Panasonic

No. : 9CB046SA04-00-GGS-0

APPROVAL SHEET

SPECIFICATIONS OF HERMETIC SCROLL COMPRESSOR

MODEL	9CB046SA04

NO.	DATE	PAGE	REVISION DETAILS	PAPCDL SIGNED	CLIENT SIGNED
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REVISION RECORD

Panasonic Appliances Compressor (Dalian) Co., Ltd.

Section 1. General Specifications

Content		Unit	Specification
Compressor Model		—	9CB046SA04
Type		—	Hermetic Scroll Compressor
Application		—	High Back Pressure
Evap. Temp. Range		°C	-25~+27
Compressor Cooling Type		—	Natural Cooling
Power Source	Phase	—	3
	Rated Voltage	V	380~415
	Rated Frequency	Hz	50
Voltage Range		V	342~456
Weight (Including Oil)		kg	37.5
Refrigerant		—	R32
Oil Type		—	FW68S
Oil Charge		ml	1700
Displacement		cm^3 /rev	46.4
Maximum Continuous Current (MCC)		A	11.2
Motor	Motor Type	—	3-PH Induction Motor
	Number of Poles	—	2
	Electrical Insulation	Class	E
	Nominal Revolution	min^{-1}	—
	Starting Current	A	66
	Winding Resistance [at 25°C (77°F)]	Ω	U-V 2.433
			U-W 2.433
			V-W 2.304
Connection Tube	Suction Line (O.D.)	mm	22.2
	Discharge Line (O.D.)	mm	12.7
Compressor Surface Paint		—	Black Paint

Notes

1 Voltage range is applied at standard rating conditions.

2 Motor specifications in the table are the average values for your reference.

3 （）：All units with parentheses are reference values..

Expiration of Specification

Expiration of this specification shall be effected until issuing a notice with indication of the expiration date from the issued date . In case of improvement or elimination of this specification , it shall be handled by the revision record based on agreement between both sides.

Section 2. Performance Warranty

2.1 Performance (PRELIMINARY DATA)

Power Source (3PH)	Hz	50	Remark
	V	380	
Refrigerant	—	R32	
Capacity	W	12,200	
	(BTU/hr)	41,626	
Input Power	W	4,360	
Current	A	7.70	

Standard Rating Conditions

Refrigerant.	—	R32
Condensing Temp.	°C	54.5
Evaporating Temp.	°C	7.0
Suction Gas Temp.	°C	18.5
Liquid Temp.	°C	46.0
Ambient Temp.	°C	35.0

2.2 Sound Level

Power Source (3PH)	Hz	50
	V	380
Sound Level	dB(A)	61Max.
Notes 1 The operating conditions are the same as 2.1. 2 MIC location is the distance of 1m (3.28feet) from the compressor. 3 Sound Level is an average sound pressure level in four directions.		

2.3 Minimum Starting Voltage

Power Source (3PH)	Hz	50
Minimum Starting Voltage	V	323

Conditions

Compressor Temp.	°C	10~60
Ambient Temp.	°C	10~40
High Pressure	MPa(G)	3.38
Low Pressure	MPa(G)	0.91

2.4 Others

Content		Unit	Specification
Design Pressure	L.P. S.	MPa(G)	2.8
	H. P. S.	MPa(G)	4.5
Insulation Resistance		MΩ	100 (without refrigerant)
Dielectric Strength (The leakage current is less than 10mA)		V	1900 (1 minute)
Residual Moisture		mg	300MAX.
Note: 1. The insulation resistance be measured with a DC500V megohm tester.			

Model: 9CB046SA04

File No: 9CB046SA04-00-GGS-0

Section 3. Standard Accessories

3.1 Accessories List

Parts Name	Qty	Parts code	Revision No.	Note
Terminal Box Cover	1	A-0101-DSB	0	Installed on Compressor
Terminal Box Clip	1	A-0201-DSB	0	Installed on Compressor
Eyelet Rub Lead Wire	1	A-0301-DSB	0	Installed on Compressor
Mounting Grommet	4	M-0101-DSB	0	
Mounting Sleeve	4	M-0201-DSB	0	
Screw Special	4	B-0101-DSB	0	Installed on Compressor

3.2 The Drawing for Reference

Parts Name	Parts Code	Revision No.
Compressor Outline Drawing	D-0101-DSB	0
Mounting Parts Listing	M-5101-DSB	0
Packing Dimensions	D-0204-DSB	0
Wiring Diagram	E-0910-DSB	0

3. 3 Inernal Motor Protector (in compressor)

Parts Name	Specification		
Inernal Motor Protector	Model	UP18MA052-770 *3	37HM530-15 *3
	Trip Temprature	130±5℃	125±5℃
	Reset Temprature	70±10℃	65±9℃
	Trip Current	46A / 3~10s	50A / 3~10s

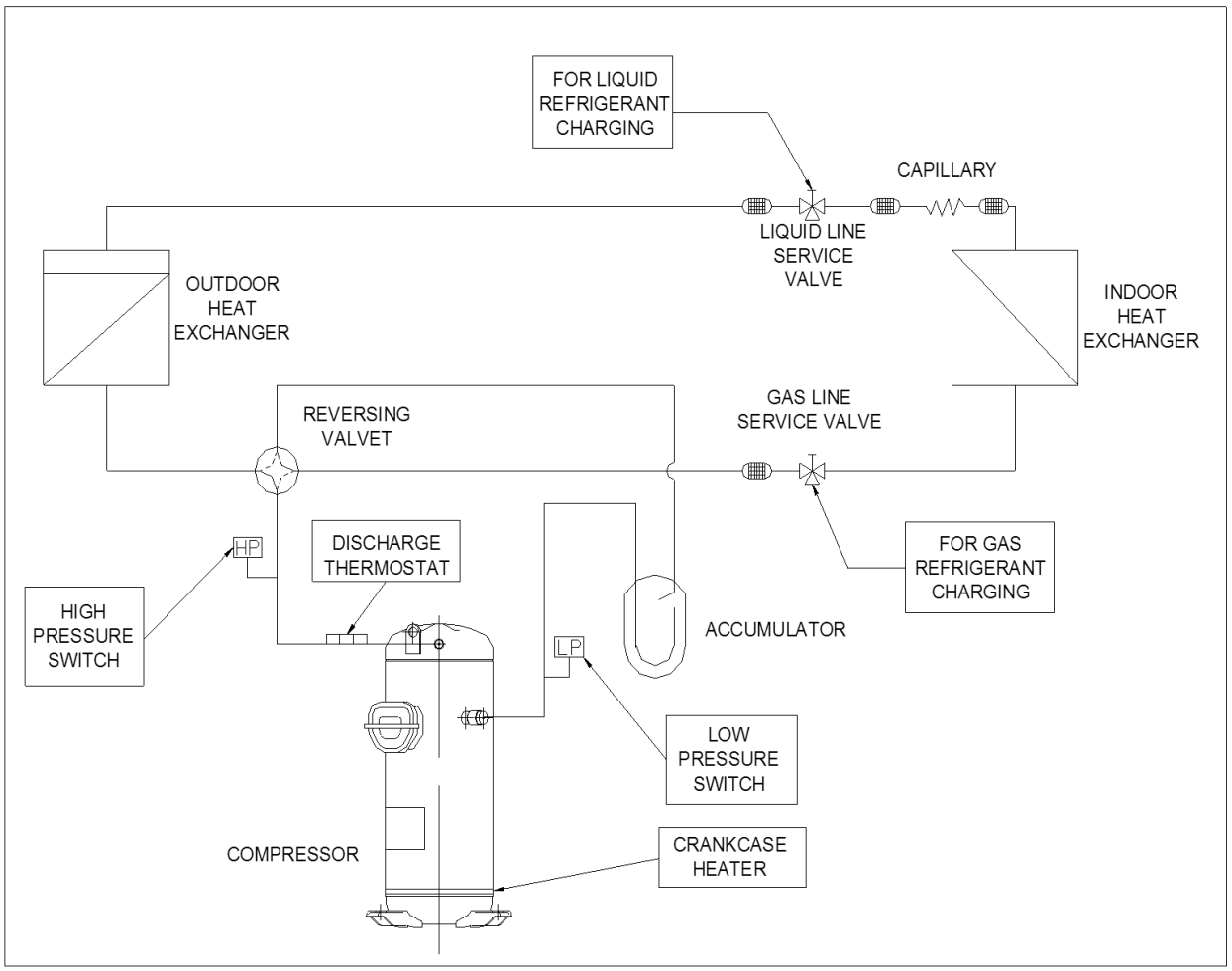
1. When the protector is not on current, the ambient temperature of the protector rises to the temperature of protector which is for touching current and off, this is operating temperature. Then, the ambient temperature of the protector goes down the moment it touches current and closes, at this moment, the temperature of the protector is recovery temperature.
2. When the current of compressor is overloaded, under the ambient temperature 25℃, the protector can guarantee the motion in the limited current within the first operating circles 3-10seconds.
3. Please kindly choose either of one.

Section 4. Compressor Protection

4.1 Protection Required but not Included with compressor

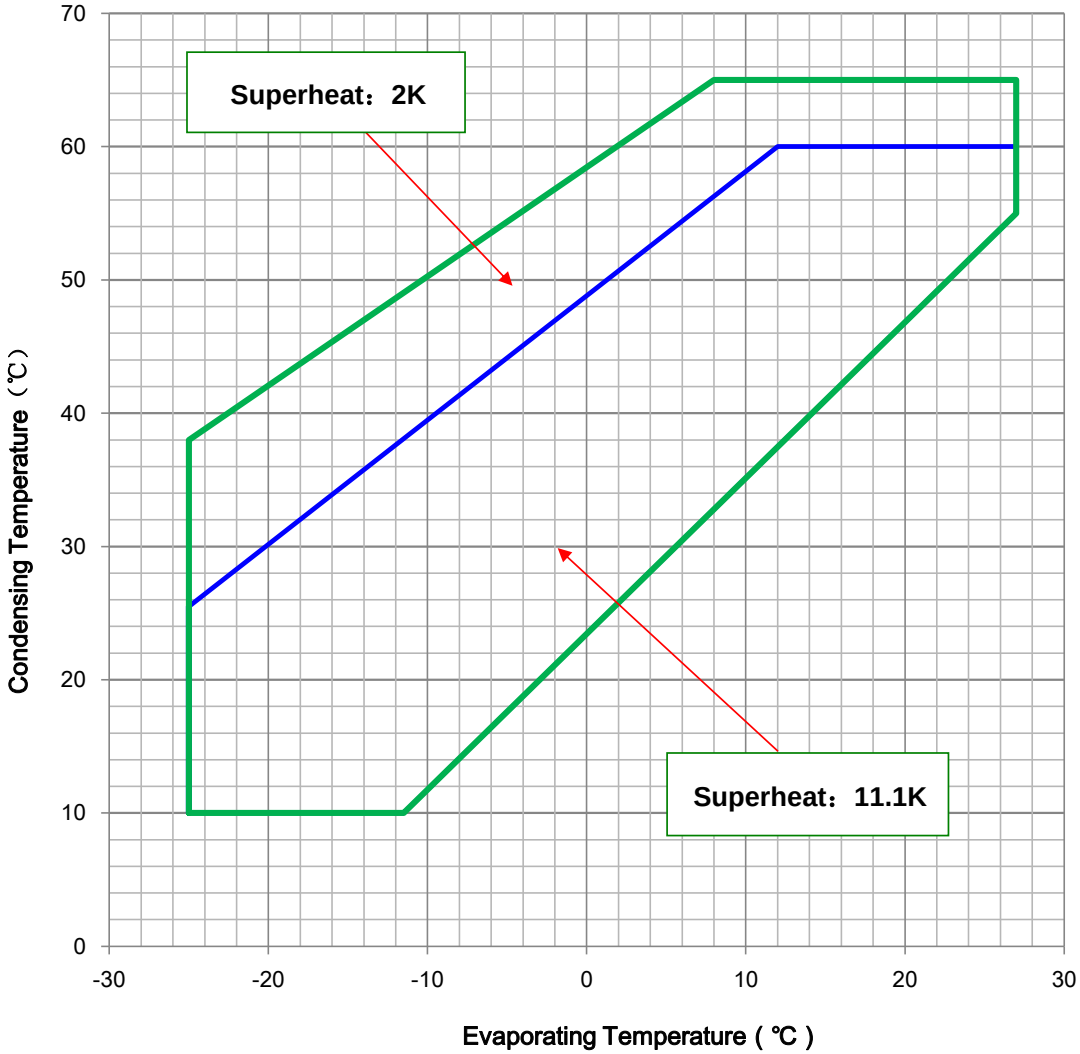
Protection Device	Items	Specifications
Reversal Defensible Relay	Features	To protect the compressor from reverse rotation
	Rated Voltage	AC380V
Crankcase Heater	Rated Power	35 W 240V
Discharge Thermostat	Mounting Position	Located within 100mm(4 in)from the compressor shell
	Trip Temperature	130±5℃
	Reset Temperature	95±11℃
High Pressure Switch	Setting	Cut-out seting no higher than 4.27Mpa(G)
Low Pressure Switch	Setting	Cut-out seting no lower than 0.23Mpa(G)

4.2 Position of the Protection and Refrigerant Charging



Section 5. Operating Envelope

Refrigerant : R32.



Section 6. Application Standard & Limit

The following requirements apply to vertical type hermetic scroll compressors:

Standard: Applicable to ordinary conditions in Japan JIS B8616 or equivalent conditions, such as standard rating conditions, maximum operating conditions, low temperature conditions, etc.

Limit: Applicable to transitional brief period of time, such as start-up and beginning of defrost mode.

No.	Item	Standard	Limit	Note
1	Refrigerant	R32		
2	Evaporating Temp.	-25~+27℃ 0.24~1.68MPa（G）		Compressor Suction Pressure
3	Condensing Temp.	+10~+65℃ 1.00~4.27MPa（G）		Compressor Discharge Pressure
4	Compression Ratio	2~8		
5	Winding Temp.	115℃ Max.	125℃Max.	
6	Shell Bottom Temp.	Upper Limit：90℃Max.		When compressor is running
		Lower Limit：Evaporating Temp.+12K Min.		
		Lower Limit：Ambient Temp.+11K Min.		When compressor shuts off
7	Discharge Gas Temp.	130℃ Max.		Temp. within 100mm(4in) of the discharge fitting.
8	Suction Gas Temp.	Superheat: 2K Min.	There should be no scour sound caused by liquid inhalation(No increase in current and vibration)	It should meet the requirement of item 5, 6, 7 and 14 within 30cm of the suction fitting.
9	Running Voltage	Within ±10% of the rated voltage		Voltage at compressor terminals.
10	Starting Voltage	Three Phase Models: 85% of the rated voltage min.		Dropped voltage at compressor terminals.
11	On/Off Cycling	On Period: Until the oil level returns to the center of the lower bearing Off Period: Until balance of high and low pressure is obtained		For at least 7 minutes -on/3 minutes-off is recommendable. 200,000 cycle Max.
12	Refrigerant Charge	oil/refrigerant(wt.)⩾0.35		Specific gravity of the Oil:0.94
13	Minimum Oil Level	Center of the lower bearing	Bottom of the lower bearing	
14	Abnormal Pressure Rise/Drop	Pressure Rise：4.27MPa(G) Max.		By high pressure switch
		Pressure Drop：0.23MPa(G) Min.		By low pressure switch
15	System Moisture Level	200ppm Max.		
16	System Uncondensable Gas Level	1 Vol.% Max. Residual Oxygen 0.1 Vol.% Max.		24 hrs. after vacuuming: 1.01kPa Max.
17	Tilt	5° Deg.Max.		

Operation beyond the above limits must be approved by Panasonic Appliances Compressor (Dalian) Co., Ltd.

(G): Gauge Pressure

Notes

1 Installation should be completed within 15 minutes after removing the rubber plugs.

2 Do not use the compressor to compress air.

3 Do not energize the compressor under vacuumed conditon.

4 Evacuation and Refrigerant charge： Evacuate internal section in the refrigeration system from high and low pressure sides and charge liquid refrigerant from condenser outlet side. Additional charge shall be done with gas condition from low side.

5 Do not tilt over the compressor while carrying it.

6 Do not remove the paint.

7 Crankcase heater is required when the oil sump temperature is too low to meet the requirement of item 6 on page7.

8 Voltage fluctuation between compressor terminals, during operation, shall be within 2% of the rated voltage.

9 Do not operate compressor in reverse rotational direction.

10 Suction strainers are recommended for all applications.

11 Copper Piping Stress	Start/Shutdown	34.32 N/mm^2 Max.
	Run	12.26 N/mm^2 Max.

12 When The Compressor body and its packaging is abandoned,Please follow every sales environmental standards, For packaging refrigerant oil ,solid recycle and dispose.

13 Panasonic Appliances Compressor (Dalian) Co,Ltd provide the 《Compressor Specification Common Appendix》and 《Safty Request on the use of Compressor》also fit this specification.

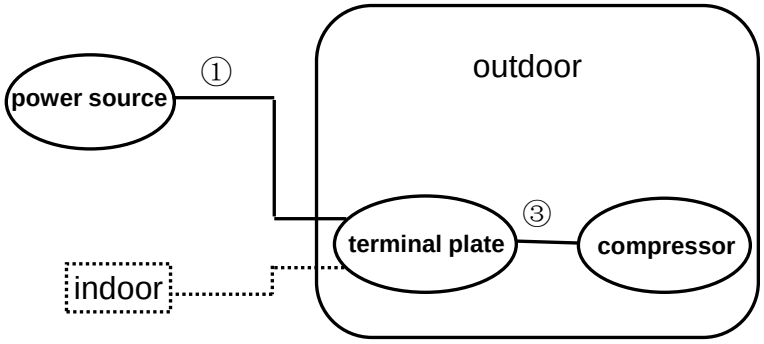
Section 7. Selection of Electrical Wire

Voltage drop may occur due to the large current draw during compressor starting.

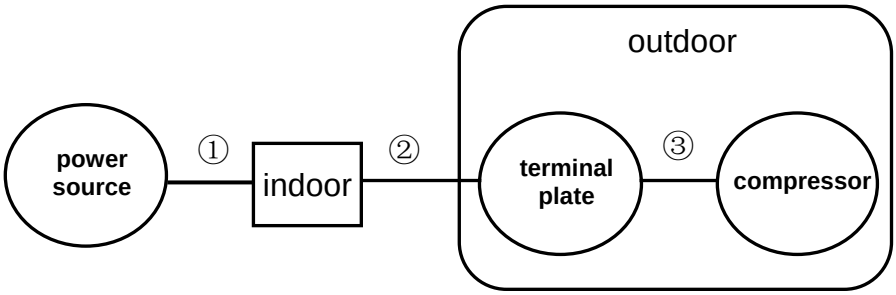
We recommend selecting the wire size from the table below.

7.1 Type of Unit

7.1.1 Window & Commercial Type Unit



7.1.2 Split Type(Separate Type)



7.2 Size Table of Electrical Wire

Starting current (A)	Size of electrical wire (mm^2)						
	Remark ①Length or Remark ①+②Length (heat-resistance Temperature: 60°C min.)						Remark③Length (heat-resistance Temperature: 120°Cmin.)
	5m max.	10m max.	15m max.	20m max.	30m max.	50m max.	1m max.
20max.	2.0	2.0	2.0	3.5	5.5	8.0	2.0
30max.	↑	↑	3.5	5.5	↑	14.0	↑
40max.	↑	3.5	5.5	↑	8.0	↑	↑
50max.	↑	↑	↑	8.0	14.0	22.0	↑
60max.	↑	5.5	↑	↑	↑	↑	↑
70max.	3.5	↑	8.0	14.0	↑	↑	3.5
80max.	↑	↑	↑	↑	22.0	30.0	↑
90max.	↑	↑	14.0	↑	↑	↑	↑
100max.	↑	8.0	↑	↑	↑	38.0	↑
110max.	↑	↑	↑	↑	↑	↑	↑
120max.	5.5	↑	↑	22.0	30.0	↑	↑
140max.	↑	14.0	↑	↑	↑	50.0	5.5
160max.	↑	↑	22.0	↑	↑	↑	↑
180max.	↑	↑	↑	↑	38.0	60.0	8.0
200max.	8.0	↑	↑	30.0	↑	↑	↑
220max.	↑	↑	↑	↑	50.0	80.0	↑
240max.	↑	↑	↑	↑	↑	↑	8.0*

* 8.0mm² wire can be used below 0.8m

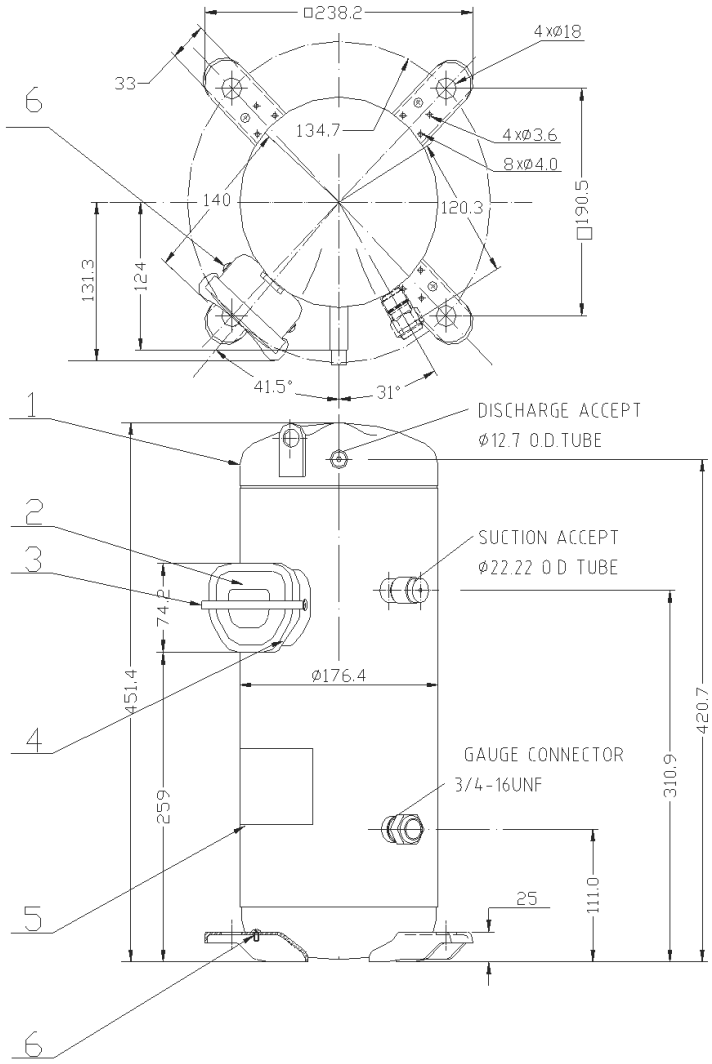
7.3 Caution of Ground

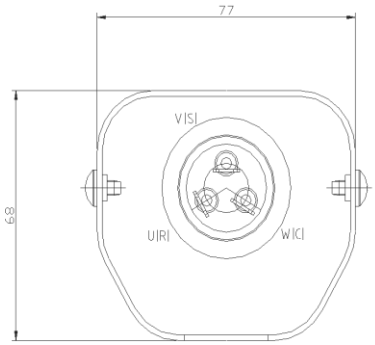
The internal motor protector does not protect the compressor against all possible conditions.

Please be sure that the system utilizes the ground connection when installed in the field.

Earth leakage circuit breaker must be installed.

No.	Part Code	Qty	Name
1	9CB046SA04	1	Compressor
2	A-0101-DSB	1	Terminal Box Cover
3	A-0201-DSB	1	Terminal Box Clip
4	A-0301-DSB	1	Eyelet Rub Lead Wire
5		1	Nameplate
6	B-0101-DSB	4	Screw Special





TERMINAL

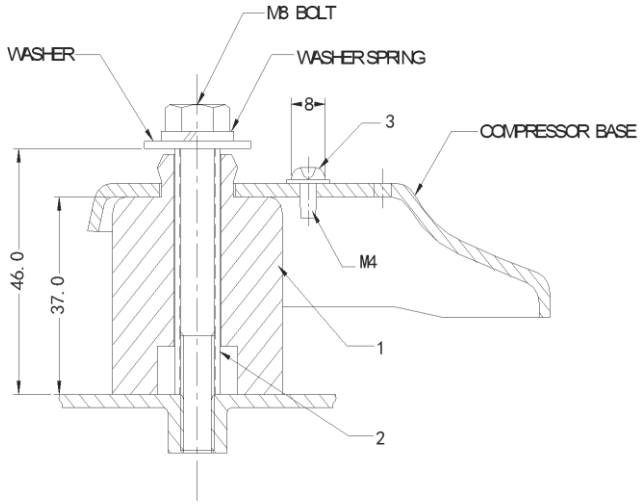
Part Code

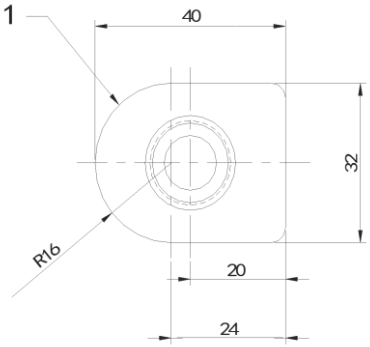
D-0101-DSB-0

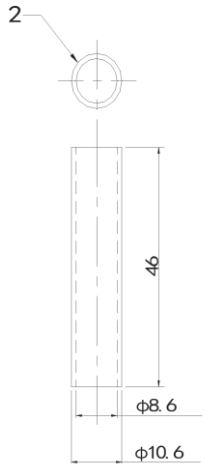
Name

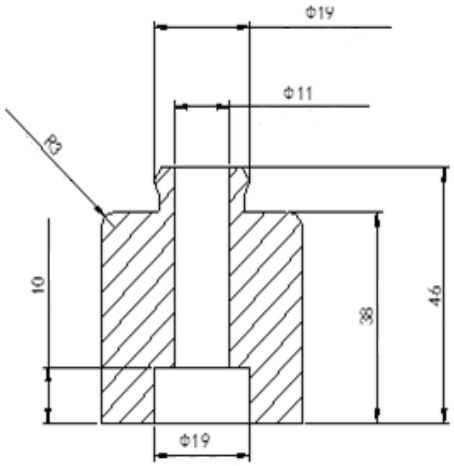
Compressor Outline Drawing

No.	Part	QTY	Name
1	**M-0101-DSB**	**4**	**Mounting Grommet**
2	**M-0201-DSB**	**4**	**Mounting Sleeve**
3	**B-0101-DSB**	**2**	**Screw Special**







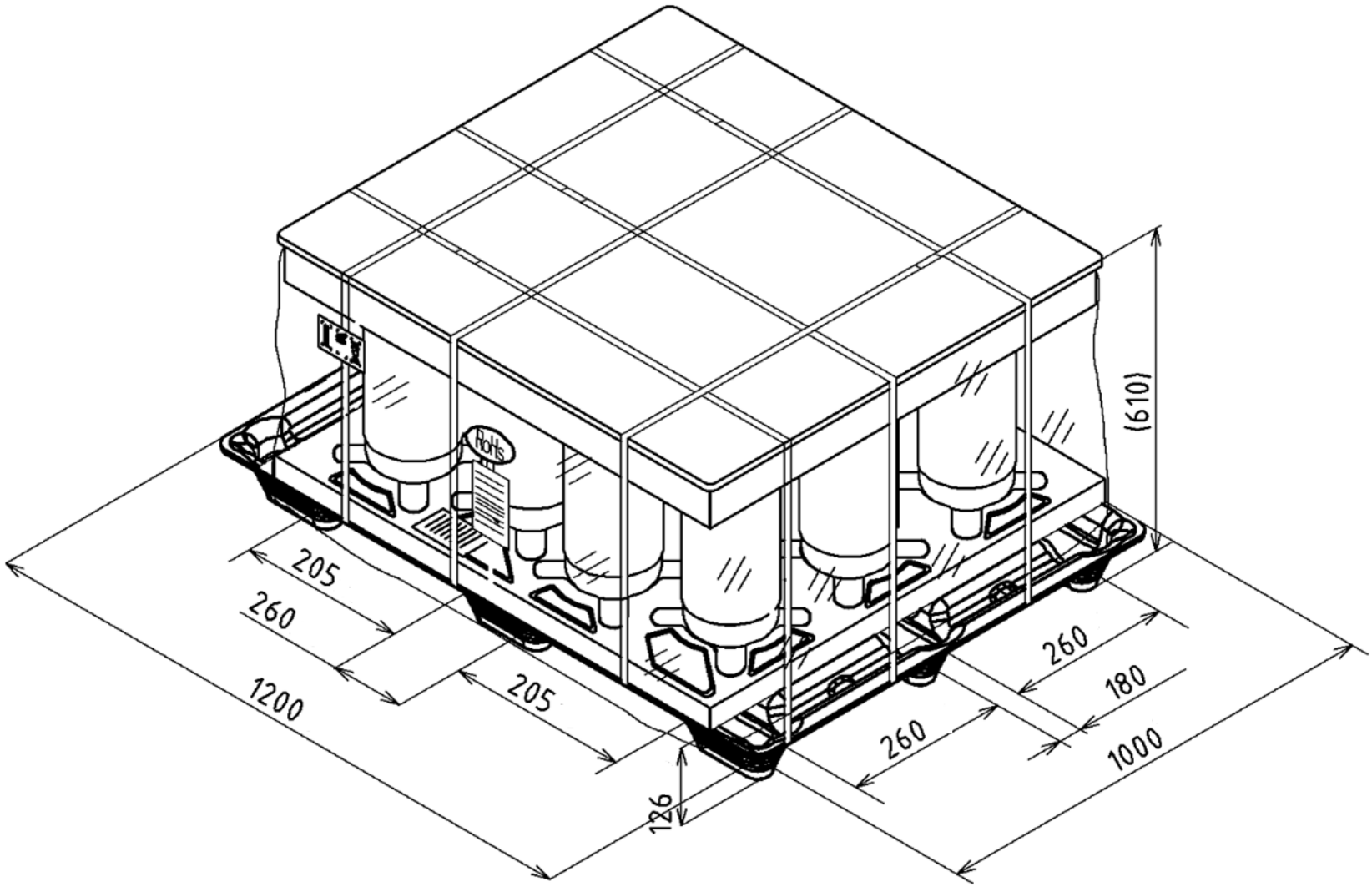


Part Code

M-5101-DSB-0

Name

Mounting Parts Listing

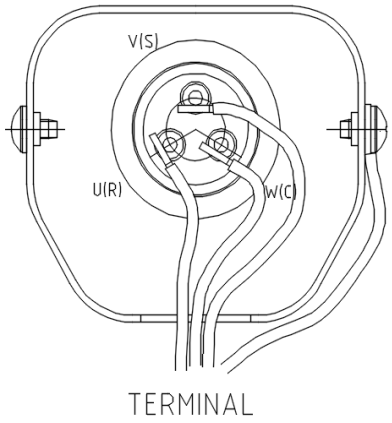


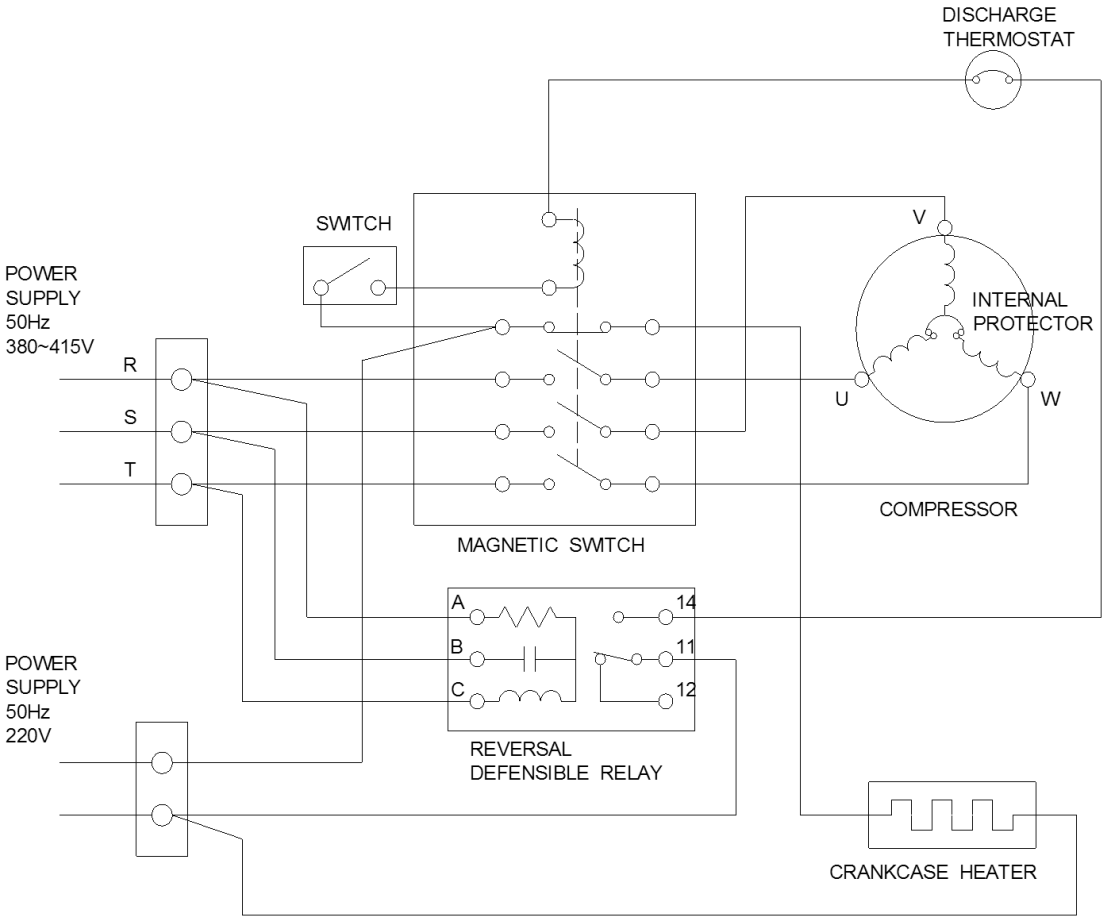
Part Code

D-0204-DSB-0

Name

Packing Dimensions





Part Code

E-0910-DSB-0

Name

Wiring Diagram

No.	CE - 100004E
Sheet No.	10-1

Compressor Specification Common Appendix

Ver. 2020-10

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2020. 11. 24

1. Scope

This common appendix applies to the Panasonic compressor for air conditioner, air-source heat pump water heater, humidifier, and dryer systems to secure the safety ,the reliability and durability of the end product and the compressor.
However as for special application such as automobile air-conditioners, each compressor specification will be arranged separately.
Regarding the detail specification, refer to each compressor specification.
When there is a difference between this common appendix and the compressor specification, prioritize the individual compressor specification.

2. Common Specifications of Compressors

2.1 Air tight and Hydrostatic withstand pressure of housings

Air tight and Hydrostatic withstand pressure of housings comply with IEC60335-2-34, UL60335-2-34, Refrigeration Safety Rules, Refrigeration Safety regulations relationship illustrated reference, and EU Pressure Equipment Directive (2014/68/EU)

2.2 Insulation resistance (at a refrigerant stagnation)

Regarding the Insulation resistance between live parts and accessible parts when applied voltage of 500V DC, refer to each compressor specification for the requirements.

2.3 Clearances and creepage distances

Clearances and creepage distances shall comply with IEC 60335-1, IEC 60335-2-34, UL 60335-1, UL 60335-2-34, and PSE (The Electrical Appliance and Material Safety Law "Denanhou").

2.4 Dielectric withstand voltage test (opened to atmosphere)

When applying alternating voltage with a frequency of 50Hz or 60Hz between the live part and accessable metal parts, the compressor shall withstand continuously for 1 minute.
The applied voltage shall be 1,500V when the rated voltage is $\leqq$ 250V or less, and twice the rated voltage +1,000V when the rated voltage is > 250V.
However, for mass production inspection, 1,800V may be applied for 1 second instead.

2.5 Residual moisture

Residual moisture is measured according to Panasonic in-house standard.
Refer to each compressor specification for the requirements.

2.6 Residual contamination

Residual contamination is measured according to Panasonic in-house standard.
Refer to each compressor specification for the requirements.

2.7 Appearance

The entire surface of the compressor is coated with black paint and shall be free from cracks, dents, peeling, rust and so on.

2.8 Marking

Model name and production date are marked on the surface of the compressor.
When refrigerant oil and dried N2 gas is charged, the designated mark is stamped.

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3. Restrictions

3.1 Compliance with compressor specification

Operate the compressor within the operating range described in the common appendix and compressor specification. Make sure to place a fuse or a breaker, when the compressor is installed to the end product. Circuit breakers will be necessary according to the installed location.

3.2 Supply voltage

The voltage applied to hermetic terminals shall be within the range described in the compressor specification.
In the case of an inverter compressor, the compressor shall be connected to an inverter driver specifically designed for the compressor.
Do not supply AC voltage (single phase 100V, 200V, 220V, three-phase 200V etc.) directly to the terminal of the inverter compressor. If an AC voltage is directly connected to the inverter compressor using a DC brushless motor, the DC motor inside the compressor will be demagnetized.
In the case of a fixed speed three-phase compressor, it is recommended that the imbalance ratio of the power supply voltage be within 2% to prevent performance deterioration and burnout due to local heating of the motor.

3.3 Suction temperature

The suction temperature shall be higher than evaporator outlet temperature. (If there is a specific description in the compressor specification regarding to superheat, follow the contents.)

3.4 Discharge temperature

The Discharge temperature shall be lower than the limitation in the compressor specification.
When there is no description regarding the discharge temperature measuring point, it shall be at the discharging tube located at 100mm ~ 150mm from the compressor surface. However, for models with a temperature sensor attached in the discharge tube, the discharge temperature is the detected temperature of the sensor.

3.5 Motor coil temperature

The motor coil temperature shall be lower than the limitation of the compressor specification.

3.6 Operating pressure and compression ratio

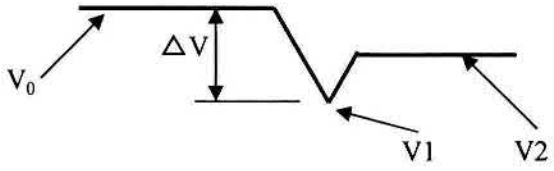
The suction pressure and discharge pressure shall be within the range described in the compressor specification. However, when operating pressures exceed the range described in the specification during transitional period such as during start up and defrosting, it may be judged by testing or checking the operating data.

3.7 Starting and maximum current of the compressor

The starting current and maximum current shall be within the range described in the compressor specification. In the case of inverter compressor using a DC brushless motor, over current will cause demagnetization of the DC brushless motor or motor burnout.

3.8. Starting voltage of compressor (exclude inverter compressor)

The starting voltage mentioned in the compressor specification is the voltage applied to the compressor terminal, and is described as V1 in the following figure.



V_0: Terminal voltage before operation
V1: Terminal voltage at starting
V2: Terminal voltage after stable operation
ΔV: Voltage drop at starting

With regards to the voltage drop at starting, it is necessary to consider the size/type of lead wire to be connected to the terminal of the hermetic terminals.

3.9 Liquid refrigerant flood back

Liquid refrigerant flood back can cause great influence to the reliability of compressor.
When liquid compression, knocking noise, current surge, or undesirable vibration etc. occurs, implement the following countermeasures to prevent liquid refrigerant flood back.
Liquid compression can lead to serious damages to mechanical parts.

1) Add another accumulator
2) Decrease refrigerant charge amount
3) Change the operation mode
4) Install an additional internal heat exchanger

Observe with the compressor with sight glasses supplied by Panasonic, and submit the results.

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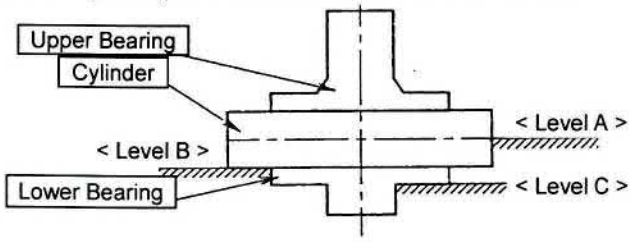
2020. 5. 12

3. 10. Oil level of the compressor

The minimum oil level in the compressor shall comply with the requirements of the compressor specification to ensure the compressor reliability.
When the oil is foamed, do not consider the foaming portion as oil level.
Low oil level will cause lack of lubrication to rotating parts and seriously affect the compressor reliability. Observe the oil level with the compressor with sight glass supplied by Panasonic, and submit the result.

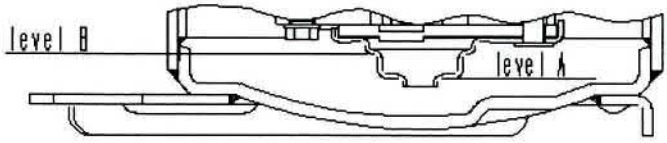
<<Example of requirements of oil level>>

The rotary compressor of PWAPCGZ and PAPAMY



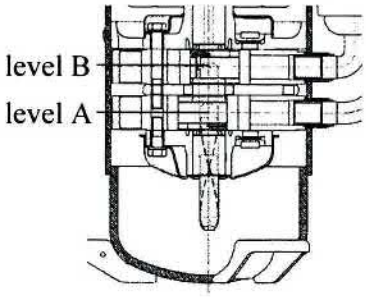
Operating Frequency	Lowest Oil Level	Transition Period
12 Hz - under 60 Hz	Level A	Level B within 3 minutes
60 Hz - 120 Hz	Level B	Level C within 2 minutes

The scroll compressor of PWAPCGZ



· level A : Lowest oil level during transition operation
· level B : Lowest oil level during stable operation

The rotary compressor of PAPCDL



· level A : Lowest oil level during transition operation
· level B : Lowest oil level during stable operation

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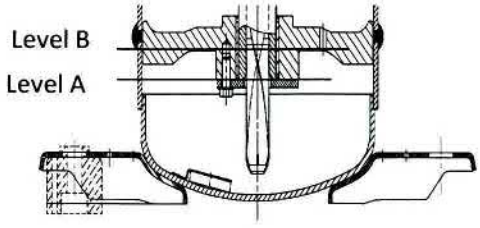
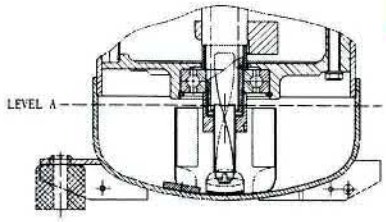
The scroll compressor of PAPCDL



· level A : Lowest oil level during transition operation
· level B : Lowest oil level during stable operation
C-SB series>



· level A : Lowest oil level during transition operation and stable operation
<C-SC series>

[Cautions on using compressor with sight glass]

1. The sight glass is made by tempered glass. However, just n case, do not look directly through the sight glass. On observation of oil from sight glass, observation through acrylic plate etc. or using a video camera is recommended.
2. Do not give any impact to sight glass.
3. Do not heat the sight glass with flame of burner, when applying the compressor to unit.
4. If sight glass get a crack or breaks etc., stop operation immediately.

3.11 Surface stress of pipe

Suppress surface stress (half amplitude) of copper pipes connecting the compressor and refrigeration cycle shall be less than the values described in the compressor specification.

3.12 Allowable inclined angle

Suppress the allowable inclined angle so as to be less than the values described in the compressor specification. However, deviations of the allowable angle may be approved after confirmation of the operation in some cases.

3.13 Change rate of compressor operation speed

The rate of operation speed change of the inverter compressor can affect the comperssor reliability. (the rate shall be determined after confirmation of compressor oil level, liquid back, and reliability test results.)

If there is a specific description in the compressor specification, follow the contents.

3.14 Starting of the compressor

In the case of inverter compressor, operation at rather low frequency after starting is necessary to avoid insufficient lubrication due to low oil level. Therefore, make sure that the oil level is secured. Confirmation of oil level is also necessary when re-starting after defrost etc. Compressors with sight glasses are available to provide from Panasonic.

If there is a specific description in the compressor specification, follow the contents.

3.15 Defrost operation

Inverter compressors shall operate at low frequency just before the start and end of defrost operation to maintain the oil level inside the compressor.

Observe the oil level using compressor with sight glass supplied by Panasonic and inform the results.

3.16 Cautions on transfer to low frequency operation (scroll compressor)

For inverter compressors, to prevent plunge of refrigeration capacity due to separation of stationary and orbit scroll, pay attention to sharp drop of pressure difference and liquid back, when transferring to low frequency operation which is no more than 1500 min^{-1}.

3.17 Low frequency operation (scroll compressor)

When operating the scroll compressor under 1500 min^{-1} more than 30 minutes, operate the scroll compressor at more than 1500 min^{-1} for more than 5 seconds to secure appropriate lubrication.

3.18 Operation Interval

The maximum number of operation interruptions shall be 6 times per hour.

Operate the compressor continuously at least for 5 minutes after restarting, or operate the compressor until the oil level is back to normal.

The shut-down period shall not be less than 3 minutes, or restart the compressor after balancing the pressure of the discharge and the suction.

3.19 Direction of rotation

Connect wires following the wiring diagram described in the compressor specification.

Misconnection cause reverse rotation or starting failure, which will damage the compressor.

Check the wiring diagram to avoid misconnection.

For the three phase induction compressor, use a negative phase protection relay.

3.20 Dustproof for hermetic terminal

Cover the hermetic terminal with the terminal cover to prevent or reduce dust intrusion. Follow the designated mounting method of the terminal cover.

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3.21 Strainer

Place a strainer with a fine mesh screen in the suction pipe and an oil supply pipe to prevent intrusion of foreign particles to the compressor. The strainer should have a diameter greater than or equal to 30mm and the screen should have a mesh greater than or equal to #100.
This shall not apply if an accumulator which includes a screen with the specification described above is used.

3.22 Dryer

When setting a dryer to the refrigeration cycle with a compressor containing POE oil (such as RB68A), use a proper dryer compatible with the used refrigerant.

4. Restriction in manufacturing processes

4.1 Contamination control in a refrigeration cycle

The contamination shall be controlled in the refrigeration cycle and avoid invasions of dust or contamination residues.

4.2 Refrigerant Charging

Do not charge liquid refrigerant directly into the compressor, when charging refrigerant to the refrigeration cycle. Confirm Nitrogen flow from the compressor, when opening the seal of the compressor. Finish installation to the unit within 15 minutes after opening the seal of the compressor.

4.3 Operation for compressor lubrication

For proper lubrication of the compressor, operate the compressor for more than 20 seconds within 15 minutes after charging the refrigerant to the refrigeration cycle.

4.4 Process Inspection

Even during inspection process, operate the compressor within the specified operation range.

4.5 Process Inspection for inverter compressors

When the inverter compressor is operated at high speed during inspection process, operate the compressor at low speed to collect oil into the compressor before shut down.

4.6 Parts

Do not use parts used for refrigerants that are not specified in the compressor specification.

4.7 Use of chlorinated solvents

Chlorinated solvents shall not be used to clean pipes or parts.
When chlorinated solvents are used, remove residues of chlorinated solvents.

4.8 Use of polymeric materials

The compatibility of polymeric materials such as plastic used in the refrigeration cycle shall be evaluated towards refrigerant and refrigerant oil.

4.9 lubricant oil for process

Check the compatibility of process oil such as lubrication oil for heat exchanging and choose oil which do not effect the system.

4.10 Brazing flux

Flux-free brazing is recommended for brazing copper pipes. When material is copper and steel which brazing flux is necessary, select a brazing flux which does not affect the refrigerant oil and eliminate residual brazing flux as much as possible.

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4.11 Brazing process

It is important to flow nitrogen through the system while brazing all joints during the system assembly process. Nitrogen displaces the air and prevents the formation of copper oxides in the system.

4.12 Leakage test

Charge the designated refrigerant and use a leakage detector exclusive to refrigerants to check the leakage. Do not use chloride refrigerants.

5. Miscellaneous requirements

5.1 Operation with air

Do not run the compressor with air.
Do not disconnect pipes during installation and pump-down.
When disconnecting pipes with the discharge side valve closed and the suction side valve opened during operation of compressor, both pressure and temperature inside the compressor would increase and may cause explosion and injuries.
When operating the compressor with air for product inspection etc., please contact us.

5.2 Operation in a vacuum

Do not operate the compressor in a vacuum state, such as operating during air purge with a vacuum pump. It may cause dangerous arc discharge and dielectric breakdown.

5.3 Electric pulse

Do not supply electric pulse to the hermetic terminals when the compressor is in a vacuum state.

5.4 Pump-down operation

Pump-down operation shall finish within 10 minutes at maximum rotation speed, 3600min^{-1}.

5.5 Vibration

Do not rock the compressor during operation.

5.6 Temperature limit

To prevent oil degradation, do not set the temperature inside the refrigeration cycle to -35 ° C or less for high / medium temperature models, and -50 ° C or less for low temperature models.
If there is a specific description in the compressor specification, follow the contents.

5.7 Operation at a low ambient temperature

If liquid refrigerant accumulates inside the compressor due to use (including stoppage) at low ambient temperature or use with large amount of refrigerant, decrease in the refrigeration oil dilution ratio or decrease in the oil level at startup may cause poor lubrication or liquid compression.
A crankcase heater which can increase the bottom temperature of the compressor 11K higher than the ambient temperature, which also can reduce the oil level to the designated line within 5 hours after turning on the electricity is recommended.

5.8 Atmosphere

Do not use the compressor in a corrosive atmosphere, such as a chemical storage area.

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5.9 Gas leakage

When refrigerant leak occurs in the refrigeration system, take measures to stop the operation of the compressor in order to protect the compressor against abnormal temperature rise due to refrigerant leak and to prevent the outflow of refrigerant oil.

5.10 Mixture of refrigerant oils

Use the designated refrigerant and control the purity of refrigerant. (Refer to Attachment 1 regarding refrigerant purity.)
Use the designated refrigerant oil at specified amount. (Less amount of refrigerant oil may affect the reliability of the compressor and more amount of refrigerant may cause performance degradation.)
Even in the market, take measures to prevent the use of refrigerants and refrigerant oils other than those specified, and take measures to prevent mixture of different types. If additional refrigeration oil is necessary, confirm the compressor specification, and add refrigeration oil with controlled water content.

5.11 Electrical safety - Lead wires connection to the compressor

Connect lead wires to the compressor without lead wire touching the surface of compressor.

5.12 Electrical safety - Water

The unit shall pass tests assuming the environment where the end product is installed. (such as water spray test etc.)

Prevent the compressor from continuous contact of water caused by water absorption of sound proof material or condensing dew of suction pipes.

5.13 Compressor storage

Store the compressor in a clean place, avoiding high temperature and high humidity. Do not store the compressors outdoor. Storage under high temperature ambience may unplug the rubber seal cap, and storage under high humidity environment may weaken the strength of packaging material and cause collapse of packing cases.

5.14 Atmosphere release

The compressor shall not be exposed to the atmosphere without the seal plug for over 15 minutes.

5.15 Compressor handling

Handle the glass portion of hermetic terminal with care.

Do not apply impact or excessive force to the glass or the terminal pin of the glass terminal.

Do not bend the terminal pin.

It may cause chipping, cracking, and consequent refrigerant leakage and short circuit.

5.16 Impact damage

Do not drop or excessively tilt the compressor during transportation.

Do not use a dropped compressor.

5.17 Accessories

Use the designated accessories by Panasonic.

Especially, for the start and run capacitor, use capacitors with protection level P2 or S2 of IEC60252-1. Pay attention to the location, the surface temperature of the capacitor, and the environment which the capacitor is used (such as cooling, water-proof, and dust-free).

The capacitor may cause fire due to aging degradation. Cover the capacitor with flame retardant metal material or plastic material classified as over UL 94 V-0.

5.18 Spacing between the rubber grommets and fasting nut.

Keep the spacing between the rubber grommet and fasting nut from 0.5 mm to 2.0 mm gap.

Refer to the accessory mounting drawing or compressor specification for details.

5.19 Insulation material for lead wires

The lead wire connected to the hermetic terminals shall not contain any substance that will emit corrosive gas (ex. Chlorine gas).

5.20 Inquiry

If there are any questions for the compressor usage, please contact us.

5.21 Exemption from obligation

Panasonic Corporation is not liable to any problems occurred, if the usage of the compressor is not complied with the compressor specification and this common appendix.

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Attachment 1. Refrigerant Purity

No.	CE - 100004E
Sheet-No.	10-9

HCFC-22

Purity	99.5 wt% min
Vapor Content	100 wtppm max
Acid Content (HCl Conversion)	1 wtppm max
Moisture Content	10 wtppm max
Non-Condensable Gas	1.5 vol% max

HFC-134a

Purity	99.5 wt% min
Vapor Content	100 wtppm max
Acid Content (HCl Conversion)	1 wtppm max
Moisture Content	10 wtppm max
Non-Condensable Gas	1.5 vol% max

HFC-407C

Structure : Composition (wt%)	HFC32 : 23 ± 2.0 wt% HFC125 : 25 ± 2.0 wt% HFC134a : 52 ± 2.0 wt%
Purity	Each composition at 99.5 wt% min
Vapor Content	100 wtppm max
Acid Content (HCl Conversion)	1 wtppm max
Moisture Content	10 wtppm max
Non-Condensable Gas	1.5 vol% max

HFC-410A

Structure : Composition (wt%)	HFC32 : 50 ± 1.5 wt% HFC125 : 50 ± 1.5 wt%
Purity	Each composition at 99.5 wt% min
Vapor Content	100 wtppm max
Acid Content (HCl Conversion)	1 wtppm max
Moisture Content	10 wtppm max
Non-Condensable Gas	1.5 vol% max

HFC-32

Purity	99.5 wt% min
Vapor Content	100 wtppm max
Acid Content (HCl Conversion)	1 wtppm max
Moisture Content	10 wtppm max
Non-Condensable Gas	1.5 vol% max

HFC-404A

Structure : Composition (wt%)	HFC125 : 44 ± 2.0 wt% HFC143a : 52 ± 2.0 wt% HFC134a : 4 ± 2.0 wt%
Purity	Each composition at 99.5 wt% min
Vapor Content	100 wtppm max
Acid Content (HCl Conversion)	1 wtppm max
Moisture Content	10 wtppm max
Non-Condensable Gas	1.5 vol% max

R744 (CO2)

Purity	99.9 vol% min
Water Content	0.005 vol% max
Gas Impurities (H2, N2, O2, Ar)	0.01 vol% max
Total sulfur	0.03 ppm max

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Attachment 1. Refrigerant Purity

No.	CE - 100004E
Sheet-No.	10-10

HFO-1234yf

Purity	99.5 wt% min
Vapor Content	100 wtppm max
Acid Content (HCl Conversion)	1 wtppm max
Moisture Content	10 wtppm max
Non-Condensable Gas	1.5 vol% max

HFC-448A

Structure : Composition (wt%)	HFC32: 26 ± 2.0 wt% HFC125: 26 ± 2.0 wt% HFC134a: 21 ± 2.0 wt% HFO1234yf: 20 ± 2.0 wt% HFO1234ze: 7 ± 2.0 wt%
Purity	Each composition at 99.5 wt% min
Vapor Content	100 wtppm max
Acid Content (HCl Conversion)	1 wtppm max
Moisture Content	10 wtppm max
Non-Condensable Gas	1.5 vol% max

HFC-449A

Structure : Composition (wt%)	HFC32: 24.3 ± 2.0 wt% HFC125: 24.7 ± 2.0 wt% HFC134a: 25.7 ± 2.0 wt% HFO1234yf: 25.3 ± 2.0 wt%
Purity	Each composition at 99.5 wt% min
Vapor Content	100 wtppm max
Acid Content (HCl Conversion)	1 wtppm max
Moisture Content	10 wtppm max
Non-Condensable Gas	1.5 vol% max

HFC-407H

Structure : Composition (wt%)	HFC32: 32.5 ± 1.0 wt% HFC125: 15 ± 1.0 wt% HFC134a: 52.5 ± 2.0 wt%
Purity	Each composition at 99.8 wt% min
Vapor Content	15 wtppm max
Acid Content (HCl Conversion)	1 wtppm max
Moisture Content	10 wtppm max
Non-Condensable Gas	1.0 vol% max

HFC-454C

Structure : Composition (wt%)	HFC32: 21.5 ± 2.0 wt% HFO1234yf: 78.5 ± 2.0 wt%
Purity	Each composition at 99.5 wt% min
Vapor Content	100 wtppm max
Acid Content (HCl Conversion)	1 wtppm max
Moisture Content	10 wtppm max
Non-Condensable Gas	1.5 vol% max

HFO-1234ze（E）

Purity	99.8 wt% min
Vapor Content	50 wtppm max
Acid Content (HCl Conversion)	1 wtppm max
Moisture Content	10 wtppm max
Non-Condensable Gas	1.5 vol% max

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No	CE-100006E
Sheet. No	12-1

Safety requirements regarding the usage of the Compressor

Ver. 2020-10

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1. Application

This safety instruction applies to the following hermetic compressors (hereinafter, referred to as known as "compressor") , produced and sold by Refrigeration and Air-Conditioning Devices Business Division, China & Northeast Asia Company , Panasonic Corporation and associated companies: Panasonic Appliances Air-Conditioning (M) Sdn. Bhd.(PAPAMY), Panasonic Wanbao Appliances Compressor (Guangzhou) Co., Ltd.(PWAPCGZ), and Panasonic Appliances Compressor (Dalian) Co., Ltd.
(hereinafter, referred to as "our company")
However regarding the compressor for special application such as an automobile air-conditioner, each compressor specification will be made.

Rotary type compressor
Scroll type compressor

2. Objective

The aim of this information is to ensure the safety of an end product which our compressor is intalled (hereinafter, referred to as product 'unit') from the compressor safety's view point. Our company will not take liability if the following safety instructions are not observed.

3. Terms and definitions

Terms which are not described in this document shall be referred to the JIS standard of Room Air-Conditioning (JIS C 9612-2013).

4. Basic safety design of the compressor

(1) Compressor has a compression mechanism and motor in its hermetic pressure vessel.

(2) The hermetic pressure vessel is designed to be in compliance with the following safety regulations
* IEC60335-2-34
* UL60335-2-34
* GB 4706.17
* Refrigeration Safety Rules and Refrigeration Safety regulations relationship illustrated reference
* EU Pressure Equipment Directive (2014/68/EU)

(3) The electric components (e.g. overload protector) is designed to be in compliance with the following safety regulations.

* IEC60335-1,IEC60335-2-34
* UL60335-1, UL60335-2-34
* PSE (The Electrical Appliance and Material Safety Law "Denanhou")

(4) The plastic resin of the compressor terminal cover contains self extinguishing and flame resistant materials, and that is designed to be in compliance with UL60335-2-34.

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5. Anticipated problem on safety (product liability)

(1)Electric shock

Contact with live parts (hermetic terminal)

If the terminal cover is properly installed, the live parts will not be directly exposed. However, access to the live hermetic terminal can cause an electric shock when detaching the terminal cover for an inspection or repairment.

Electrical leakage due to motor burnout

Motor burnout might occur due to the following causes. The compressor itself will never ignite by itself, however a short circuit between a live part and non-live part can cause shock and electrical leakage.

<Common examples of motor burnout>

- Wrong power supply: when the compressor is supplied with power rating other than the specified power rating.
- Wrong wiring: when wiring other than the wiring specified in the circuit diagram is used.
- Non-specified parts: when using a parts other than the specified parts.

- Gas leakage operation: when operating the compressor with inadequate amount of refrigerant.
- In vacuum operation: when the compressor is operated while evacuation to quicken the evacuation of the refrigerant cycle.
- Air operation: when the compressor is operated while the refrigerant cycle is exposed to air.
- Abnormal parts: abnormality or defective OLP, capacitor, and etc.

- Others: lightning strike , instantaneous blackout, quality defect and etc.

(2) Rupture and ignition

The hermetic pressure vessel will never leak or destruct as long as it is operated below the permissible limit (pressure, current, temperature, ambient condition and so on) specified in the compressor specification. However, for the following exceptional cases, the refrigerant gas and refrigerant oil may leak (spout) out of the compressor.

·Rupture due to air-compression operation

When the compressor is operated under the condition of mixing air in the refrigerant cycle, the refrigerant oil charged in the compressor is misted, which can trigger a rupture caused by ignition due to a high temperature and high pressure condition.

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<Cases which cause rupture>

- Operating the compressor with the service-valve open and without connecting the refrigerant pipe.
- Operating the compressor without refrigerant.
- Removing the connection pipe during compressor operation. (The above three cases are air-compression operation)
- Charging refrigerant which is not specified.

Leak caused by hermetic terminal insulation glass melting (terminal blowout)

When a large current flows through the hermetic terminal instantaneously, the insulation glass may melt and crack-open, and refrigerant gas and refrigerant oil may leak (spout) out of the compressor.

Following are some examples of situation of causes:

<Cases which cause large current flow through the hermetic terminal>

- Short-circuit by adhesion of foreign object (sand, dust, moisture, etc.) to the insulation glass portion.
- Internal electricity discharges due to operation under vacuum. (Compressor operation during evacuation)
- Damage of motor caused by burning.

Usage of unspecified refrigerant or unspecified refrigeration oil

When unspecified refrigerant or refrigeration oil is charged into the refrigeration system, it may causes mechanical defect, fault operation or breakdown which may become a serious risk to maintain safety.

Leakage due to corrosion of hermetic pressure vessel

When the compressor is used for a long time under a severe corrosion-causing environment, the internal refrigerant gas and refrigeration oil might leak (spout) due to the corrosion of hermetic pressure vessel.

When the leakage occurs, the internal refrigerant gas and refrigeration oil will spout out momentarily in the form of a white spray or foam. However, this is not a rupture or smoke due to combustion.

It is very dangerous if the pipe connected to the compressor discharge pipe is removed for inspection or repair by using a brazing torch while pressured refrigerant gas remains in the compressor. The internal high pressure refrigerant gas and refrigeration oil may suddenly spout out.
Moreover, if the flame of the brazing torch contacts the refrigerant gas or refrigeration oil, a toxic gas may be generated or may cause a fire.
Be sure to wear protection glasses etc. to prevent the refrigerant gas or refrigeration oil injuring the eye.

Do not mix air etc., others than the designated refrigerant into the refrigeration cycle.
Mixture of air etc. might cause a abnormally high pressure in the refrigeration cycle and may cause rupture and injury.

(3) Skin burn

The compressor surface is "HOT" during operation or immediately after ceasing operation. Touching the "HOT" surface of compressor directly with bare hands will cause skin burn. (The compressor surface temperature may reach up to 150°C.)

6. Safety request items for the unit design

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(1) Design the unit to make the compressor operate within the specified range (refrigerant, rated power supply, temperature, pressure etc.). Furthermore, for OLP, terminal cover, gasket, retainer, spring, parts designated by Panasonic as standard parts or approved parts in the specification shall be used.

(2) Provide a ground to the unit and be sure to ground at installation. Furthermore, to secure safety, provide fuse(s), abnormal current protection circuit(s) etc. to the product, depending on the necessity.

(3) The hermetic terminal portion must be designed in a way which is not easily exposed to electrically conductive objects, such as water, foreign objects, metal powder, sand, insects etc. If there is possibility of potential exposure of the conductive object, apply a gasket sheet to the bottom of the terminal cover and fill up the opening of the terminal cover with a sealing material.

(4) When usage under severe environment or condition (seaside, volcanic hot springs, chemical erosion gas area, dusty area etc.) is anticipated, it is necessary to take precautions by preparing an anti-corrosion structure or sealing of hermetic terminal surrounding etc.

(5) A wrongly connected 3-phase power supply wiring could become the cause of motor burn due to reverse rotation of the motor. Install a phase detector in the electric circuit to prevent current flows to compressor in the case of miss-connection.

(6) Reverse rotation of motor may occur when a momentary power cut occur, and may cause motor burn. Therefore, consider prevention of reverse rotation by making the motor stop when a momentary power cut occur.

(7) Regarding start and run capacitors, please use the protection level P2 or S2 capacitors of of IEC60252-1. It is also important to pay attention to the installed location (cooling, water proof and dust-free), environment and surface temperature of the capacitors.
Capacitors may also cause ignition by aged deterioration. To prevent the spread of fire, the surrounding of capacitor shall be enclosed with metal or plastic rated UL 94V-0 or higher.

(8) The specifications (size, heat resistance of insulation cover material and etc.) of the lead wires and terminals to be connected to the compressor must be made from the ones that are able to withstand the respective maximum current and properly comply with the standard of the unit.

(9) In the case of portable or mobile dehumidifier or air-conditioner, consider a ground connection which is easy to connect, such as employing a plug with ground etc.

(10) For units with built-in water tanks such as dehumidifiers or movable air-conditioners etc. which may fall or topple, design a protection towards electrical shock and electrical leakage due to water leakage from falling.

(11) The low-pressure pipe must not be located above the hermetic terminal of compressor because its surface will form dew condensation and water droplets will accumulated on the compressor surface.

(12) The unit design must be made to pass the tests (water spray test and etc.) with consideration to the environment in which the product is to be installed.
The structure must be designed to avoid continuous contact of water to compressor surface caused by absorption of sound proof material or condensation at suction pipe etc.

(13) If a protection cap will be placed at the wire-connection portion, it should be made of a heat-resistance material. However, Do not use vinyl chloride. (Vinyl chloride will generate chlorine gas at high temperature which rusts the neighboring metal).

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(14) If the insulation glass of the hermetic terminal melts and opens, the lead pin (metal) may spout out. To be sure of safety, construct the outside case covering above the terminal cover with a strong structure.

(15) Compressor surface may heat-up to maximum 150°C. Surface of parts/materials which may contact the compressor surface should be designed with adequate heat-resistance.

(16) If the cycle is designed to continue up and doun of pressure in a short term for more than 1.0MPa inside the compressor during operation due to bypass operation or temporary stopping of fan, there is possibility that the strength of hermetic pressure vessle will decrease. Therefore, durability testing to secure the compressor relyability is necessary.

7. Safety requirements item during the unit production

(1) Do not operate the compressor in air suction or vacuum state.
Refrigerant tubes must be connected securely to prevent suction of air during operation. When pump-down operation, confirm the stoppage of compressor before removing the refrigerant tubes. If the refrigerant tubes are disconnected without stopping the compressor, suction of air will cause abnormally high pressure in the refrigerant cycle and may cause injury due to burst of compressor housing.
Please state this clearly in the operation/installation manual of the unit to ensure proper operation/installation.

(2) Do not allow water or foreign objects to remain in the terminal cover and keep the hermetic terminal clean.

(3) Handle the hermetic terminal with extra care and do not apply excessive force or shock (such as bending the pins or knocking it). Please do not straighten bent pins.
When brazing the discharge tube, protect the flame of torch not to rise the temperature of the terminal portion.
All above may cause chip or crack to terminal and subsequently cause refrigerant leakage or short-circuit of power supply.

(4) The terminal cover must be fixed properly and ensure that there is no pinching of lead wire by terminal cover edge and lifted OLP.

(5) Pay attention not to block the piping internal with brazing residue during brazing.

(6) When using air-blow to get rid of condensing water which occurred during unit running test or inspection test, make sure that there is no moisture remaining around the power supply parts. Moreover, if the unit is packed with plastic bags after the air-blow process, dew-drops may accumulate around the power supply portion. Consider to enclose desiccants to prevent moisture.

(7) Do not use refrigerant or refrigerant oil other than designated/specified.
Control the refrigerant purity. The purity is referred to Attachment 3.

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8. Safety considerations during installation, inspection and repair (including during development experiment)

(1) Be sure to ground the unit.
When performing an inspection or a repair work, make sure the unit is grounded.

(2) Before starting any work on the unit, disconnect power supply.

(3) Properly fix the terminal cover before supplying electricity.
Do not to run compressor without terminal cover.

(4) Wear safety goggles when performing an inspection or repair on the compressor.

(5) Be sure to evacuate the refrigerant gas completely before using the brazing torch to remove the piping of the compressor from the unit.
If the brazing torch is used to disconnect pipes from a pressurized cycle with refrigerant gas, the internal high pressure refrigerant gas and refrigerantion oil may suddenly spout out and it is very dangerous.
Furthermore, if the flame or the brazing torch comes into contact with the refrigerant gas or refrigeration oil, toxic gas may generate or even cause fire.

(6) Do not operate the compressor in air suction or vacuum state.

* During installation, ensure the connection of all refrigerant tubes before operating the compressor. If the refrigerant tubes are not connected and the compressor is operated with the service valve open, air will be sucked-in and cause abnormally high pressure inside the refrigeration cycle. The compressor may burst and cause injuries.

* For pump-down operation, ensure the stoppage of compressor before removing the refrigerant tubes. If the refrigerant tubes are removed when the compressor is still in operation, air will be sucked-in and an cause abnormally high pressure inside the refrigeration cycle.
The compressor may burst and cause injuries

* When transporting the air-conditioner or refrigerator, do not mix any other gas such as air (except the specified refrigerant) into the refrigerant cycle. Mixture of other gas will cause abnormally high pressure inside the refrigerant cycle. The compressor may burst and cause injuries. Be sure to state this clearly in the operation/installation manual of the unit to ensure proper operation/installation.
Since this is special work, please limit the operation to only qualified people.

(7) Use the designated/specified refrigerant or refrigeration oil and do not use others.
Control the refrigerant purity. Refer to Attachment 3 for the purity.

(8) Do not touch the compressor during the operation or immediately after stoppage.
The surface temperature of compressor will become maximum 150°C (when the designated parts are applied).

(9) The safety instruction during inspection or repairs of the compressor shall be clearly instructed by the product procedures, manual etc. of the unit. The work must be made in accordance to the instructions.

(10) When replacing parts, use correct and original parts that is designated for the unit. Furthermore, the wiring of the compressor shall be performed in accordance to the wiring diagram.

(11) A circuit breaker shall be installed to the power supply side.

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(12) Connect the wires following the connection diagram. A misconnection can damage the compressor. For 3-phase compressor, use a proof reverse rotation relay.

(13) If power supply is obtained from a generator, its frequency, waveform and voltage may not be as stable as commercial power supply. Therefore, ensure safety by performing a confirmation test.

(14) Do not apply excessive force or shock (bending the pins, impact, etc.) to the glass portion of terminal. Also, do not straighten a bended pin.
Chip-off or crack of terminal may cause refrigerant leakage or short circuit.

(15) Make sure that there is no adherence of water content, foreign object and etc. on the hermetic terminal and OLP. The terminal cover must be fixed properly. Lead wires shall not be stucked under the edge of terminal cover, and there shall not be any gaps between the OLP and upper shell.

(16) Do not touch the surface of low pressure side (such as accumulator) of the compressor with bare hands. The surface temperature may reach low temperature (-20°C or below).

(17) Make sure not to crush the pipe of refrigeration cycle during maintenance, repair, or exchange of compressor, or not to block inside of piping with solder during brazing.

(18) For leak test, use refrigerant gas, inert gas or dry gas, and make sure that the pressure for leak test does not exceed the air tight pressure prescribed in the compressor specification.

9. Safety requirements during storage and transportation (collective packing)

(1) Instruction marks for handling the packings are printed on the external surface of the compressor packing material. Observe the instruction while handling the packing.

(2) Transfer the collective packings prperly by using cargo-handling machinery such as a forklifts, and pay attention to avoid injury due to fall, drop, etc.

(3) When stacking the packings for storage, observe the maximum stacking numbers marked on the packing to avoid injury due to fall, drop, etc.

(4) Avoid storing packing using corrugated carton in a high humidity place, which will cause fall or collapse of the packing.
Regadless of the packing materials, do not store the packing outdoor.

(5) Compressors are heavy. Pay attention to avoid injury during unpacking or transportation.

(6) The packing materials consist of corrugated cardboards, strofoams (depending on the factory), PP band, wood etc. Storage the packing materials in a location without any ignition sources and equipted for fire prevention.

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10. For the usage except air-conditioner, dehumidifier, and water heater applications

When applying to products other than air-conditioner, dehumidifier, and water heaters, please contact the inquiry office listed in clause 11.

11. Caution to end users and service personnel

(1) Make sure end useres or repair personnels to observe the safety requirements of this dosuments using the inspection procedure, servicer manual, caution and warning labels and so on.

Inquiry office:

【Japan】

Air-Conditioning Devices Marketing Department,
Refrigeration and Air-Conditioning Devices Business Division,
China & Northeast Asia Company, Panasonic Corporation
E6 Building, 5-1-5 Sakuragaoka, Kusatsu City,
Shiga, 525-8502, Japan
TEL: 8177- 567-9825 FAX: 8177- 561-3224

【Malaysia】

Marketing Department,
Panasonic Appliances Air-Conditioning Malaysia Sdn. Bhd.
(PAPAMY)
No.17, Jalan Puchong, Taman Perindustrian
Subang Utama, Seksyen 22, 40300 Shah Alam
Selangor D. E., Malaysia.
TEL: 603-58913030 FAX: 603-58913035

【China】

Marketing Department,
Panasonic Wanbao Appliances Compressor (Guangzhou) Co., Ltd.
(PWAPCGZ)
ZhongCun, PanYu District, GuangZhou City
Guangdong Province, China
TEL: 86-20-84778123-5116 FAX: 86-20-34712140

Marketing Department,
Panasonic Appliances Compressor (Dalian) Co., Ltd.
(PAPCDL)
DongHai Road, GanJingZi District, DaLian City,
LiaoNing Province, China
TEL: 86-0411-62658178 FAX: 86-0411-86586556

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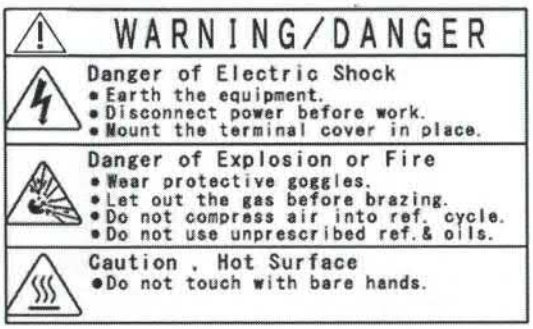
Attachment1. Safety indication (warning label) on the compressor

The minimum handling warning or danger are indicated on the label of the compressor.
(Refer to the followings)

* Do not damage or remove the indication labels.
* Make sure the compressor inspectors or repair personnels observe the warning.
* When the warning is illegible due to the structure of the unit, make sure the compressor inspectors or repair personnels observe the warning from the product installation procedure, service manual, etc.

<Contents of warning label of the compressor>



Attachment2. Main materials of the compressor

Parts name	Material	Remarks
Hermetic vessel	Iron (painted)	Auto ignition tempt of paint: about 700℃
Hermetic terminal	Iron (plating), glass	
Overload protector enclosure	Bakelite	UL 94V-1, Auto ignition tempt.: 440℃
Terminal cover	PET	UL 94-5VA
	PPE+PS	UL 94-5VA
Gasket for terminal cover	Rubber	Auto ignition tempt.: 350℃
Grommet for mounting	Rubber	Auto ignition tempt.: 350℃
Refrigerant oil (in the compressor)	Suniso or Atomos	Flash point : 170℃ and more
	POE or PVE	Flash point: 180℃ and more
	PAG	Flash point : 200℃ and more
	LAB	Flash point : 160℃ and more

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Attachment3. Refrigerant Purity

No.	CE-100006E
Sheet. No	12-11

HCFC-22

Purity	99.5 wt% min
Vapor Content	100 wt ppm max
Acid Content (HCl Conversion)	1 wt ppm max
Moisture Content	10 wt ppm max
Non-Condensable Gas	1.5 vol% max

HFC-134a

Purity	99.5 wt% min
Vapor Content	100 wt ppm max
Acid Content (HCl Conversion)	1 wt ppm max
Moisture Content	10 wt ppm max
Non-Condensable Gas	1.5 vol% max

HFC-407C

Structure : Composition (wt%)	HFC32 : 23 + 2.0 wt% HFC125 : 25 + 2.0 wt% HFC134a : 52 + 2.0 wt%
Purity	Each composition at 99.5 wt% min
Vapor Content	100 wt ppm max
Acid Content (HCl Conversion)	1 wt ppm max
Moisture Content	10 wt ppm max
Non-Condensable Gas	1.5 vol% max

HFC-410A

Structure : Composition (wt%)	HFC32 : 50 + 1.5 wt% HFC125 : 50 + 1.5 wt%
Purity	Each composition at 99.5 wt% min
Vapor Content	100 wt ppm max
Acid Content (HCl Conversion)	1 wt ppm max
Moisture Content	10 wt ppm max
Non-Condensable Gas	1.5 vol% max

HFC-32

Purity	99.5 wt% min
Vapor Content	100 wt ppm max
Acid Content (HCl Conversion)	1 wt ppm max
Moisture Content	10 wt ppm max
Non-Condensable Gas	1.5 vol% max

HFC-404A

Structure : Composition (wt%)	HFC125 : 44 + 2.0 wt% HFC143a : 52 + 2.0 wt% HFC134a : 4 + 2.0 wt%
Purity	Each composition at 99.5 wt% min
Vapor Content	100 wt ppm max
Acid Content (HCl Conversion)	1 wt ppm max
Moisture Content	10 wt ppm max
Non-Condensable Gas	1.5 vol% max

R744 (CO2)

Purity	99.9 vol% min
Water Content	0.005 vol% max
Gas Impurities (H2, N2, O2, Ar)	0.01 vol% max
Total sulfur	0.03ppm max

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Attachment3. Refrigerant Purity

No.	CE-100006E
Sheet. No	12-12

HFO-1234yf

Purity	99.5 wt% min
Vapor Content	100 wt ppm max
Acid Content (HCl Conversion)	1 wt ppm max
Moisture Content	10 wt ppm max
Non-Condensable Gas	1.5 vol% max

HFC-448A

Structure : Composition (wt%)	HFC32: 26±2.0wt% HFC125: 26±2.0wt% HFC134a: 21±2.0wt% HFO1234yf: 20±2.0wt% HFO1234ze: 7±2.0wt%
Purity	Each composition at 99.5 wt% min
Vapor Content	100 wt ppm max
Acid Content (HCl Conversion)	1 wt ppm max
Moisture Content	10 wt ppm max
Non-Condensable Gas	1.5 vol% max

HFC-449A

Structure : Composition (wt%)	HFC32: 24.3±2.0wt% HFC125: 24.7±2.0wt% HFC134a: 25.7±2.0wt% HFO1234yf: 25.3±2.0wt%
Purity	Each composition at 99.5 wt% min
Vapor Content	100 wt ppm max
Acid Content (HCl Conversion)	1 wt ppm max
Moisture Content	10 wt ppm max
Non-Condensable Gas	1.5 vol% max

HFC-454C

Structure : Composition (wt%)	HFC32: 21.5 ± 2.0 wt% HFO1234yf: 78.5 ± 2.0 wt%
Purity	Each composition at 99.5 wt% min
Vapor Content	100 wtppm max
Acid Content (HCl Conversion)	1 wtppm max
Moisture Content	10 wtppm max
Non-Condensable Gas	1.5 vol% max

HFO-1234ze（E）

Purity	99.8 wt% min
Vapor Content	50 wtppm max
Acid Content (HCl Conversion)	1 wtppm max
Moisture Content	10 wtppm max
Non-Condensable Gas	1.5 vol% max

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