in lieu of any other warranty, of merchantability or fitness. AIRSYS' OBLIGATION UNDER THIS WARRANTY IS STRICTLY AND EXCLUSIVELY LIMITED TO THE REPAIR OR REPLACEMENT OF DEFECTIVE COMPONENT PARTS AND AIRSYS DOES NOT ASSUME OR AUTHORIZE ANYONE TO ASSUME FOR IT ANY OTHER OBLIGATION. AIRSYS ASSUMES NO RESPONSIBILITY FOR INCIDENTAL, CONSEQUENTIAL, OR OTHER DAMAGES INCLUDING, BUT NOT LIMITED TO LOSS OR DAMAGE TO PROPERTY, LOSS OF PROFITS OR REVENUE, LOSS OF THE UNIT, LOSS OF TIME, OR INCONVENIENCE. AIRSYS' liability does not include any labor charges for replacement of parts, adjustments, repairs, or any other work done outside its factories and its liability does not include any resulting damage to persons, property, equipment, goods or merchandise arising out of any defect in or failure of its apparatus. AIRSYS' obligation to repair or replace shall not apply to any apparatus which shall have been repaired or altered outside of its factory in any way, or which has been subject to negligence, to misuse, or to pressures in excess of stated limits. On parts not of AIRSYS' manufacture, such as motors, controls, etc., AIRSYS extends only those warranties given to AIRSYS to the extent AIRSYS can do so. AIRSYS' agreement hereunder runs only to the immediate purchaser from AIRSYS and does not extend, expressly or by implication, to any other person.

Rev. C Effective Jan 5th, 2009

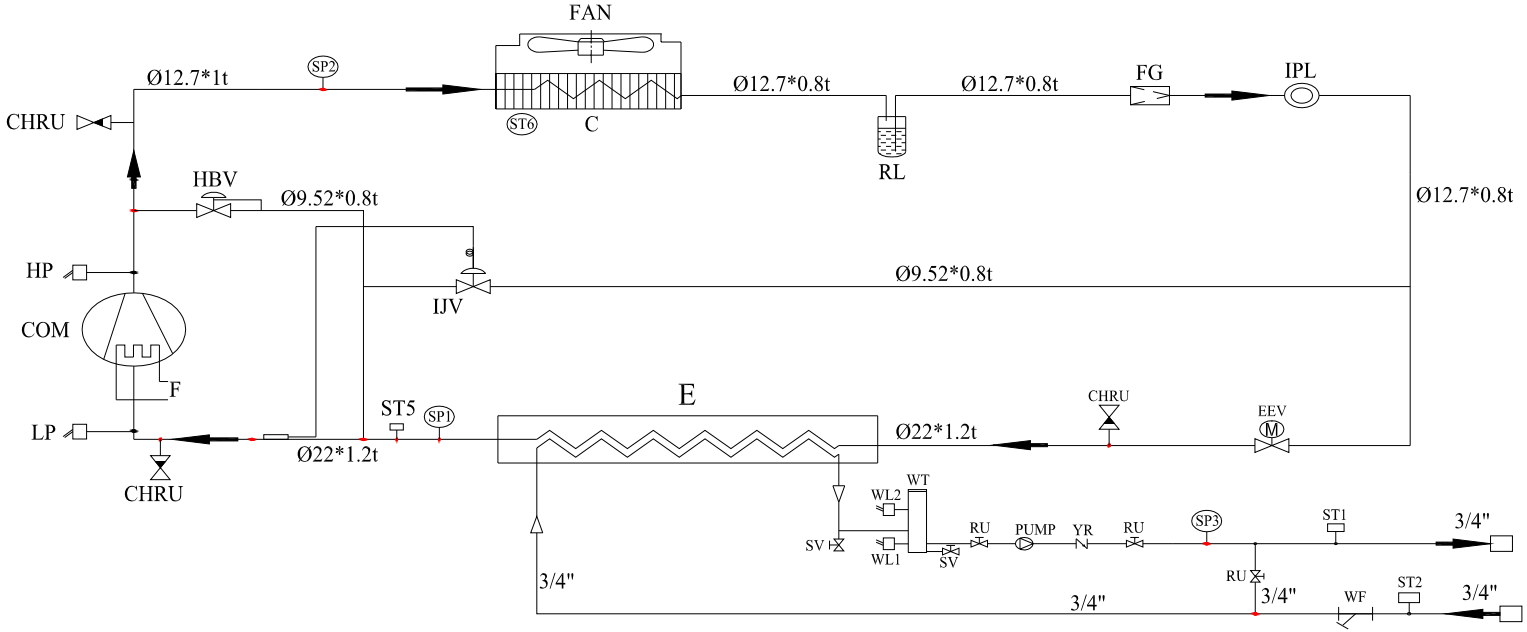
10. APPENDIX

10.1. Circuit Diagram



NO.	Code	Name
1	QS	SwitchLine
2	KM1、KM2	AC Contactor
3	FR1、FR2	Thermal overload relay
4	QF1~QF3	Miniature circuit breaker
5	FV	Phase sequence monitor
6	LP	Low pressure switch
7	HP	High pressure switch
8	T1	Transformer 650VA 380~460V/230V
9	T2	Transformer 40W 240V/24V
10	pCOxs	Controller
11	Fs	Fan Controller
12	pGD	PGD terminals
13	ST1.ST2.ST5.ST6	Temperature sensor
14	A1	Electronic expansion valve Driver
15	A2	Electronic expansion valve
16	XP1	Electronic expansion valve Cable
17	XP2~XP4	Pressure sensor Cable
18	SP1~SP3	Pressure sensor
19	W1、W2	Connect Cable
20	XS	Socket
21	MC	Compressor
22	M1	Pump
23	M2	Condenser fan
24	DL1、DL2	Filter

10.2. Piping Diagram



C	Condenser	**HBV**	Hot gas by-pass valve	**ST1**	Temp sensor (water supply)	**WL1**	Water level switch(low)
CHRU	Re-charge valve	**HP**	High pressure switch	**ST2**	Temp sensor (water return)	**WL2**	Water level switch(high)
COM	Compressor	**IJV**	TXV	**ST5**	Temp sensor (suction)	**WT**	Water tank
E	Evaporator	**IPL**	Sight glass	**ST6**	Temp sensor (ambient)	**YR**	Check valve
EEV	Electronic expansion valve	**LP**	Low pressure switch	**SP1**	Pressure sensor(suction)	**SV**	Drain valve
FAN	Condenser fan	**PUMP**	Water pump	**SP2**	Pressure sensor(discharge)		
F	Crankcase heater	**RL**	Reservoir	**SP3**	Pressure sensor(coolant)		
FG	Dry filter	**RU**	Service valve	**WF**	Water filter		

10.3. Start-up list

Start up Checklist of Medicool 11kW Chiller

Model: Medicool/CH,11P3R407C & Medicool/CH,11P4R407C Airsys Refrigeration Engineering Technology Co. Ltd.

Customer: *Document NO. GEService003* *Revision:1.0*

Location: *Unit Serial NO.:*

Service company:

Service Engineer signature: *Date:*

	Check list	Initial status		Correct action	Status after		Remarks	Requirement
1	Check the location of the unit, it should be on a strong, and level surface. The casters should be locked for an indoor installation, tied down for an outdoor installation. Chiller can be located 30 m above or 3 m below the gradient coil or cryogen compressor. See Section 2 in the user manual.							-3m<H<30m, lean < 1/300
2	Check coolant piping for loose connections and leaks.							No leak
3	Leak test refrigerant system.							No leak
4	Check the coolant in the reservoir, add coolant if it is below the charge level.							Fill to "Coolant Charge Level "
5	Check electrical wiring, including control panel and all junction boxes, for loose connections or misplaced wiring Check time setting according to local time.							
6	Check the voltage, and phase rotation. Verify voltage setting of chiller to match power supply in site.							Voltage variable range should be within +/-10%
7	Verify the pump outlet valve is adjusted to the correct outlet pressure after start up. Adjust pressure to obtain correct flow of 6.1 GPM. Do not allow the pressure to exceed 66 Psig.							0.45MPa+0.5MPa/6.1 GPM
8	Verify the clearances around the chiller meet the requirements in Sections 4 in the installation manual.							Front>500mm, Rear>600mm
9	Verify the proper operation of the pump system, record the following running data;							
9.1	Flow rate							rated 6.1GPM/23.1 LPM
9.2	Outlet pressure							<0.455MPa
9.3	Running current of each phase	L1:			L1:			11.0<A<17.0
		L2:			L2:			11.0<A<17.0
		L3:			L3:			11.0<A<17.0
9.4	Running voltage of each phase	L1&L2:			L1&L2:			(380/460)+/- 10%
		L1&L3:			L1&L3:			(380/460)+/- 10%
		L2&L3:			L2&L3:			(380/460)+/- 10%
10	Verifying proper operation of refrigerant system, record the following operating data.							
10.1	Compressor discharge pressure							<2400kpa
10.2	Temp of compressor inlet							>0°C
10.3	Coil temperature (read from PLC)							<55 °C/ 131 °F
10.4	Condenser air inlet temperature							<43°C
10.5	Supply coolant temperature (read from PLC)							18.0°C<T<20.0°C, +/- 1°C
10.6	Return coolant temperature (Read from PLC)							24.5°C<T<28.5°C
10.7	Compressor suction pressure							>436kpa
10.8	Compressor input voltage of each phase	L1&L2:			L1&L2:			(380/460)+/- 10%
		L1&L3:			L1&L3:			(380/460)+/- 10%
		L2&L3:			L2&L3:			(380/460)+/- 10%
10.9	Coil temperature (read from PLC)							<55 °C/ 131 °F
10.10	Compressor discharge pipe temperature at 4 to 8 inches from the discharge port.							<90 °C/194 °F
10.11	Compressor running current of each phase	L1:			L1:			5.0<A<10.0
		L2:			L2:			5.0<A<10.0
		L3:			L3:			5.0<A<10.0
10.12	Chiller total running current of each phase	L1:			L1:			11.0<A<17.0
		L2:			L2:			11.0<A<17.0
		L3:			L3:			11.0<A<17.0
10.13	Check refrigerant sight glass status (add refrigerant and do leak-test if it indicates a low refrigerant charge)							Refrigerant should be dry and no or only few bubble
11	Do a detailed visual inspection of the equipment and a general cleaning. Record any damages.							
12	Check PLC parameters setting by comparing with the table of parameters in manual, and correct the wrong settings.							
13	Verify that the cooling capacity meets the requirement of the GE equipment. Record the supply water temperature every 5 minutes for 30 minutes.				T1: T2: T3: T4: T5: T6:			20 °C +/- 1°C
14	Check/correct time setting. Clear all history alarm record							

10.4. Maintenances check list

Preventative Maintenance Verification Checklist of Medicool 11kW Chiller

Model: Medicool/CH,11P3R407C & :Medicool/CH,11P4R407C Airsys Refrigeration Engineering Technology Co. Ltd.

Customer: *Document NO. GEService003 Revision: 1.0*

Location: *Unit Serial NO.:*

Service company:

Service Engineer signature: *Date*

	Check list	Initial status	Maintenance action	Status after action	Other comments	Requirement
1	Check the controller for any error codes and investigate as appropriate. Clear history alarms in controller.					
2	Check the coolant water filter if the flow rate is under the normal value(6.1 GPM / 23.1 LPM) (A pump outlet pressure that exceeds 500Kpa may indicate that the flow rate is under the normal value)					-3m<H<30m, lean < 1/300
3	Leak test for refrigerant system and check for damage in piping.					
4	Check coolant piping inside the unit cabinet for obvious leaks and for worn areas. Report any leaks or worn areas on piping outside the unit cabinet to GE.					
5	Fill the reservoir if the coolant level is below the label "COOLANT CHARGE LEVEL", which is located on the back upper panel.					
6	Check electrical control system including control panel and all junction boxes inside or outside the chiller for burned or frayed wiring and loose connections, and do the insulation test of the field installing power input line with meg-ohm meter. Record the insulation data. Check time setting and battery of clock board. Replace battery if necessary.					
7	Check for weak or defective contactors, burned or pitted contacts. Fix or replace contactor if it makes any unusual noise or is the source of high current draw.					
8	Verify the proper operation of the pump system, record the following running data;					
8-1	Flow rate (if available)					rated 6.1GPM/23.1 LPM
8-2	Outlet pressure					0.455MPa
8-3	Running current of each phase	L1:		L1:		11.0<A<17.0
		L2:		L2:		11.0<A<17.0
		L3:		L3:		11.0<A<17.0
8-4	Running voltage of each phase	L1&L2:		L1&L2:		Nominal +/- 10%
		L1&L3:		L1&L3:		Nominal +/- 10%
		L2&L3:		L2&L3:		Nominal +/- 10%
9	Verifying proper operation of refrigerant system, record the following operating data.					
9-1	Compressor discharge pressure					<2400kpa
9-2	Condenser air inlet temperature					<43°C
9-3	Supply coolant temperature (read from PLC)					18.0°C<T<20.0°C, +/- 1°C
9-4	Return coolant temperature (Read from PLC)					24.5°C<T<28.5°C
9-5	Compressor suction pressure					>436kpa
9-6	Compressor Input voltage of each phase	L1&L2:		L1&L2:		Nominal +/- 10%
		L1&L3:		L1&L3:		Nominal +/- 10%
		L2&L3:		L2&L3:		Nominal +/- 10%
9-7	Coil temperature (read from PLC)					<55 °C/ 131 °F
9-8	Compressor discharge pipe temperature at 4 to 8 inches from the discharge port.					<90 °C/194 °F
9-9	Compressor running current of each phase	L1:		L1:		5.0<A<10.0
		L2:		L2:		5.0<A<10.0
		L3:		L3:		5.0<A<10.0
9-10	Chiller total running current of each phase	L1:		L1:		11.0<A<17.0
		L2:		L2:		11.0<A<17.0
		L3:		L3:		11.0<A<17.0
9-11	Check refrigerant sight glass status (add refrigerant and do leak-test if it indicates a low refrigerant charge)					Refrigerant should be dry and no or only few bubble
10	Visual check and clean for the equipment.					record damages
11	Check PLC parameters setting by comparing with the table of parameters in user manual, and correct the wrong settings.					refer to parameter in manual
12	Verify that the cooling capacity meets the requirement of the GE equipment. Record the supply water temperature every 5 minutes for 30 minutes.			T1: T2: T3: T4: T5: T6:		20 °C +/- 1°C
13	Record the ambient temperature and temperature at inlet of condenser.					< 43 °C
14	Confirm the condenser fan is operating normally. Check the fan speed can be changed through observation.					
15	Check condenser coils for dirt or damage, clean the coil if necessary					Condenser wind inlet speed > 1.8m/s(average)
16	Confirm coolant supply temperature setting is 19 deg C.					
17	Record compressor inlet temperature.					>0°C
18	Check/correct time setting. Clear all history alarm record					

10.5. Data sheet

Data sheet of Medicool 11kW Chiller

Model: Medicool/CH.11P3R407C & Medicool/CH.11P4R407C Airsys Refrigeration Engineering Technology Co. Ltd.

Customer: *Unit Serial NO.:.*

Location: *Service company:*

Service Engineer signature: *Date:*

Number	Parameter list							Record Date
	Outlet Temp	Inlet Temp	Ambient Temp	High Pressure of Comp.	Low Pressure of Comp.	Suction Temp	Water Pressure	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
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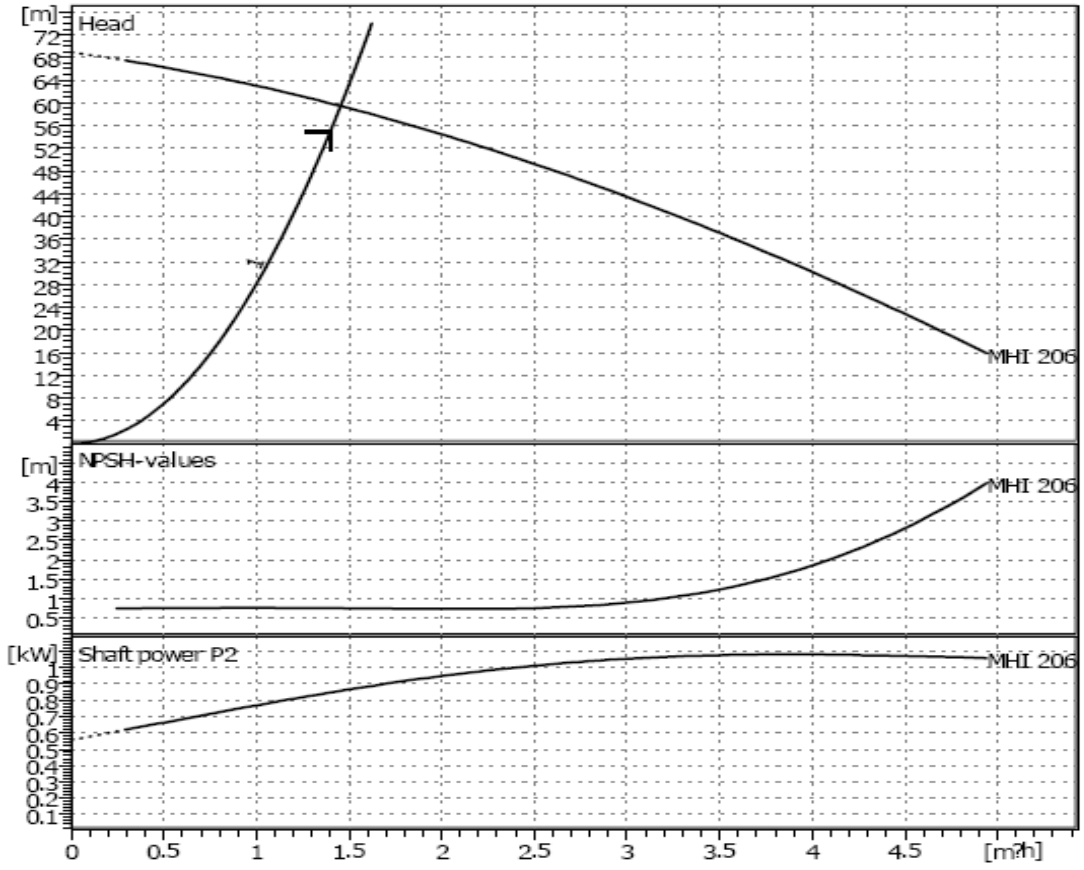
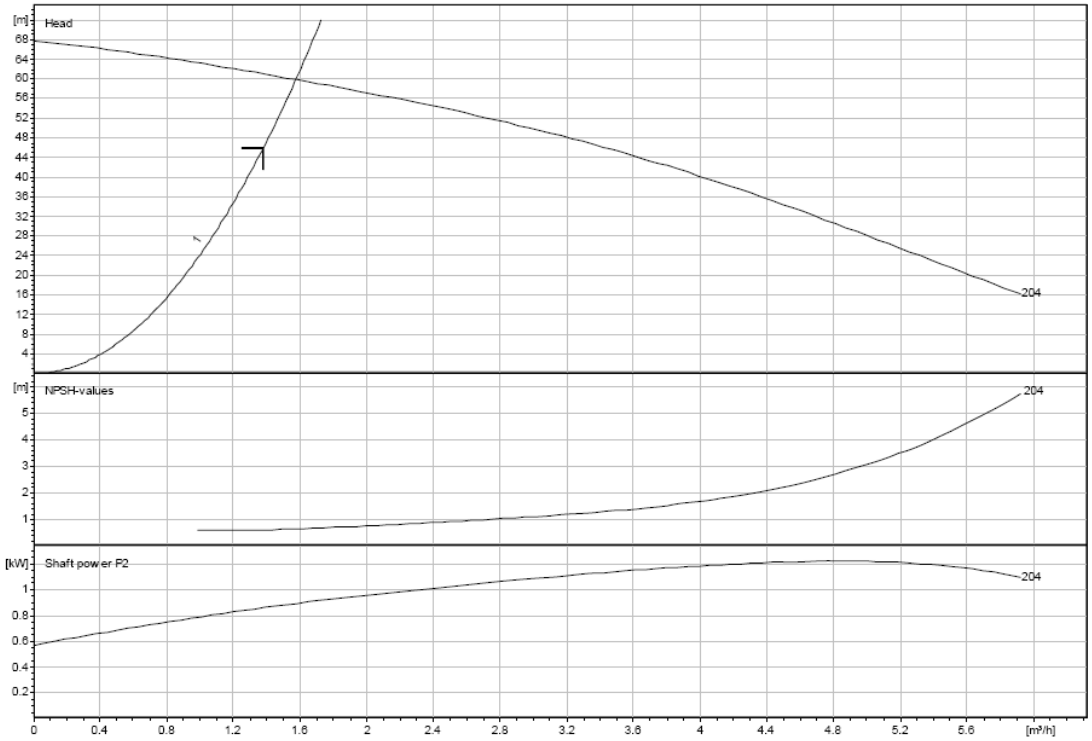
10.6. Pump Curve Diagram



MHI206-50Hz



MHI204-60Hz

10.7. Safety Date sheet of Propylene Glycol (English/Chinese)

10.8. Safety Data Sheet of R407C MSDS

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