

服务热线 4001 8989 63

**MELUCK**<sup>®</sup>  
Enjoy the future with science

## VOLUMIC COMPRESSING CONDENSING UNITS

MANUAL



**MELUCK**<sup>®</sup>  
Enjoy the future with science

SHANGHAI MELUCK REFRIGERATION EQUIPMENT CO.,LTD.

Shanghai ADD: 1111#, Xiangjiang Rd, Nanxiang, Jiading, Shanghai, China

Tel: +86-21-39199148

Fax: +86-21-39199150

E-mail: yf@chinabingfeng.com

Website: www.sh-meluck.com

SHANGHAI MELUCK REFRIGERATION EQUIPMENT CO.,LTD.

Thanks you for your purchasing our product.  
We remind you read this manual carefully before you use our product,  
and contact us anytime when you need.

Applicable to XJQ, XJB, XJW, JZB, MGM, MT series of products of this company

## 1. Open the Packing Box and Inspections

- Observe the package to confirm it is in good condition, no toppling and up side down occurred. If those occurred, contact your forwarders, and inform your suppliers or the manufacturers.
- Confirm the contents compared with the pack list or contract, if there are issues, contact your forwarders, and inform your suppliers or the manufacturers.

## 2. Safety

### 2.1 mark and explanation



Attention: No harm to operators!



Attention: Temperature over 60C, attention not touch to prevent from burning the body!



Attention: Attention to the safety from electricity!



Attention: The correction fan direction!

# Contents

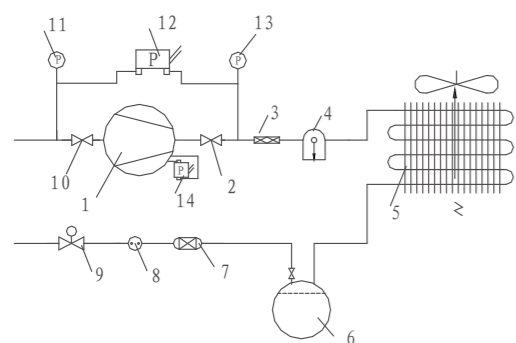
- |   |                            |
|---|----------------------------|
| 1. Open the Packing Box and Inspections | 6. Electrical connection   |
| 2. Safety                               | 7. Commissioning           |
| 3. Description of the Units             | 8. Operation & maintenance |
| 4. Installation                         | 9. Trouble shooting        |
| 5. Pipeline connection                  |                            |

- 2.2 The condensing unit can only be installed in the refrigeration system. It can be put into use only after it is correctly installed and completely conformed to the relative national laws and regulations.
- 2.3 All operation of condensing unit and cooling system should be handled by qualified or authorized refrigeration professionals, or the serious danger will be caused by incorrect operation.
- 2.4 The condensing unit is with 1.3~1.5 bar gauge pressure imposed before delivery, that has to be released before operation. Man should keep away from the discharge outlet to avoid the hurt in releasing air pressure.
- 2.5 The temperature of the compressor or pipe line may be higher than 60°C or lower than 0°C in running, pay attention to it to avoid scald or frostbite.
- 2.6 Opening running is prohibited for box type condensing unit.
- 2.7 Reliable grounding protection is necessary in running.
- 2.8 All maintenance and repair should be made after the power is cut off.

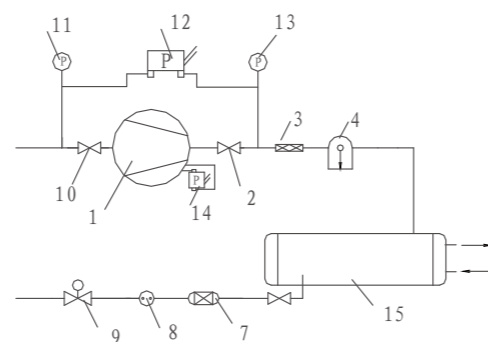
## 3. Description of the Units

### 3.1 Unit system composition diagram

Air cooled unit:



Water cooled unit



- |                         |                         |                   |                            |                            |
|-------------------------|-------------------------|-------------------|----------------------------|----------------------------|
| 1. Compressor           | 4. Oil separator        | 7. Filter         | 10. Suction stop valve     | 13. H/P gauge              |
| 2. Discharge stop valve | 5. Air cooled condenser | 8. Sight glasses  | 11. L/P gauge              | 14. Oil pressure protector |
| 3. Vibration eliminator | 6. Liquid receiver      | 9. Solenoid valve | 12. H/L pressure protector | 15. Water cooled condenser |

**Note: The components included differ from the unit models and the compressor types used !**

### 3.2 Main components

- 1) Compressor: suction the evaporated refrigerant gas, then discharge it into the condenser;
- 2) Condenser: A heat releasing device, with air or water, cool the compressor discharged refrigerant gas of high temperature and high pressure to become liquid;
- 3) Liquid receiver: To store the liquid refrigerant condensed by the condenser, and maintain an appropriate reserves, according to the change of working condition of refrigeration system decrease or supplement the refrigerant liquid in circulation. In addition, in case of repairing, the refrigerant can be collected into the liquid receiver. For the small water-cooled unit, as the condenser itself can function as the liquid receiver, it can be saved;
- 4) Dry filter: It keeps the refrigerant dry, and takes the impurities in it ensuring the reliable operation of the refrigeration system.
- 5) Sight glasses: with it can judge whether the refrigerant filling quantity right, whether there is water, air in the system.
- 6) Solenoid valve (if any) : When compressor stopped, the refrigerant can be shut down in the high side, effectively prevent liquid migrate into the compressor, resulting liquid striking the compressor. when the liquid refrigerant migration to the evaporator. If the unit arrives without solenoid valve, a solenoid is recommended to be fixed by the expansion valve.
- 7) H/L pressure protectors: when the high pressure is over or the low pressure is below their normal setting values, the compressor is stopped, thus ensuring the normal operation of the unit. There are diaphragm and mechanical types.
- 8) Oil separator(if any): The oil mixed in the discharged gas will be separated, and kept at the bottom of the oil separator, and supplied to the compressor automatically when the compressor crankcase oil level is low.
- 9) Oil pressure protector (if any): When the compressor lacks of oil or oil pressure is abnormal, it will stop the compressor, thus effectively protects it.

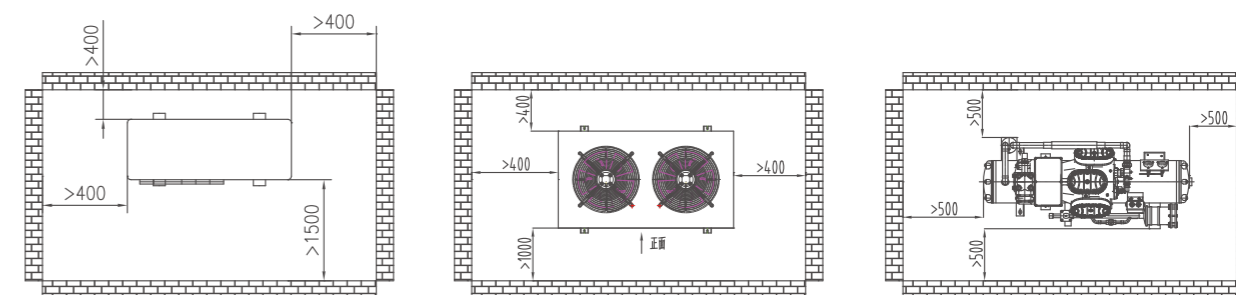
### Unit working principle:

The compressor discharge high temperature and high pressure gas refrigerants into the condenser, which makes the gas as liquid through cooling by the condensing fans or cooling water, then the liquid refrigerant goes into the liquid receiver, with its water and debris taken way by the dry filter, then through refrigerant liquid pipe into the evaporator, it evaporates completely as gas, then is suctioned into the compressor through suction line, and repeat the same circulation.

## 4. Installation

- 4.1 The declining angle of the units in transporting and installing must not be over 45°C.
- 4.2 The compressor condensing units must be installed in level in the place that can support the units' weight, avoiding the high temperature and moisture place. It should be covered with sunshine tent to shelter straight sunshine or raindrop if it is in the open.
- 4.3 The anti-vibration bottom feet of the compressor in the units were locked firmly originally. Before operating, the anti-vibration spring must be in the right place by taking off locked part or readjust the bottom nuts.
- 4.4 Installation space. For the air cooled condensing units, over 400mm has to be kept from the wall to the condensers, and over 1500mm space has to be kept from the wall to fans. For the water cooled units, over 500mm space has to be kept for convenience of operation.

Requirement is shown as below:



- 4.5 In the water cooled unit installation, sufficient capacity of cooling tower, pumps and pipelines have to be used to match the units demand. And strong alkaline or strong acid, or thick water is prohibited to be used as the cooling water.

## 5. Pipeline connection

### 5.1 The requirement of the pipe ling for refrigeration system

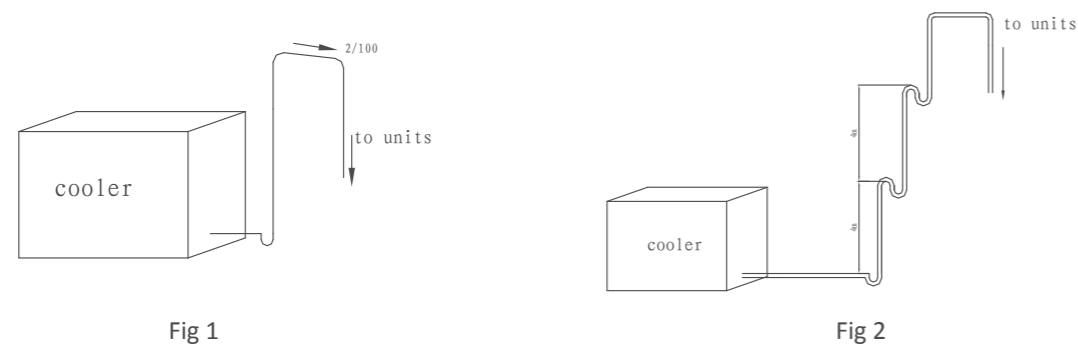
Match the refrigeration system according to the units' inlet and outlet pipe diameters or the calculated diameters for the liquid supply pipe and suction pipe lines.

Connect the refrigeration system with clean, moistureless copper pipes, in case steel pipes has to be used, it must be seamless type and the rust in it has to be cleaned.

The pipe lines between the unit and the evaporator should be as short and simple as possible and less elbows. If the elbows have to be used, their diameter has to be bigger ones.

For the flared mouth connections, the mouth must be smooth and burr free; For the brazing connection, the dry Nitrogen has to be used to remove the oxide skin; for the valves, precaution has to be taken to protect it from being burnt.

No less than 0.02 of slope for the suction line before the Compressor has to be set sloping down the compressor to ensure that the oil can flow back into the compressor in operation as figure 1.



A U-shape oil return elbow has to be set, and a standing part has to be made with its top over the evaporator. In case the unit is located above the evaporator, an inverted U-shaped elbow has to be set for every 4 m on suction line (See Figure 2)

The pipelines should be fixed and supported firmly to prevent vibration of the line.

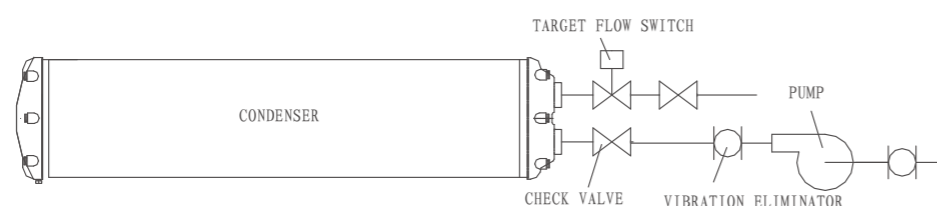
Heat insulation has to be made for the suction line to prevent condensation and abnormal overheating.

### 5.1 The requirement of the water cooling pipe line for water cooled units

The connection for the cooled water system of the units should follow the principle of that the the water will always goes in the condenser from the below inlet and goes out of the condenser from the upper pipe mouth.

A target flow switch is recommended for no water protection of the system.

The connection for the water cooled condenser is shown as diagram below:



## 6. Electrical connection

- 6.1 Please check the power supply used in the compressor and the condensing units. The power supply to be used must be exactly the same that of the unit required.
- 6.2 Cable connection with the compressor must be made strictly according to the specification. Wrong connection will ruined the compressor motor.
- 6.3 The electrical connection should be done by qualified electrical professionals;
- 6.4 In case the crankshaft case heater is used, it requires being on in compressor stop and being off in compressor operation.
- 6.5 The units should be properly grounding connected.
- 6.6 If the electrical control box is equipped, read its manual carefully before electrical installation and operation.

## 7. Commissioning

- 7.1 The refrigerating system must be cleaned with dry nitrogen gas to rid of the dust, oxidizes in the pipes, System not clean may result in abnormal running of the refrigerating system, or it may even ruined the compressor.
  - 7.2 Open all the valves in the refrigerating system, Test the system with pressure by dry nitrogen with 2.4Mpa of high pressure and 1.5Mpa in the low pressure, and keep the pressure 24h. It should be no leakage in the system. In case the condensing units have inner pressure before the installation, then it can save the test. The pressure has to be imposed gradually lest the gauges are damaged.
  - 7.3 The oxygen is not permitted absolutely to make the test, for it may result in explosion, and hurt.
  - 7.4 For the units with filter whose core is replaceable and arrived in the auxiliaries, the core has to be fixed in the filter.
  - 7.4 Release the pressure in the system, close all mouths in the system, and pump the air out from the high pressure side and low pressure side simultaneously with vacuum pump until the pump is over 30 Pa.
- Attention: It is prohibited to pump vacuum with the compressor, which may burnt the compressor. And don't use mega meter, or electrify the compressor in vacuum status, that may burn the compressor down.**
- 7.5 After the vacuuming process, fill the refrigerating system with specified refrigerant. The refrigerant filling has to be made in liquid through the bypass hole of the liquid supply valve of the liquid receiver. If the amount can not be up to the standard set-up, the refrigerant can be put in through the suction pipe of the compressor.
- Attention: In filling from the suction side, the refrigerant has to be in gas state; For R404A refrigerant, it can be filled in liquid state gradually, or too much liquid refrigerant mix with the oil, leading to compressor failure.**
- 7.6 Replenish oil. In case the connection pipeline is longer than 20m, replenishing oil will be necessary, attention that only the specified oil can be used, the specification is as the follow form.

Compressor type	Refrigerant	
	R22	R404A
ZB Scroll	3GS	32CF
ZF Scroll	32CF	
Bitzer semi hermetic	B5.2	BSE32
Danfoss Manurop	160P	160PZ

Check the compressor nameplate for the information.

### 7.7 Trial operation

- 7.7.1 Before operation, please check if the electrical connection is right, all the valves open, or there will be danger in it.
- 7.7.2 Set the value for all the control components at the right, such as mechanical type pressure controller, relay operation current, cold room temperature control etc. Wrong setting may impact the normal operation of the units.
- 7.7.3 The oil heater has to be electrified for over 4 hours before the unit starting.
- 7.7.4 Please check the fan turning direction of the condenser and that of the scroll compressor right or not. They can not run in the wrong direction for long.
- 7.7.5 Please check the refrigerant status by the sight glass on the liquid line. Tell if there is bubble or moisture. Bubble means refrigerant not sufficient, have to add until no bubble being seen.
- 7.7.6 Check the oil-returning of the compressor, the oil level in the crankcase box should be within 1/3-3/4 on oil glass. If it is lower than 1/3 or not in sight, then should check the oil-returning situation or supplement the refrigerated oil.
- 7.7.7 After the unit is started, and running, check if the condensing pressure, evaporation pressure, discharge temperature, and current is right.
- 7.7.8 Observe and test if the protection devices can act normally.

**Attention: In the trial operation, whenever abnormality is found, it is necessary to stop the unit and check it immediately.**

## 8. Operation & maintenance

- 8.1 A regular check to the units should be made to see the operation normal or not after the units run normally. Stop the unit for check and repair if there is any thing not in order.
- 8.2 When any trouble found, it should be inspected by specialist and the units can only be turned on again after the trouble is cleared. Never start forcibly, or it will damage the compressor seriously.
- 8.3 To keep the units run efficiently, a regular clean to the dust on the condenser surface should be made. No sharp tools or corrosive liquid has to be used for the cleaning of the water cooled condensers.
- 8.4 The refrigerant should be kept in the liquid receiver or shell and tube condenser and shut off the discharge cut-off valves for compressor when the unit will not run for a long term,
- 8.4 The units should not be used outside their working conditions, or the compressor may be damaged.
- 8.5 The CIC liquid injection has to be equipped for the semi hermetic compressors over 6 hp, and being used below the temperature of 025C for R22 refrigerant.
- 8.6 A oil separator has to be fixed for the units without it, and the units are to be fixed away from the evaporator more than 20 meters, and pipe line itself can not ensuring the oil returning completely.
- 8.7 A gas-liquid separator has to be fixed for the flood type evaporator system, or hot gas defrosting is used.
- 8.8 In the winter low temperature operation, to prevent the condensing pressure over low, the regulation by condenser fans or cooling water flow can be considered.
- 8.9 A regular check of the compressor oil is recommended, if it shows black or degraded quality, replace it timely.
- 8.10 For water cooled units, if they are not to be used in the winter, the water inside has to be drained to prevent it from freezing breaking.

## 9. Trouble shooting

Trouble	Reason	Action
Compressor start failure	No power in the main line, phase lack	Check and repair.
	Control trouble.	Check control circuit and repair or replace the troubled components.
	Compressor motor burnt.	Replace the compressor.
Compressor stop soon after start.	Unreasonable control setting.	Reset the value.
	Abnormal system pressure.	Check and repair.
	Compressor axis sticking.	Replace the compressor.
H pressure too high	Condenser fan or pump trouble	Repair or replace.
	Serious stain (or water stain) on the condenser surface.	Clean.
	Drainage air not complete, air or other gas in the system	Pump vacuum again.
	Too much refrigerant injected.	Discharge some refrigerant.
	Environment temperature too high or cooling water lack.	Control the environment temperature or enlarge the cooling water.
	The compressor outlet valve or liquid receiver valve not open well.	Open the valves completely.
H pressure too low	System leakage and not enough refrigerant.	Check leak, repair, refrigerant filling.
	Compressor inlet and/or outlet valve leakage.	Replace the troubled valves.
	Too thick frost or dirt on the evaporator	Clean or defrosting.
	Too much air flow in the condenser and too low temperature.	Control the air flow or cooling water flow.
	Oil separator returning valve no good, and high and low pressure connected.	Replace the oil separator.
L pressure too high	Load too heavy.	Decrease load.
	Compressor Inlet valve leak or cylinder gasket broken	Replace the compressor valve plate or cylinder gasket.
	Oil return valves of the oil separator trouble, and high and low pressure connected.	Replace the oil separator.
	The expanding valve supply too much liquid.	Check the temperature sensor ball, adjust the over heating.
	Insoluble gas in the system.	Release the air or insoluble gas.
L pressure too low	No clean inside system and the filter blocked.	Replace the core.
	Water in the system, and the expanding valve ice blocked.	Replace the core.
	Too thick frost or dirt on the evaporator.	Clean or defrosting.
	Evaporator fan trouble.	Replace the evaporator fan.
	The expanding valve trouble.	Adjust the over heat or change the valve.
	Too little refrigerant injection.	Check the leak and repair and filling refrigerant.

Oil pressure too low	Oil dirty, filter blocked.	Change the oil and oil filtering core.
	Compressor oil pump trouble.	Check the oil pump, repair or replace.
	Oil temperature too low, too much liquid in the crankshaft case.	Check the oil heater.
	Oil pressure controller trouble.	Replace.
	Compressor Bearing wore.	Replace the compressor.
Poor oil return	Oil separator trouble.	Replace.
	Pipe line defect resulted in oil obstacle.	Correct the pipe line.
Compressor Vibration	Compressor liquid striking.	Replace the compressor.
Noise level too high	Loose nut in the bottom foot compressor.	Tighten the bolting.
	Fan trouble of condenser.	Change the condenser fan.

## ! Alarm:

- All the installation, maintenance and repair can only be done by professionals.  
All maintenance and repair can only be done with the power supply switch off.

## Attachment 1:

### R22 refrigerant temperature to Gauge Pressure

Temperature (°C)	60	58	56	54	52	50	48	46	44	42
Pressure (kgf/cm <sup>2</sup> )	23.2	22.2	21.2	20.3	19.3	18.4	17.5	16.7	15.9	15.1
Temperature (°C)	40	38	36	34	32	30	28	26	24	22
Pressure (kgf/cm <sup>2</sup> )	14.3	13.6	12.9	12.2	11.6	10.9	10.3	9.7	9.2	8.6
Temperature (°C)	20	18	16	14	12	10	8	6	4	2
Pressure (kgf/cm <sup>2</sup> )	8.1	7.6	7.1	6.7	6.2	5.8	5.4	5.0	4.6	4.3
Temperature (°C)	0	-1	-2	-3	-4	-5	-6	-7	-8	-9
Pressure (kgf/cm <sup>2</sup> )	3.96	3.81	3.64	3.5	3.35	3.2	3.06	2.92	2.8	2.66
Temperature (°C)	-10	-12	-14	-16	-18	-20	-22	-24	-26	-28
Pressure (kgf/cm <sup>2</sup> )	2.53	2.3	2.06	1.84	1.63	1.44	1.25	1.1	0.92	0.77
Temperature (°C)	-30	-32	-34	-36	-38	-40	-42	-44	-46	-48
Pressure (kgf/cm <sup>2</sup> )	0.62	0.49	0.37	0.25	0.14	0.04	-0.05	-0.14	-0.22	-0.3

## Attachment 2:

### R404A refrigerant temperature to Gauge Pressure

Temperature (°C)	60	58	56	54	52	50	48	46	44	42
Pressure (kgf/cm <sup>2</sup> )	28.2	26.9	25.8	24.6	23.5	22.4	21.3	20.3	19.4	18.4
Temperature (°C)	40	38	36	34	32	30	28	26	24	22
Pressure (kgf/cm <sup>2</sup> )	17.5	16.6	15.8	15.0	14.2	13.4	12.7	12.0	11.3	10.7
Temperature (°C)	20	18	16	14	12	10	8	6	4	2
Pressure (kgf/cm <sup>2</sup> )	10.1	9.5	8.9	8.4	7.8	7.3	6.9	6.4	6.0	5.5
Temperature (°C)	0	-2	-4	-6	-8	-10	-12	-14	-16	-18
Pressure (kgf/cm <sup>2</sup> )	5.1	4.8	4.4	4.1	3.7	3.4	3.1	2.8	2.6	2.3
Temperature (°C)	-20	-22	-24	-26	-28	-30	-32	-34	-36	-38
Pressure (kgf/cm <sup>2</sup> )	2.08	1.85	1.64	1.44	1.25	1.08	0.91	0.75	0.61	0.47
Temperature (°C)	-40	-42	-44	-46	-48	-50				
Pressure (kgf/cm <sup>2</sup> )	0.35	0.23	0.12	0.02	-0.08	-0.17				