

Specifications No.

C-2546

16-Nov.-2018

CUSTOMER : Hawco

RoHS Compliant

COMPRESSOR SPECIFICATIONS

Compressor type : Scroll Compressor

Refrigerant : R404A, R448A, R449A

Power source : 1PH, 208-230V, 60Hz

Motor type : CSR

Model Name	Nominal Capacity [W]			Motor Rated Output [W] ([HP])	Remark
	R404A	R448A	R449A		
ZS6013X1	1390	1450	1450	600 (0.8)	with UL
ZS7516X1	1730	1760	1760	750 (1.0)	
ZS1120X1	2170	2210	2210	1100 (1.5)	

Packing	Check
Gathered Packing	<input type="checkbox"/>
Separated Packing	<input type="checkbox"/>

We acknowledge the receipt of this copy.

Please return this compressor specifications after confirming the contents. If you do not return this copy by the above date, we will assume that you have checked the contents.

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NOTE

The Specifications in this bulletin are subject to change without notice, in order that HITACHI may bring the latest innovations to our customers.





SAFETY PRECAUTION

Read and understand all of the safety precautions in this manual before operating the product. These precautions are intended to ensure safe and correct operation of the product and to prevent injury to the operator and other persons and damage to the product. Observe these precautions strictly.






The following symbols indicate the presence of potentially hazardous conditions.

 WARNING	This symbol indicates a potentially hazardous situation which, if not avoided, <u>could result in</u> death or serious injury.
 CAUTION	This symbol indicates a potentially hazardous situation which, if not avoided, <u>may result in</u> minor or moderate injury or property damage accidents to the product. It may also be used to alert against unsafe practices.

The meanings of the graphic symbols in text are shown below.

	<u>Be sure to perform</u> the operation.
	<u>Disconnect</u> the power cable from the electrical outlet.
	<u>Connect</u> the grounding wire.
	<u>Prohibit</u> .

WARNING

	<u>Provide</u> the refrigerating cycle unit with adequate electrical grounding. Incomplete grounding could result in electrical shock hazards in the event of troubles and current leakage.
	<u>Connect</u> a fuse or a leak circuit breaker to the main circuit to avoid electrical shock hazards or fire in the event of troubles and current leakage.
	<u>Check</u> to see that the main power is turned off, before repairing, to avoid electrical shock hazards in case of touching the terminals.
	<u>Measure</u> the temperature of the hermetic terminals of the compressor and then <u>connect</u> the appropriate lead wires. Lead wire insulation deterioration (thermal deterioration) could result in electrical shock hazards, short-circuiting, or fire.
	<u>Keep</u> the lead wires <u>away</u> from the surface of the compressor or the piping. Lead wire insulation deterioration (thermal deterioration) could result in electrical shock hazards, short-circuiting, or fire.



Keep the lead wires away from any rotational parts like fans or any vibrational parts like piping.

Lead wire insulation deterioration due to vibration or friction could result in electrical shock hazards, short-circuiting, or fire.



Do NOT make the compressor self-evacuated during operation, which avoids overheating the compressor that could cause burns or fire.



Do NOT touch the surface of the compressor with empty hands, which avoids burns. The surface is very hot during operation and immediately after it has stopped.



Do NOT use this compressor for air compression, which avoids overheating of the compressor that could cause burns or fire.



Do NOT view the inspection window of the compressor for internal observation directly. Use a video camera or other suitable equipment to avoid serious injury owing to explosion of the inspection window or blowout of the refrigerant.



Wear protective goggles during repairs to avoid serious injury owing to explosion of piping or blowout of the refrigerant.

CAUTION



Do NOT install the compressor in a humid place or locations exposed to water. Do NOT dip it into water or spray it with water. In case of using the sound insulation material to enclose the compressor, which is highly hygroscopic, that material must NOT absorb water. Insulation deterioration causes electrical shock hazards, current leakage, short-circuiting, or explosion owing to corrosion.



Attach the specified cover to the hermetic terminals of the compressor by the specified method to prevent entry of dirt.

Incomplete electrical conduction of the hermetic terminals may cause troubles or fire.



Do NOT apply electrical pulse to the compressor while its inside is maintained in a vacuum. It avoids insulation failure inside the compressor, which may result in electrical shock hazards, current leakage, or fire.



Store the compressor in clean and dry environment. Insulation failure of the hermetic terminals of the compressor may result in electrical shock hazards or current leakage. Corrosion of the compressor surface may result in explosion. Blowout of the refrigerant may result in burns.



In case of attaching cluster terminals, the PTC starter, receptacle terminals, or other electrical parts to the hermetic terminals of the compressor, those parts must NOT be obliquely connected or twisted after connections, which avoids reducing fastening force of the terminals. Incomplete electrical conduction of the hermetic terminals may cause troubles or fire.

1. GENERAL SPECIFICATIONS

Model		ZS6013X1	ZS7516X1	ZS1120X1						
Nominal Output	HP	0.8	1.0	1.5						
	W	600	750	1,100						
Power Supply	-	1 Phase, 208-230V, 60 Hz								
Refrigerant	-	R404A, R448A, R449A	R404A, R448A, R449A	R404A, R448A, R449A						
Allowable amount of Refrigerant Charge	g	1600	1700	2000						
Refrigerant Oil	-	POE (VG68)								
Oil Charge	liter	0.55	0.55	0.65						
Displacement	cm ³ /rev	12.5	15.9	20.1						
	m ³ /h	2.59	3.30	4.17						
Rated Revolution	rpm	3456								
Performance ⁽¹⁾		R404A	R448A	R449A	R404A	R448A	R449A	R404A	R448A	R449A
Cooling Capacity	W	1,390	1,450	1,450	1,730	1,760	1,760	2,170	2,210	2,210
Power Input	W	930	880	880	1,110	1,065	1,065	1,400	1,345	1,345
COP	-	1.49	1.65	1.65	1.56	1.65	1.65	1.55	1.64	1.64
Sound Level and Vibration Level ⁽²⁾										
Sound Level ⁽³⁾ MAX	dB(A)	65	63	63	68	67	67	68	67	67
Vibration Level ⁽⁴⁾ MAX	μm	40	37	37	40	28	28	50	39	39
Net Weight (Including Oil)	kg	12.6			12.7			13.6		
Piping ⁽⁵⁾ Connection	Suction	φ13.0 I.D. (BR)								
	Discharge	φ8.2 I.D. (BR)								
	Injection	φ6.2 I.D. (BR)								
Motor	Type	Capacitor Start and Run (CSR) Permanent Split Motor								
	Poles	2								
	Voltage	V	208	230	208	230	208	230	208	230
	Starting Current	A	22.9	25.3	25.3	28.0	33.8	37.4		
	Winding resistance (at20°C)		Main	Aux	Main	Aux	Main	Aux		
Ohm		3.116	4.258	2.580	4.070	1.967	2.334			
Capacitor	Starting Capacitor	40μF/450V			40μF/400V			60μF / 450V		
	Running Capacitor	30μF/450V			30μF/450V			45μF / 450V		
Starting Relay	-	AMVL-250V2			AMVL-250V2			AMVL-250V2		

[notes]

(1) Above performance is based on the following conditions 【AHRI Standard 540】

Refrigerant	R404A	R448A	R449A
Evaporating Temperature (dew point)	- 6.7 °C(0.481MPa[abs])	- 6.7 °C(0.405MPa[abs])	- 6.7 °C(0.406MPa[abs])
Condensing Temperature (dew point)	48.9 °C(2.234MPa[abs])	48.9 °C(2.072MPa[abs])	48.9 °C(2.072MPa[abs])
Return gas Temperature	4.4 °C		
Subcooling	0 K		
Ambient Temperature	32.0 °C		
Compressor Cooling	Fan Cooling + Liquid Injection		

Rated capacity and Rated input are measured by using the equipment including the calorimeter met to JIS B8606. Minimum allowable capacity is 90% of rated capacity, maximum allowable input is 110% of rated input.

(2) Measurement condition for Sound and Vibration Level.

Refrigerant	R404A	R448A	R449A
Suction Pressure	0.481 MPa[abs]	0.405 MPa[abs]	0.406 MPa[abs]
Discharge Pressure	2.234 MPa[abs]	2.072 MPa[abs]	2.072 MPa[abs]
Return gas temp.	18.3 °C		
Noise of soundproof room	under 40 dBA		
Vibration of soundproof room	under 5 μm		
Liquid refrigerant back	No liquid back		
Draft	No draft		

- (3) Sound level is measured at the point 30cm away from the compressor surface in a soundmeasuring room.
- (4) Vibration level is measured on the compressor surface.
- (5) Connection Type
BR : Brazing, RL : Rotalock, FL : Flange, FR : Flare
- (6) Scope of Supply
 - 1) Compressor Assembly Charged with Refrigerant Oil and Nitrogen Gas.
 - 2) The companion connections shall be provided by others.

The other specifications

- 1. Hermetic terminal : 1/4"quick connect type
- 2. Space volume of inner shell : 1600 mL
- 3. Motor Insulation grade : E
- 4. Approval voltage range rated voltage $\pm 10\%$
- 5. Starting performance
 - The minimum starting voltage shall be as Table 1. (see note 7) under the following conditions.
 - (1) The starting pressure should be between the suction and discharge of the compressor was balanced and adjusted as shown in the Table 1.
 - (2) The temperature of compressor case was adjusted to 20 °C or higher at the starting conditions.

Table 1

Starting conditions Motor temperature	Ambient temp.	Pressure 「abs」			Minimum starting voltage {V2}
		R404A	R448A	R449A	
Cold-starting Cold state (Room temperature)	20 °C	1.35 MPa	1.21 MPa	1.21 MPa	85% of rated voltage
Hot-starting<Standard> Hot state after operated under standard condition	32.0 °C	1.29 MPa	1.16 MPa	1.16 MPa	85% of rated voltage
Hot-Starting<Overload> Hot state after operated overload condition.	43 °C	1.42 MPa	1.28 MPa	1.28 MPa	90% of rated voltage

[note 7]

The starting voltage (V2) is measured by Hitachi starting test apparatus. It means the accelerable minimum voltage by the accelerating torque between the motor starting torque and the stalling torque, and it is different with the continuous operable voltage (V4) after the reach of maximum speed of motor. (see Fig 1)

As the starting voltage of the product depend on the structure and design of the product, you should measure the starting voltage of the product and you should confirm it is no problem.

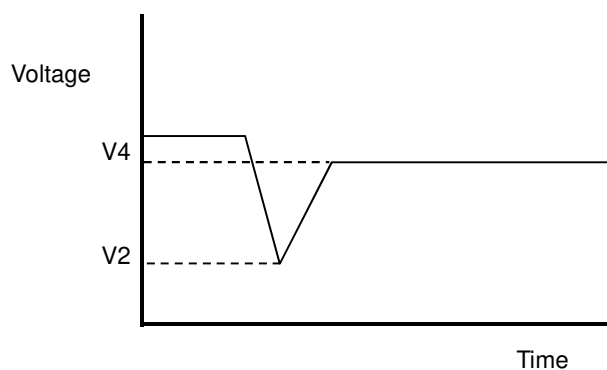


Fig 1

2. PARTS AND DRAWING LIST

Item	Q'ty/Compressor			Drawing No.	Remarks	Supply					
	ZS6013X1	ZS7516X1	ZS1120X1			Pat.1	Pat.2	Pat.3	Pat.4		
Dimension sketch	X	-	-	NN0011595		-					
	-	X	-	NN0011596		-					
	-	-	X	NN0011597		-					
Circuit diagram	X	X	X	BB0041918		-					
Refrigeration system	X	X	X	3CYCA6131		-					
Connecting sketch of accumulator	X	X	X	3CYCA1588		-					
Compressor packing sketch	Gathered Packing	X	X	X	BB0001805	-					
	Separated Packing	X	X	X	BB0044221	-					
OVER LOAD PROTECTOR	X	X	X	-	Internal OLP	YES					
PARTS SET	1	1	1	3CYCA4303		YES					
Mounting Parts	BRACKET	1	1	1	3CYCA1589	2CFD49318A	-				
	HOLDER	1	1	1	4CYC11184	NN0001048A	-				
	RUBBER GROMMET	4	4	4	BB0014618	3TMWA3762A	-				
	PIPE	4	4	4	4CYC11191	3PFH28256C	-				
	WASHER	4	4	4	4CYC11192	NN0001047B	-				
Terminal and cover	TERMINAL-COVER (OLR-COVER)	1	1	1	3CYCA1824	2TRR58845C	-				
	RUBBER PLATE (GOMUITA)	1	1	1	3CYCA1825	NN0004242A	-				
	NUT	1	1	1	4CYC11177	RSMG1082	-				
Electrical parts											
E-BOX	J	K	L	BB0000406	BB0000405	YES	NO				
START CAPACITOR	1	-	-	3CYCA4896	40µF/450V						
	-	1	-	3CYCA2077	40µF/400V						
	-	-	1	3CYCA3791	60µF/450V						
RUNNING CAPACITOR	1	1	-	3CYCA2679	30µF/450V						
	-	-	1	3CYCA3790	45µF/450V						
DISCHARGE RESISTANCE	1	1	1	[note 8]	68kΩ/2W						
STARTING RELAY	1	1	1	3CYCA1986	AMVL-250V2 (UL FILE No.E228842)						
START CAPACITOR	1	-	-	3CYCA4896	40µF/450V			-	YES		
	-	1	-	3CYCA2077	40µF/400V					YES	
	-	-	1	3CYCA3791	60µF/450V						
RUNNING CAPACITOR	1	1	-	3CYCA2679	30µF/450V	-		YES			
	-	-	1	3CYCA3790	45µF/450V						
DISCHARGE RESISTANCE	1	1	1	[note 8]	68kΩ/2W	-		YES			
STARTING RELAY	1	1	1	3CYCA1986	AMVL-250V2 (UL FILE No.E228842)	-		YES			
Cycle parts											
CAPILLARY FOR REQUID INJECTION [note 9]	1	-	-	BB0032682C	Resistance value 26.6 kPa	YES					
	-	1	-	BB0032682B	Resistance value 13.3 kPa						
	-	-	1	3CYCA4165	Resistance value 2.67 kPa						
ACCUMULATOR	1	1	-	3CYCA1592	2PDP47489A valid volume 307mL	YES	NO	YES	NO		
	-	-	1	3CYCA4166	2PDP56828C valid volume 650mL						

[note 8]
A discharge resistance has been attached to the starting capacitor.

[note 9]
The recommended resistance value for the injection capillary is the result of the matching trial using our calorimeter. Since proper capillary specification will depend on refrigeration cycle, please conduct a matching test installed in your product subject to the following conditions.
(1) To satisfy the over load coil temperature: 115°C or lower. (preferably about 100°C max)
(2) To apply the Injection capillary resistance value considering the appropriate amount of injection resulting in the best performance in the cooling capacity and input value.

3. APPLICATION RANGE

1. Scope

This specification is applied to HITACHI scroll compressor.

2. Common specification of compressor

2.1 Appearance

The surface of compressor shall be painted black and has no cracks, dents, peeling, or significant rust.

2.2 Marking

Model name and production date should be shown on the surface of compressor. The compressor containing refrigeration oil and dried N₂ gas has one white circle mark and one yellow circle mark.

2.3 Insulation distances

IEC C60335-2-34 are applied.

2.4 Insulation resistance

Measurement should be above 10 MΩ between charged parts and non-charged parts by 500 V insulation resistance meter at normal temperature and normal humidity.

2.5 Dielectric Withstand Voltage Test

After 2.4 test, 1500 V A/C 50 Hz or 60 Hz is applied between live parts and dead metal parts continuously for one minute by gradual rise of voltage. In case of 1800 V, duration is one second instead of one minute.

2.6 Maximum allowable pressure and Test Pressure

Table 2. Test Pressure

Components	Maximum allowable pressure			Tightness test pressure	Strength test pressure (type-test)
	R404A	R448A	R449A		
Refrigerant Pressure	3.13MPa「abs」	3.09MPa「abs」	3.09MPa「abs」	3.24MPa「abs」	15.79MPa「abs」

2.7 Dryness

Residual water content is below 0.18mL by the cold trap method described below:

Table 3. Cold trap method

Item	Condition
Furnace	146 ± 3 °C
Pre-heat hour	No pre-heat
Hour of taking water (Preheating time excluded)	6 hours
Degree of vacuum (Continuous vacuum)	Below 133 Pa「abs」
Solvent for cold bath	Methanol
Coolant for cold bath	Dry ice

2.8 Cleanliness

Drain the refrigerant oil. Pour washing liquid into the compressor. Lay down and roll the compressor and drain washing liquid. Filtrate by filter paper. The trapped particles should be under 70 mg.

3. System design limitations

3.1 Observance of the specification

The compressor should always be operated under the condition set forth in this specification and it should not be operated under any other specifications. Accessories should also be used as specified. In addition, the specified parts should be used during servicing. Fuse or circuit breaker should be connected to main electric circuit.

3.2 Power source voltage

Voltage applied to the hermetic terminal should be within the range mentioned in this specification.

In the case of 3 phases electric power source, the unbalance of the voltage between each phase must be used within 3%.

$$\text{Unequilibrium} = \frac{\text{Max.deviation voltage} - \text{Ave.voltage}}{\text{Average voltage}} \times 100(\%)$$

Furthermore, in the case of 3 phases electric power source, the wiring for reverse rotating

caused by two phases replacement must not be used. The damage of the compressor caused by the reverse rotating is out of warranty. If wiring may cause reverse rotating, the direction relay listed on the list of equipment and materials must be connected.

3.3 Operating temperatures and pressures

Suction pressure and discharge pressure should be within the range of Fig.4, 5, 6, 7. (page 14, 15, 16, 17)

The difference between discharge pressure and suction pressure must be more than the pressure of Table 4. [Oil supply system in compressor doesn't work without this pressure difference.]

Table 4

Model	ZS6013X1, ZS7516X1	ZS1120X1
Discharge pressure – Suction pressure (MPa)	more than 0.46	more than 0.59

The operating temperatures and pressures of a compressor should be within the range shown in the following section 3.4 - 3.7.

3.4 Compressor case bottom temp

6 degrees higher than condensing temperature. (Refer to Fig attached with 3.10.)

3.5 Motor winding temp. (Measured by the resistance method)

(1) Standard load condition

Rated voltage ; 105°C MAX

Rated voltage ±10% ; 115°C MAX

(2) Overload condition^[10]

Rated voltage ±7.5% ; 115°C MAX.

Winding temperature being lower than 115°C by liquid injection-cooling in any kind of environment.

Please be careful to temperature rises by the sunlight.

3.6 Suction pipe temp.

Higher than outlet pipe of evaporator

[note 10]

Overload condition should not be continuous.

3.7 Temperature and pressure at blocked fan condition

Don't operate compressor at blocked fan condition. To avoid problem of fire, discharge pressure should be under 4.22MPa「abs」. Under stable condition, Confirm the motor winding temperature should be not more than 165°C (average) or 190°C MAX (highest).

3.8 Compressor ambient temperature

The compressor should be operated within the ambient temperature range that satisfies the motor winding temperature requirements shown previously Section 3.3. This compressor should be used in the place that the ambient temperature is above -10 °C. Please confirm the starting of compressor, when the temperature of compressor surface is -10 °C.

Under -10°C ambient temperature, in the case that the temperature of compressor surface is above -10°C by the crankcase beating etc, you can use the compressor if the starting is possible.

3.9 Operating and Shut-off interval

The compressor should not be started/stopped more than 6 times per hour. The compressor should be operated continuously at least for 5 minutes after being turned on. Allow a minimum of 3 minutes shut-off time before restarting.

Compressor should be started on the condition that pressure status of high/low pressure sides is balanced.

3.10 Oil back and oil level of compressor

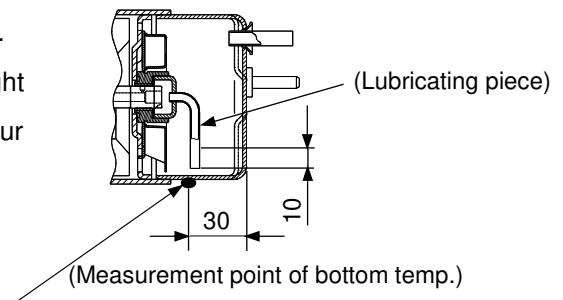
Oil level of compressor should be higher than 10 mm from the lubricating piece fixed on the end of the crankshaft.

We recommend to check oil level using compressor with sight glass. We can supply the compressor with sight glass by your order. (In case of foaming situation, the height of this foam does not mean the height of the oil level.)

If the oil level is not kept, the oil shortage will occur, and influence the reliability of compressor.

To keep oil level, following points are important.

- 1) Oil should be returned continuously to the compressor.
- 2) The compressor should be operated continuously at least for 5 minutes after being turned on. (see Clause 3.12)
- 3) Liquid refrigerant must not flood back to the compressor. Oil may flow out of the compressor if liquid refrigerant back.
- 4) The pressure difference between discharge and suction is shown in Table 4. (see Clause 3.3)



3.11 Liquid refrigerant back and Accumulator

There should be superheated gas returned to the compressor under all normal operating conditions.

Liquid refrigerant must not flood back to the compressor. Liquid back damages the compressor.

We recommend to use the accumulator to prevent liquid back to the compressor.

When knocking noise, current increase and undesirable vibration are caused, another accumulator should be equipped to the compressor and/or refrigerant charge should be reduced to prevent liquid refrigerant flood back.

Liquid level in the accumulator should be maintained smaller than the valid volume of accumulator.

(see Fig 2)

We recommend to check liquid level in the accumulator using accumulator with sight glass.

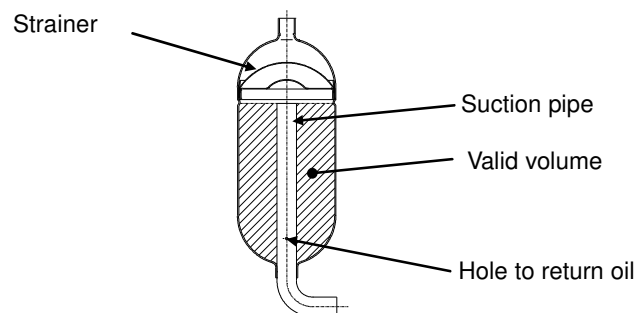


Fig 2

The accumulator must have a hole to return oil. If you use a non-specified accumulator, to prevent harm to oil return, please check size and location of oil return hole. Please refer to the drawing of accumulator.

3.12 Strainer

Strainer should be equipped to avoid insert foreign bodies.

We can supply the accumulator with a strainer by your order.

In case of using an accumulator without a strainer, a strainer should be added to a tube on suction side.

3.13 Allowable incline

Compressor should be operating in the horizontal rotating shaft. But the inclination of shaft is within 3 deg in every direction. In case of the hermetic terminal side in the shaft direction is higher than horizontal, it should be kept up to 5 deg.

3.14 Pipe vibration

The displacement of the pipes, which connect from the compressor to other parts of the refrigeration systems, should be less than 0.8 mm (1/32") when the compressor is operating at rated frequency +10 / -10 and voltage range of rate $\pm 10\%$.

Displacement in excess of 0.8 mm (1/32") will require changing tube length and/or routing.

3.15 Connecting tube design

in designing and routing tubing that connects the compressor to the other parts of the air conditioner, the following should be considered.

Moving tubes to the moving parts;
 minimum clearance 12.7 mm (1/2")

Moving tubes to non-moving parts ;
 minimum clearance 9.5 mm (3/8")

Moving tubes never touch the electrical lead wires.

3.16 Dust of hermetic terminal

Hermetic terminal area should be covered with the electrical cover by the designated method to prevent the entering of dust.

3.17 Rotation direction of compressor

Connect compressor terminals as specified in circuit diagram. Reverse operation will result pump breakdown.

3.18 Internal over load protector (OLP).

Although an OLP that Hitachi selected is installed in this compressor, the current and temperature may not be appropriated for the structure or design of the unit in which the compressor will be mounted.

Unit-mounting matching tests should therefore be conducted and checks should be performed to ensure that the requirements listed as item (1) and (2) below are satisfied.

If the OLP could not satisfy the requirements in the unit test, this should be notified to Hitachi and then after reselection through mutual discussions on the optimum OLP for the unit, unit-mounting test should be performed again.

(1) OLP non-operating test:

The provisions of section 3.3 should be satisfied.

(2) OLP operating test (trouble-assuming test):

When the compressor ambient temperature is $23 \pm 2 \text{ }^\circ\text{C}$, the winding temperature should not exceed $190 \text{ }^\circ\text{C}$ at rated voltage $\pm 6\%$, and when the compressor ambient temperature is $0 \pm 2 \text{ }^\circ\text{C}$, the winding temperature should not exceed $240 \text{ }^\circ\text{C}$ at rated voltage -15% .

Supplementary description;

[1] Exception for the value in transitional states.

[2] The motor winding temperature should be measured using the resistance method.

[3] The tests should be terminated when the total number of OLP operations or the total OLP operating time reaches 10,000 (time) or 15 days, which ever comes first.

But OLP is equipped in order to avoid the problem of fire.

It's not for a restriction of coil temperature, 115°C MAX.

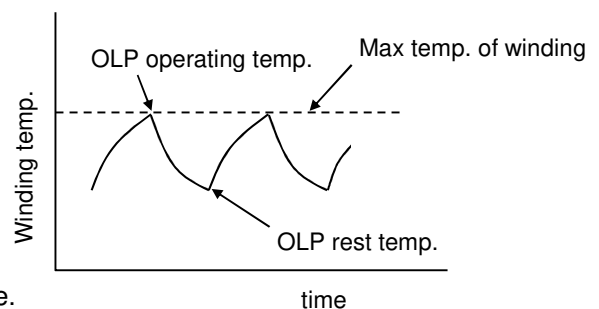


Fig 3

4. Process limitations

- 4.1 The degree of vacuum in the refrigerating system should be less than 133 Pa 「abs」 at room temperature just before charging refrigerant.
The reference quantity of water in the refrigerating system is less than 200mg.
The quantity of water the cycle in operation is to make to the 40 ppm following in the refrigerating cycle by using the suitable dryer that does not contain ACTIVATED ALUMINA.
- 4.2 The structure of cycle constitution or drier should be done so that the powder of the drying material does not come out throughout the cycle.
- 4.3 The weight of foreign particles on the inside surface of the heat exchange tubes should be less than 0.05 g/m². This value means the weight of foreign particles filtered after washing inside surface of the heat exchange tubes with alkali.
Metallic dust should not be permitted to enter the refrigerating system.
- 4.4 Eliminate all system contaminates such as trichloroethane, alkalis, soaps, acids, oil and washing fluid used in machining the heat exchanger.
- 4.5 Always purge the compressor with dry nitrogen during assembly of the system.
- 4.6 The quantity and kind of contamination (the process materials) in the cycle should be grasped and managed. Carry on reliability test that Input contamination a lot than anticipated contamination quantity.
- 4.7 The motor winding temperatures should be less than 149 °C in process of manufacturing the refrigerating system. The temperature of the hermetic terminal body should be less than 177 °C.
- 4.8 The compressor should be operated for more than 20 seconds within 15 minutes after refrigerant is put into the system so that proper lubrication of the pump can occur.

5. Miscellaneous

- 5.1 The pipe and hermetic pins, which are attached to the compressor, should not be bent.
- 5.2 The compressor should never be operated while under vacuum; otherwise, internal arcing can damage parts.
- 5.3 The compressor should not be operated in a method that forms a vacuum and absorbs air.
- 5.4 The compressor should not be left open to the atmosphere for more than 15 minutes.
- 5.5 The electric pulse should not be applied to the hermetic terminals when the compressor is under vacuum.
- 5.6 The compressor should be kept in a clean place with low-moisture.
- 5.7 The compressor must not be applied for transportation equipment such as automobiles, trains, ships, and the others.
- 5.8 The compressor should not be splashed intentionally with water.
- 5.9 Refrigerant should be charged from the condenser end of the refrigeration system. Never charge refrigerant to the compressor directly.
- 5.10 Temperatures within systems during stable compressor operation should not be less than -45 °C because oil is hard to return to the compressor.
- 5.11 The compressor, if dropped, should not be used.

5.12 Compressor mounting

Rubber grommets are designed soft to provide noise isolation and to lessen vibration energy transmission. Stud bolt should be designed to provide sufficient clearance for noise and vibration isolation and to prevent compressor from coming off its mount.

5.13 The first starting voltage supplied to the refrigerating system should be more than the starting voltage mentioned Table 1. (page 4)

Because the viscosity of the oil may be high at first starting until the refrigerant dissolves in the oil.

5.14 The compressor should be kept out of a corrosive atmosphere, such as a chemicals storage area.

5.15 The lead wires should be connected to the hermetic terminals without touching the surface of the compressor.

5.16 There should be adequate clearance between the OD23-under-surface of push-nut and the upper surface of rubber grommets.

5.17 The compressor should be used within one year of receipt.

5.18 The failure of refrigeration system components such as the reversing valve, solenoid valve, defrost mechanism, refrigerant control parts, fan motor, etc. may cause failure of the compressor. Reliability of those components should be checked.

A design that insures no leakage during manufacturing and usage should be applied.

5.19 The refrigerating cycle should be grounded.

5.20 The failure of accessory parts (ex. Capacitor) utilized by the customer is not related to Hitachi -Johnson Controls Air Conditioning, Inc.

5.21 The person who is directly in charge of setting up the product or repair of the product should be well instructed to prevent contamination of this product by water or other foreign matters.

When recharging refrigerator, dryer must be changed. And water value should be less than 40 ppm.

5.22 When connecting terminals of the unit to the hermetically sealed terminals of the compressor, the parts must not be obliquely connected or twisted after connection, fastening force of the terminals would be reduced.

5.23 Modifications and additions

If modifications or additions are to be made to the items provided for in this specification, both companies shall immediately report the details of those modifications or additions, together with the reasons for them, in writing before performing the modifications or additions.

5.24 Occurrence of problems

If problems occur after delivery, both companies shall immediately list those problems. After reporting, a solution to these problems will be sought and reported.

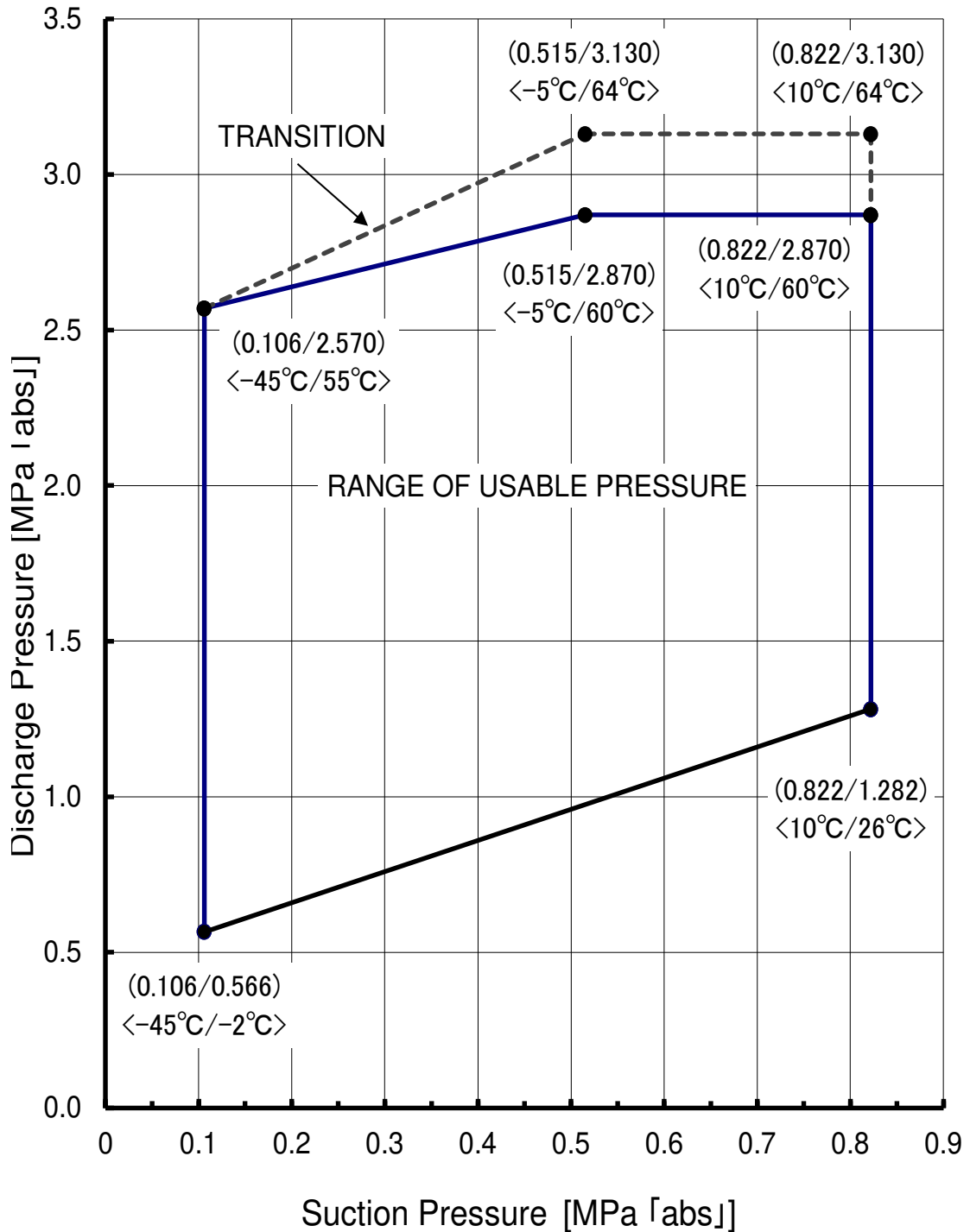
Hitachi -Johnson Controls Air Conditioning, Inc. has no obligation duty for the problem in the case that the user didn't obey this compressor using specification & criteria.

5.25 Term of Validity

This specification shall go into effect from the date that the user signs the specification.

6. RANGE OF USABLE PRESSURE

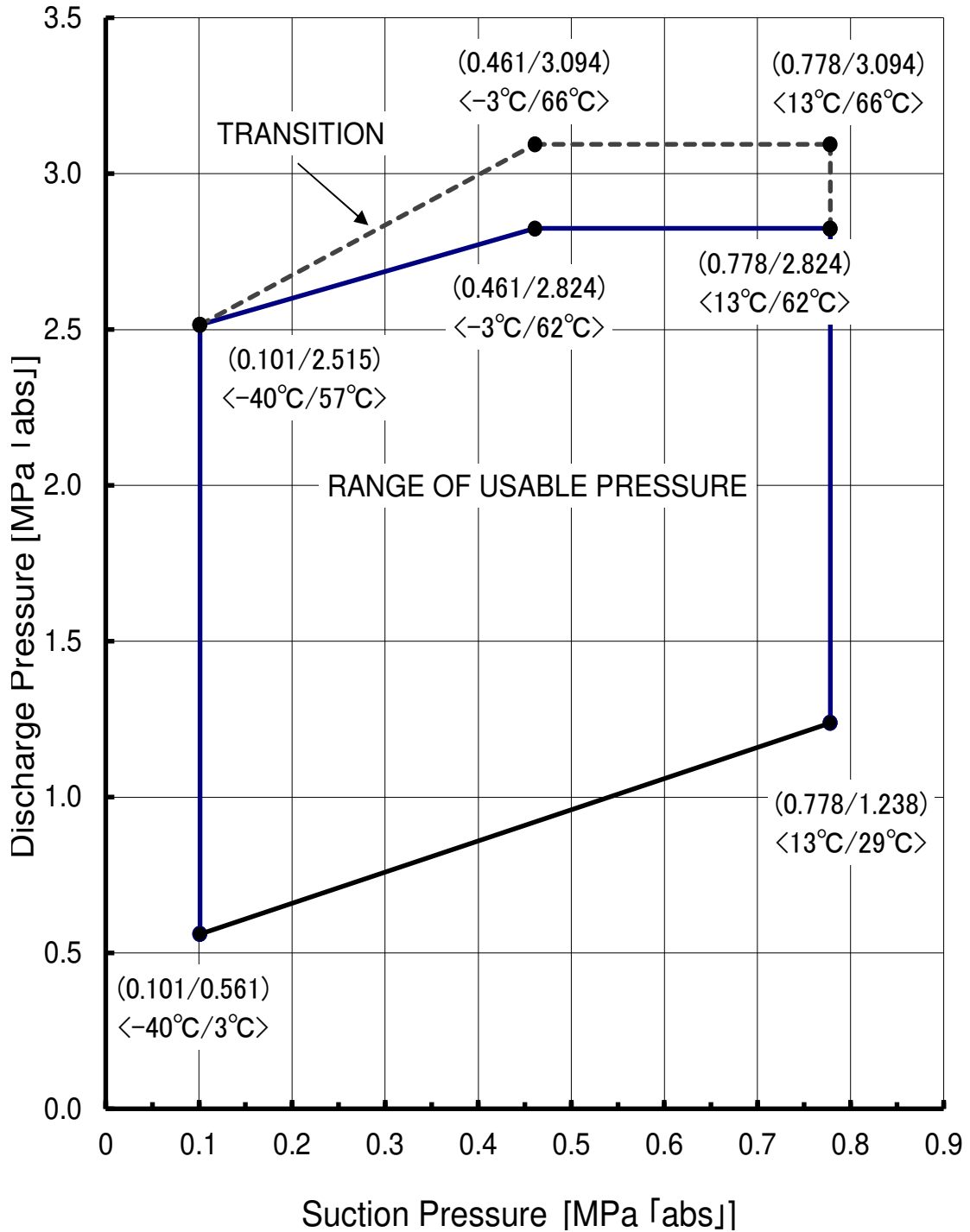
REFRIGERANT : R404A
MODEL : ZS6013X1, ZS7516X1



(Suction pressure / Discharge pressure [MPa])
 < Evaporation Temp (dew point) / Condensing Temp (dew point) [°C] >

Fig.4

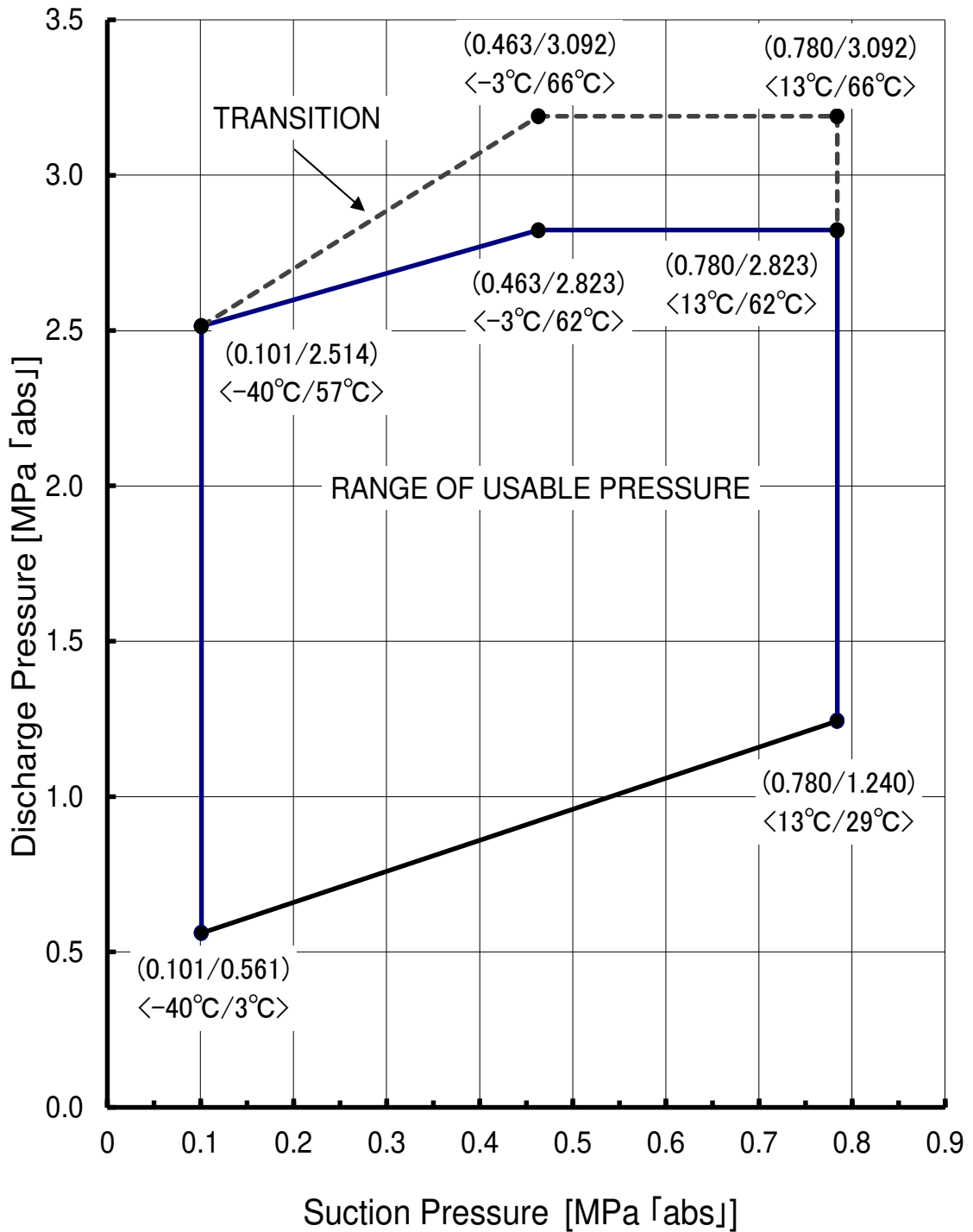
REFRIGERANT : R448A
 MODEL : ZS6013X1, ZS7516X1



(Suction pressure / Discharge pressure [MPa])
 < Evaporation Temp (dew point) / Condensing Temp (dew point) [°C] >

Fig.5

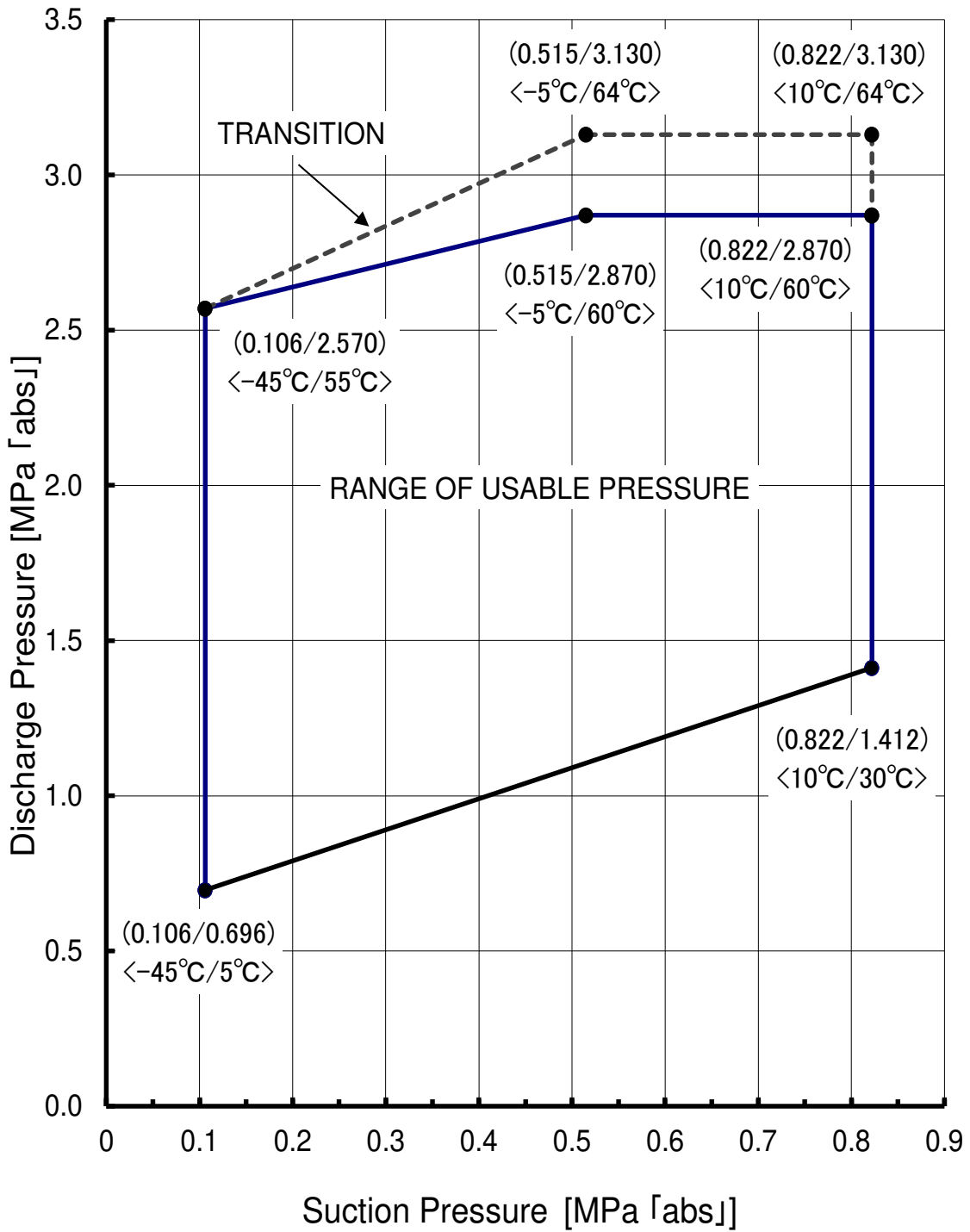
REFRIGERANT : R449A
 MODEL : ZS6013X1, ZS7516X1



(Suction pressure / Discharge pressure [MPa])
 < Evaporation Temp (dew point) / Condensing Temp (dew point) [°C] >

Fig.6

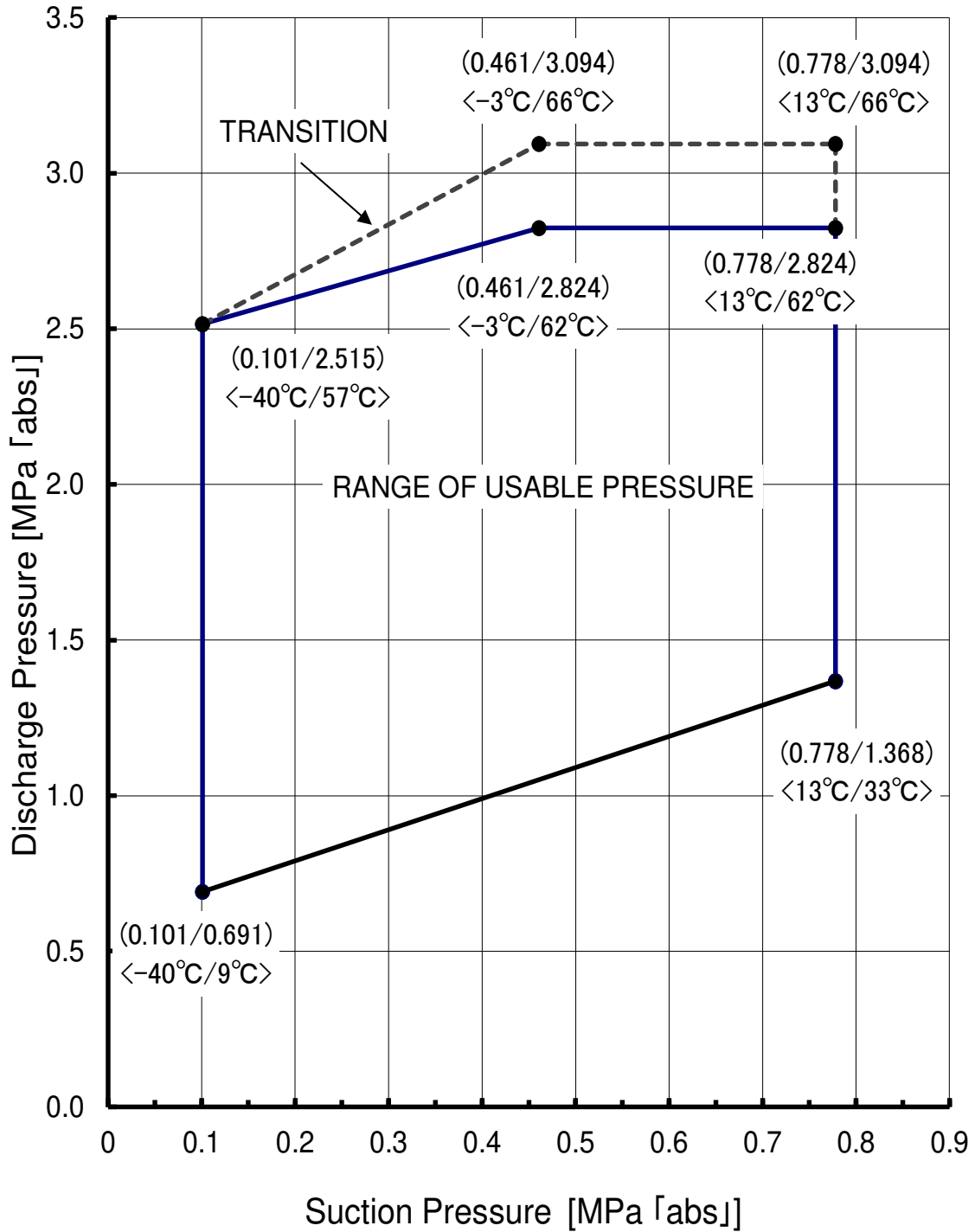
REFRIGERANT : R404A
 MODEL : ZS1120X1



(Suction pressure / Discharge pressure [MPa])
 < Evaporation Temp (dew point) / Condensing Temp (dew point) [°C] >

Fig.7

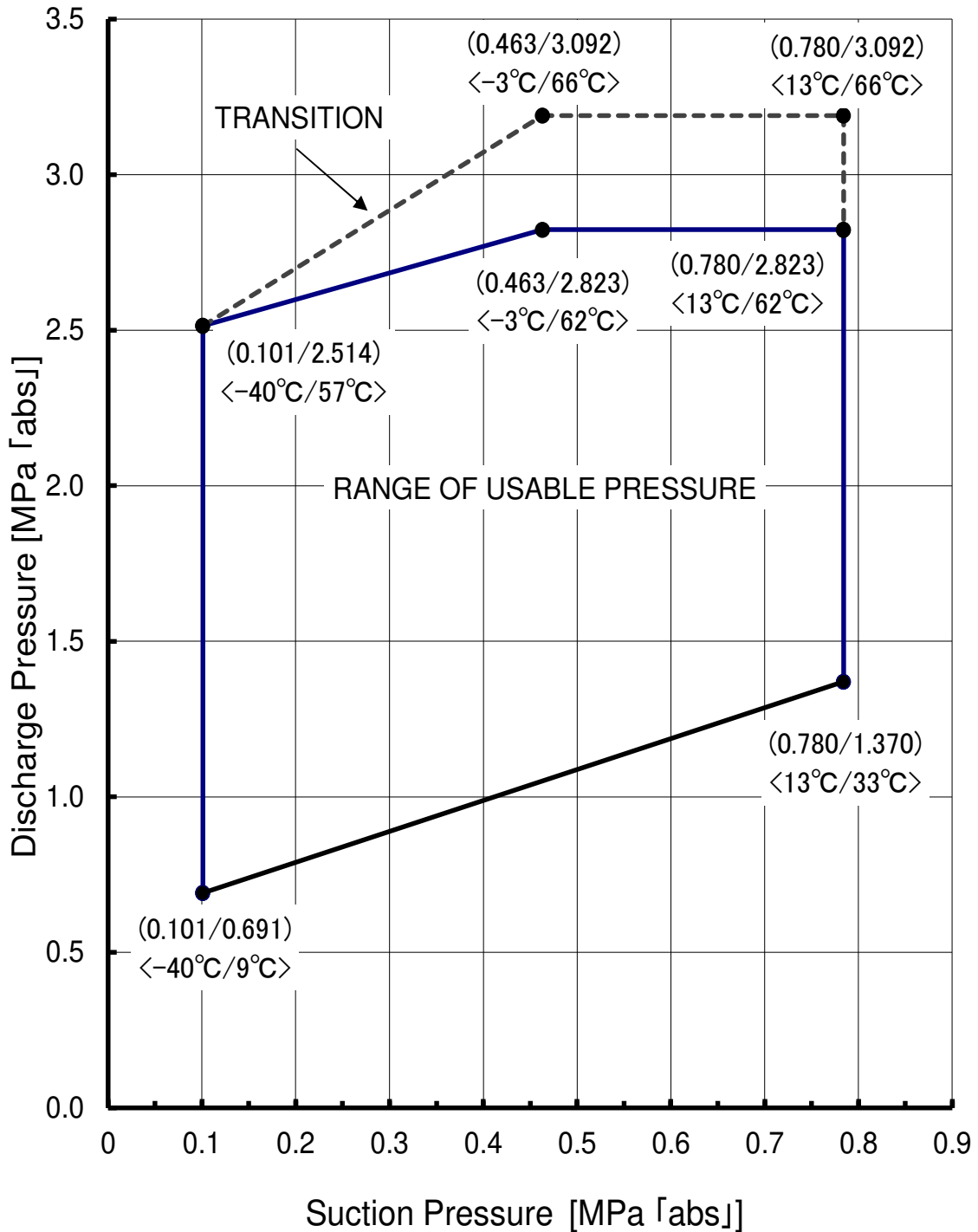
REFRIGERANT : R448A
 MODEL : ZS1120X1



(Suction pressure / Discharge pressure [MPa])
 < Evaporation Temp (dew point) / Condensing Temp (dew point) [°C] >

Fig.8

REFRIGERANT : R449A
 MODEL : ZS1120X1



(Suction pressure / Discharge pressure [MPa])
 < Evaporation Temp (dew point) / Condensing Temp (dew point) [°C] >

Fig.9

Model: ZS6013X1 Refrigerant: R448A, R449A

Refrigerant	R448A, R449A
Power Supply	1PH/208V/60Hz
Sub Cooling	0K
Return Gas Temp.	18°C
Cooling	Fan Cooling + Liquid Injection

Cooling capacity[W]

Condensing Temp. °C	Evaporating Temp. °C											
	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
35	303	401	520	667	843	1,053	1,300	1,587	1,923	2,306	2,743	3,238
40	287	374	483	618	783	981	1,215	1,489	1,807	2,173	2,589	3,060
45	280	347	446	570	723	909	1,131	1,391	1,694	2,041	2,438	2,886
50	235	305	395	510	652	826	1,033	1,277	1,561	1,889	2,263	2,689
55	197	261	345	450	583	743	936	1,164	1,431	1,740	2,093	2,496

Motor Input[w]

Condensing Temp. °C	Evaporating Temp. °C											
	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
35	703	704	704	704	704	704	704	704	704	704	705	706
40	751	753	756	759	759	761	763	765	765	766	768	768
45	799	804	809	814	817	819	822	825	828	829	831	832
50	886	887	888	890	892	895	898	902	906	912	917	924
55	973	971	968	968	969	971	974	979	986	993	1,004	1,016

Current[A]

Condensing Temp. °C	Evaporating Temp. °C											
	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
35	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
40	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
45	4.1	4.1	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2
50	4.4	4.4	4.4	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.6	4.6
55	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.9	4.9	4.9	5.0

Model: ZS7516X1 Refrigerant: R404A

Refrigerant	R404A
Power Supply	1PH/208V/60Hz
Sub Cooling	0K
Return Gas Temp.	18°C
Cooling	Fan Cooling + Liquid Injection

Cooling capacity[W]

Condensing Temp. °C	Evaporating Temp. °C											
	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
35	461	602	768	963	1,192	1,458	1,768	2,126	2,534	2,999	3,522	4,110
40	425	552	702	881	1,094	1,345	1,634	1,969	2,350	2,783	3,272	3,819
45	402	500	635	800	997	1,230	1,499	1,811	2,166	2,570	3,022	3,529
50	334	437	564	717	899	1,112	1,359	1,645	1,971	2,340	2,756	3,220
55	276	374	492	633	799	993	1,219	1,478	1,775	2,111	2,490	2,914

Motor Input[w]

Condensing Temp. °C	Evaporating Temp. °C											
	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
35	836	842	848	853	858	863	868	871	876	879	882	887
40	913	922	931	939	948	954	960	968	972	977	981	983
45	989	1,001	1,013	1,025	1,035	1,045	1,053	1,061	1,069	1,075	1,079	1,083
50	1,101	1,109	1,117	1,126	1,135	1,144	1,154	1,163	1,174	1,185	1,195	1,206
55	1,213	1,217	1,220	1,227	1,235	1,244	1,253	1,265	1,279	1,294	1,310	1,329

Current[A]

Condensing Temp. °C	Evaporating Temp. °C											
	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
35	4.2	4.2	4.2	4.3	4.3	4.3	4.3	4.3	4.4	4.4	4.4	4.4
40	4.5	4.6	4.6	4.6	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.8
45	4.9	4.9	5.0	5.0	5.1	5.1	5.1	5.2	5.2	5.2	5.3	5.3
50	5.4	5.4	5.4	5.5	5.5	5.6	5.6	5.7	5.7	5.8	5.8	5.9
55	5.9	6.0	6.0	6.0	6.1	6.1	6.1	6.2	6.3	6.4	6.4	6.5

Model: ZS7516X1 Refrigerant: R448A, R449A

Refrigerant	R448A, R449A
Power Supply	1PH/208V/60Hz
Sub Cooling	0K
Return Gas Temp.	18°C
Cooling	Fan Cooling + Liquid Injection

Cooling capacity[W]

Condensing Temp. °C	Evaporating Temp. °C											
	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
35	393	521	675	858	1,077	1,335	1,638	1,990	2,398	2,864	3,395	3,994
40	366	483	624	794	1,001	1,246	1,531	1,866	2,251	2,692	3,194	3,760
45	351	444	573	732	924	1,154	1,425	1,741	2,105	2,522	2,995	3,529
50	296	394	517	667	847	1,062	1,315	1,609	1,949	2,338	2,782	3,282
55	249	345	461	601	769	969	1,204	1,477	1,796	2,159	2,572	3,042

Motor Input[w]

Condensing Temp. °C	Evaporating Temp. °C											
	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
35	779	785	791	796	803	808	815	821	828	834	841	850
40	851	859	869	878	886	894	902	911	919	927	935	943
45	924	936	948	960	970	981	991	1,001	1,012	1,019	1,029	1,039
50	1,030	1,038	1,046	1,056	1,065	1,075	1,087	1,099	1,111	1,126	1,141	1,157
55	1,135	1,140	1,145	1,152	1,162	1,171	1,183	1,197	1,213	1,231	1,251	1,276

Current[A]

Condensing Temp. °C	Evaporating Temp. °C											
	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
35	3.9	3.9	4.0	4.0	4.0	4.1	4.1	4.1	4.1	4.2	4.2	4.2
40	4.2	4.3	4.3	4.4	4.4	4.4	4.5	4.5	4.5	4.6	4.6	4.7
45	4.6	4.6	4.7	4.7	4.8	4.8	4.9	4.9	5.0	5.0	5.0	5.1
50	5.0	5.1	5.1	5.2	5.2	5.2	5.3	5.4	5.4	5.5	5.6	5.6
55	5.5	5.6	5.6	5.6	5.7	5.7	5.8	5.8	5.9	6.0	6.1	6.3

Model: ZS1120X1 Refrigerant: R404A

Refrigerant	R404A
Power Supply	1PH/208V/60Hz
Sub Cooling	0K
Return Gas Temp.	18°C
Cooling	Fan Cooling + Liquid Injection

Cooling capacity[W]

Condensing Temp. °C	Evaporating Temp. °C											
	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
35	640	846	1,077	1,338	1,633	1,970	2,354	2,795	3,293	3,856	4,488	5,195
40	583	773	985	1,229	1,506	1,826	2,189	2,604	3,074	3,602	4,196	4,857
45	545	697	893	1,120	1,380	1,680	2,024	2,414	2,855	3,352	3,905	4,522
50	462	623	810	1,024	1,269	1,548	1,866	2,228	2,637	3,096	3,609	4,179
55	392	547	726	928	1,156	1,414	1,710	2,043	2,419	2,842	3,314	3,840

Motor Input[w]

Condensing Temp. °C	Evaporating Temp. °C											
	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
35	1,123	1,128	1,134	1,139	1,143	1,148	1,152	1,156	1,159	1,161	1,163	1,166
40	1,226	1,236	1,242	1,251	1,257	1,261	1,267	1,272	1,274	1,275	1,277	1,276
45	1,331	1,342	1,353	1,362	1,369	1,376	1,381	1,386	1,388	1,391	1,391	1,389
50	1,487	1,491	1,495	1,497	1,502	1,506	1,511	1,516	1,522	1,528	1,533	1,540
55	1,644	1,639	1,635	1,634	1,635	1,637	1,640	1,646	1,654	1,664	1,676	1,689

Current[A]

Condensing Temp. °C	Evaporating Temp. °C											
	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
35	5.7	5.7	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
40	6.1	6.1	6.2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3
45	6.5	6.6	6.6	6.7	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8
50	7.3	7.3	7.3	7.3	7.4	7.4	7.4	7.4	7.5	7.5	7.5	7.5
55	8.1	8.0	8.0	8.0	8.0	8.0	8.0	8.1	8.1	8.2	8.2	8.3

Model: ZS1120X1 Refrigerant: R448A, R449A

Refrigerant	R448A, R449A
Power Supply	1PH/208V/60Hz
Sub Cooling	0K
Return Gas Temp.	18°C
Cooling	Fan Cooling + Liquid Injection

Cooling capacity[W]

Condensing Temp. °C	Evaporating Temp. °C											
	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
35	546	733	947	1,193	1,476	1,803	2,181	2,617	3,117	3,683	4,326	5,049
40	502	677	876	1,108	1,377	1,691	2,051	2,468	2,944	3,485	4,096	4,783
45	476	619	805	1,024	1,280	1,577	1,924	2,321	2,774	3,290	3,870	4,522
50	410	563	742	952	1,196	1,478	1,805	2,180	2,608	3,094	3,643	4,259
55	354	504	679	881	1,113	1,380	1,689	2,042	2,447	2,906	3,424	4,008

Motor Input[w]

Condensing Temp. °C	Evaporating Temp. °C											
	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
35	1,046	1,051	1,058	1,063	1,070	1,076	1,082	1,088	1,095	1,101	1,109	1,118
40	1,143	1,152	1,160	1,169	1,176	1,182	1,190	1,197	1,203	1,210	1,217	1,223
45	1,243	1,253	1,265	1,275	1,283	1,291	1,299	1,308	1,314	1,319	1,327	1,332
50	1,390	1,395	1,399	1,404	1,409	1,416	1,423	1,432	1,441	1,452	1,464	1,477
55	1,540	1,536	1,534	1,535	1,538	1,542	1,547	1,557	1,569	1,583	1,601	1,622

Current[A]

Condensing Temp. °C	Evaporating Temp. °C											
	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
35	5.3	5.4	5.4	5.4	5.4	5.5	5.5	5.5	5.6	5.6	5.6	5.7
40	5.8	5.8	5.8	5.9	5.9	5.9	5.9	6.0	6.0	6.0	6.1	6.1
45	6.2	6.2	6.3	6.3	6.3	6.4	6.4	6.4	6.5	6.5	6.5	6.5
50	6.8	6.8	6.9	6.9	6.9	6.9	7.0	7.0	7.1	7.1	7.2	7.2
55	7.5	7.5	7.5	7.5	7.5	7.6	7.6	7.6	7.7	7.8	7.8	7.9

5691100NN

MODEL	ZS6013X1
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MODEL NAME	MANUFACTURING DATE	REFREGERANT NAME
POWER SOURCE	BAR CODE	
OIL NAME		

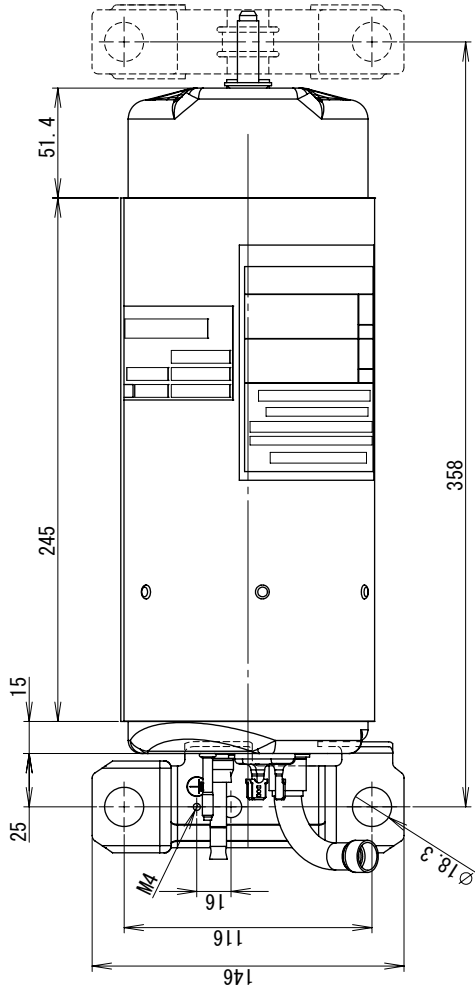
WARNING INDICATION

MODEL NO. *****
 208-230V 60Hz 1PH LRA **
 DESIGN PRESSURE 3.13 MPa MAX
 THERMALLY PROTECTED
 Hitachi-Johnson Controls Air Conditioning Inc. JAPAN

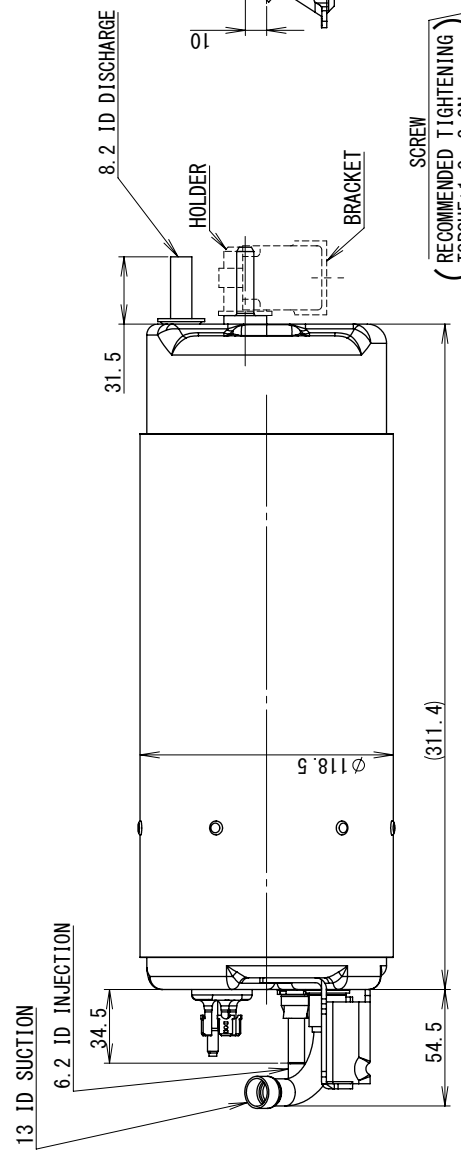
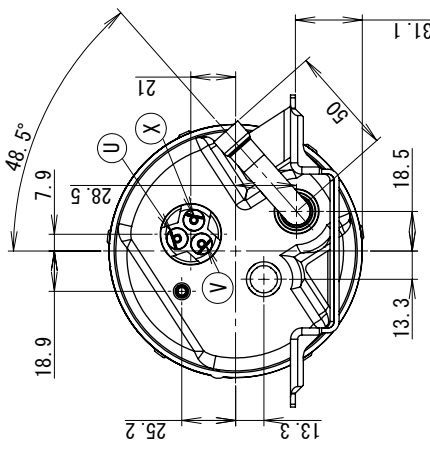
WARNING Turn power OFF before servicing.
 Use this compressor on a grounded system only.

CAUTION DO NOT touch compressor surface. Touching may result in personal injury due to high surface temperature.

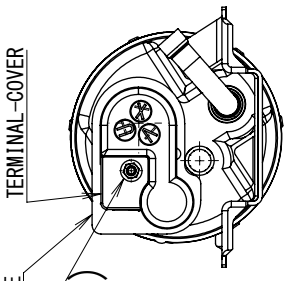
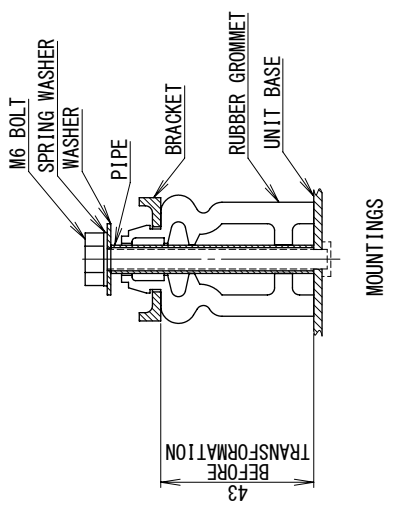
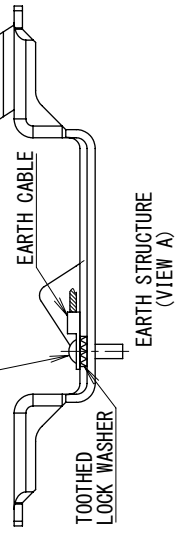
SA 6737 R410A-R448A-446A *****



LABEL CONTENTS (VIEW Q)



SCREW
 (RECOMMENDED TIGHTENING)
 TORQUE: 1.0~2.0N·m



(RECOMMENDED TIGHTENING)
 TORQUE: 2.65±0.49N·m

MSD	SIGNATURE	DATE	PROJECT/TITLE
	T. Kikuchi	2018-10-15	COMPRESSOR DIMENSION SKETCH
	T. Akiyama	2018-10-15	
	APPD: M. Onoguchi	2018-10-15	SCALE NTS
JOB NO.	PRD		3DCAD

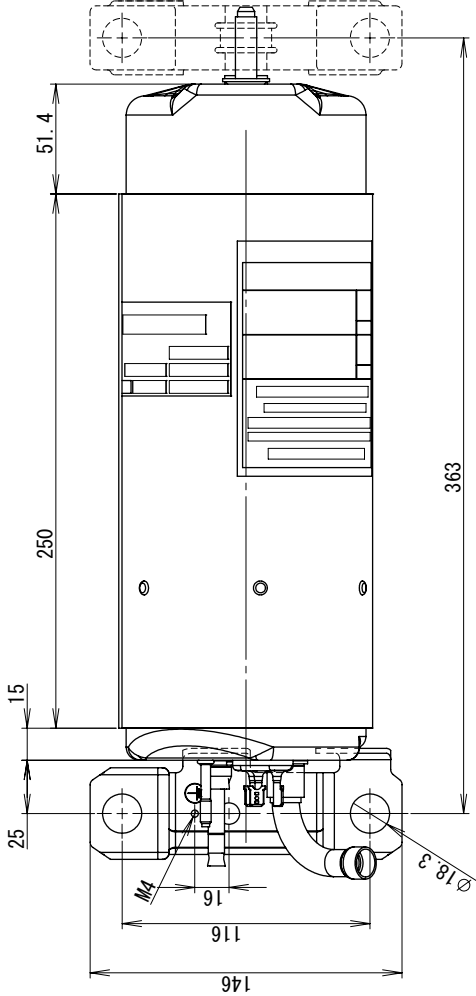
Hitachi-Johnson Controls Air Conditioning, Inc.
 TOCHIGI DWG. NO. 3CYC NN0011595
 RECD 2018 1015

9651100NN

A

MODEL	ZS7516X1
-------	----------

A →



MODEL NO. *****
 208-230V 60Hz 1PH LRA **
 DESIGN PRESSURE 3.13 MPa MAX
 THERMALLY PROTECTED
 Hitachi-Johnson Controls Air Conditioning Inc. JAPAN

⚠ **WARNING** Turn power OFF before servicing.
 Use this compressor on a grounded system only.

⚠ **CAUTION** DO NOT touch compressor surface. Touching may result in personal injury due to high surface temperature.

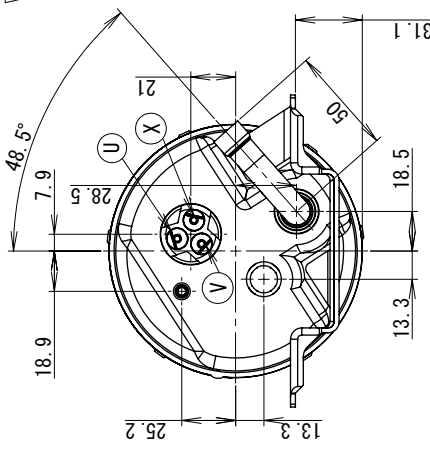
SA 6737 R410A-3448A-3448A *****

MODEL NAME _____ MANUFACTURING DATE _____ REFRIGERANT NAME _____
 POWER SOURCE _____ IBAR CODE _____
 OIL NAME _____

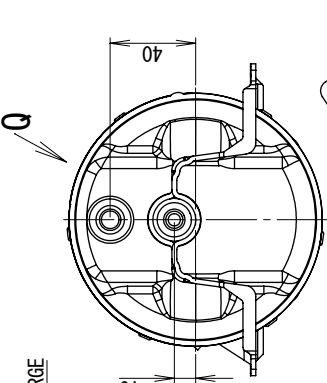
WARNING INDICATION

B

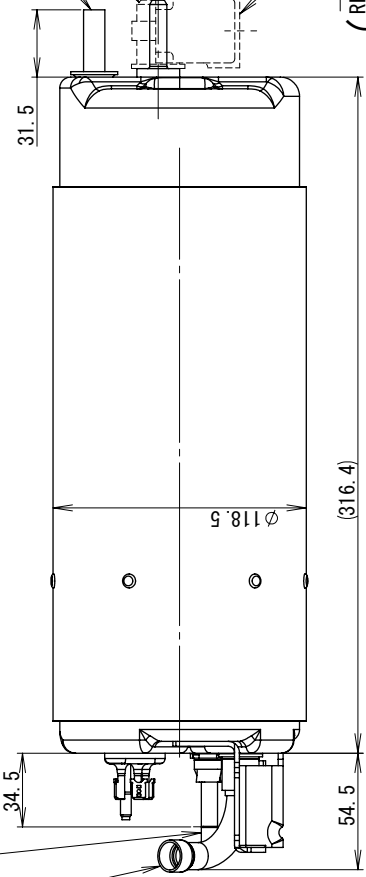
13 ID SUCTION
 6.2 ID INJECTION



8.2 ID DISCHARGE

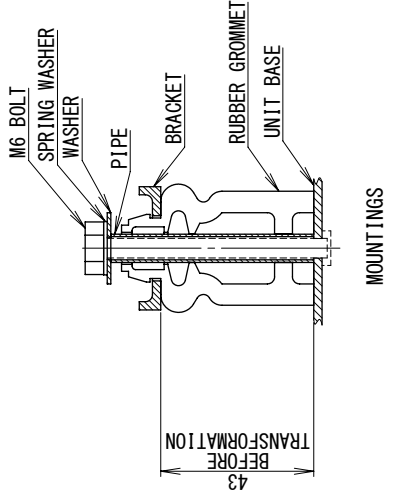


HOLDER
 BRACKET

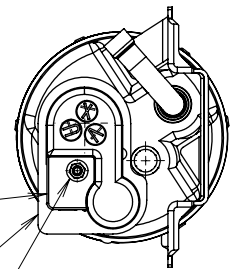


LABEL CONTENTS
 (VIEW Q)

E

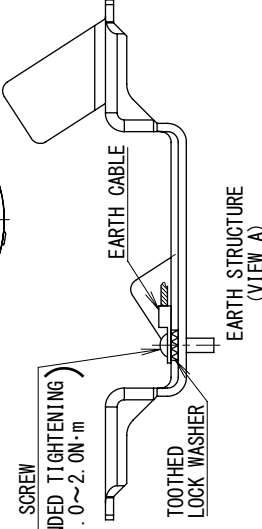


RUBBER PLATE NUT
 (RECOMMENDED TIGHTENING TORQUE: 2.65±0.49N·m)



RUBBER PLATE, TERMINAL-COVER SETTING

SCREW
 (RECOMMENDED TIGHTENING TORQUE: 1.0~2.0N·m)



EARTH STRUCTURE
 (VIEW A)

MSD	SIGNATURE	DATE	PROJECTION/TITLE	PROJ. NO.	C
DWN.	T. Kikuchi	2018-10-15	 SCALE NTS	JOB NO.	3DCAD
CHKD.	T. Akiyama	2018-10-15		3CYC	COMPRESSOR DIMENSION SKETCH
APPD.	M. Onoguchi	2018-10-15		TOCHIGI DWG. NO.	NN0011596
Hitachi-Johnson Controls Air Conditioning, Inc.					
REGD 2018 1015					

F

1

2

3

4

5

6

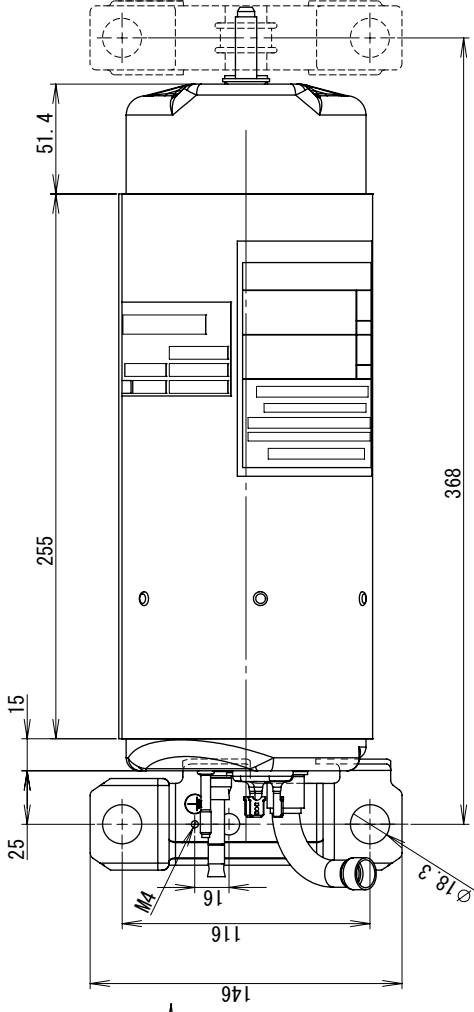
7

8

001

Z691100NN

MODEL
ZS1120X1



MODEL NO. *****
208-230V 60Hz 1PH. LRA **
DESIGN PRESSURE 3.13 MPa MAX
THERMALLY PROTECTED
Hitachi-Johnson Controls Air Conditioning Inc. JAPAN

⚠ **WARNING** Turn power OFF before servicing.
Use this compressor on a grounded system only.

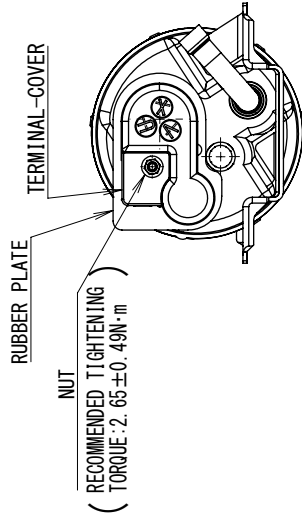
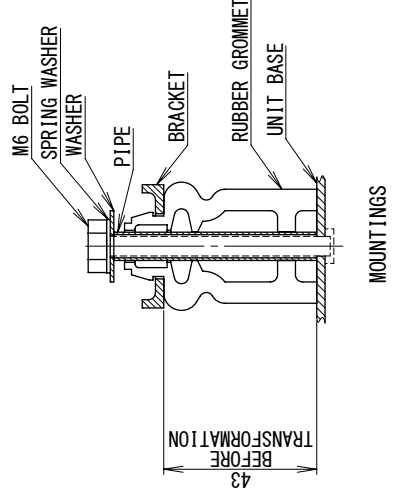
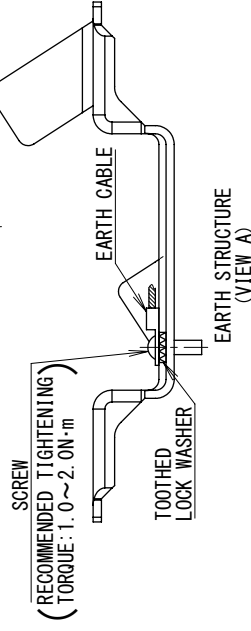
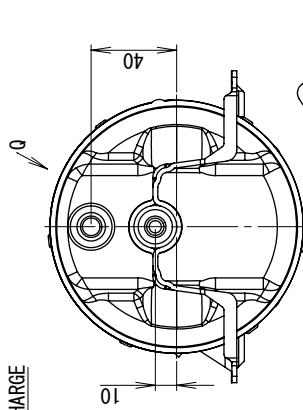
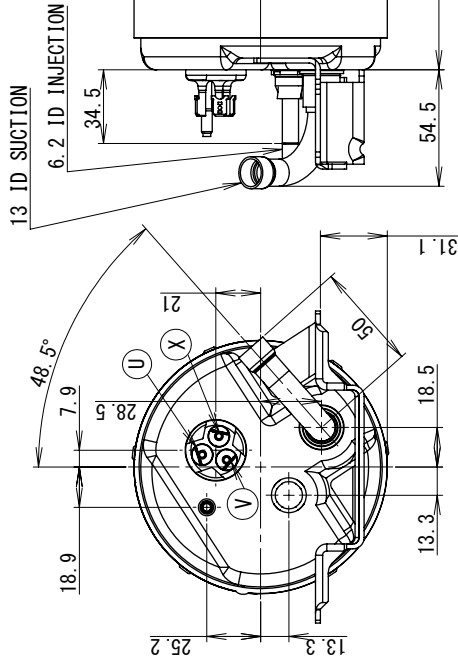
⚠ **CAUTION** DO NOT touch compressor surface. Touching may result in personal injury due to high surface temperature.

SA 6737 R404A-R448A-9448A *****

MODEL NAME _____ MANUFACTURING DATE _____ REFRIGERANT NAME _____
POWER SOURCE _____ BAR CODE _____
OIL NAME _____

WARNING INDICATION

LABEL CONTENTS
(VIEW Q)



MSD	SIGNATURE	DATE	PROJECT/TITLE
DWN	T. Kikuchi	2018-10-15	3DCAD
CHKD	T. Akiyama	2018-10-15	
APPD	M. Onoguchi	2018-10-15	SCALE
			NTS

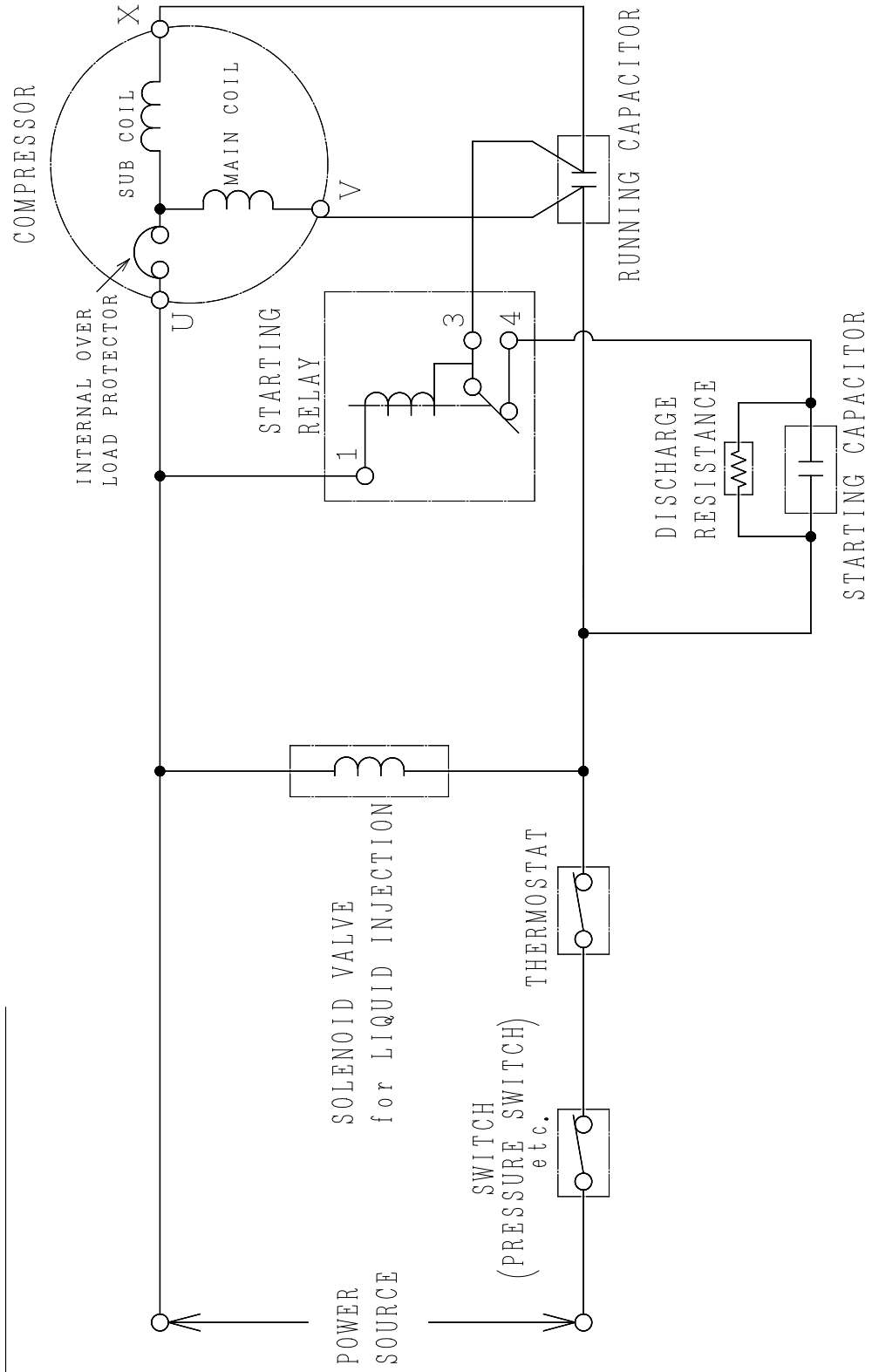
Hitachi-Johnson Controls
Air Conditioning, Inc.

TOCHIGI DWG. NO. **3CYC NN0011597**

REGD 2018 1015

BB0041918

SINGLE-PHASE POWER

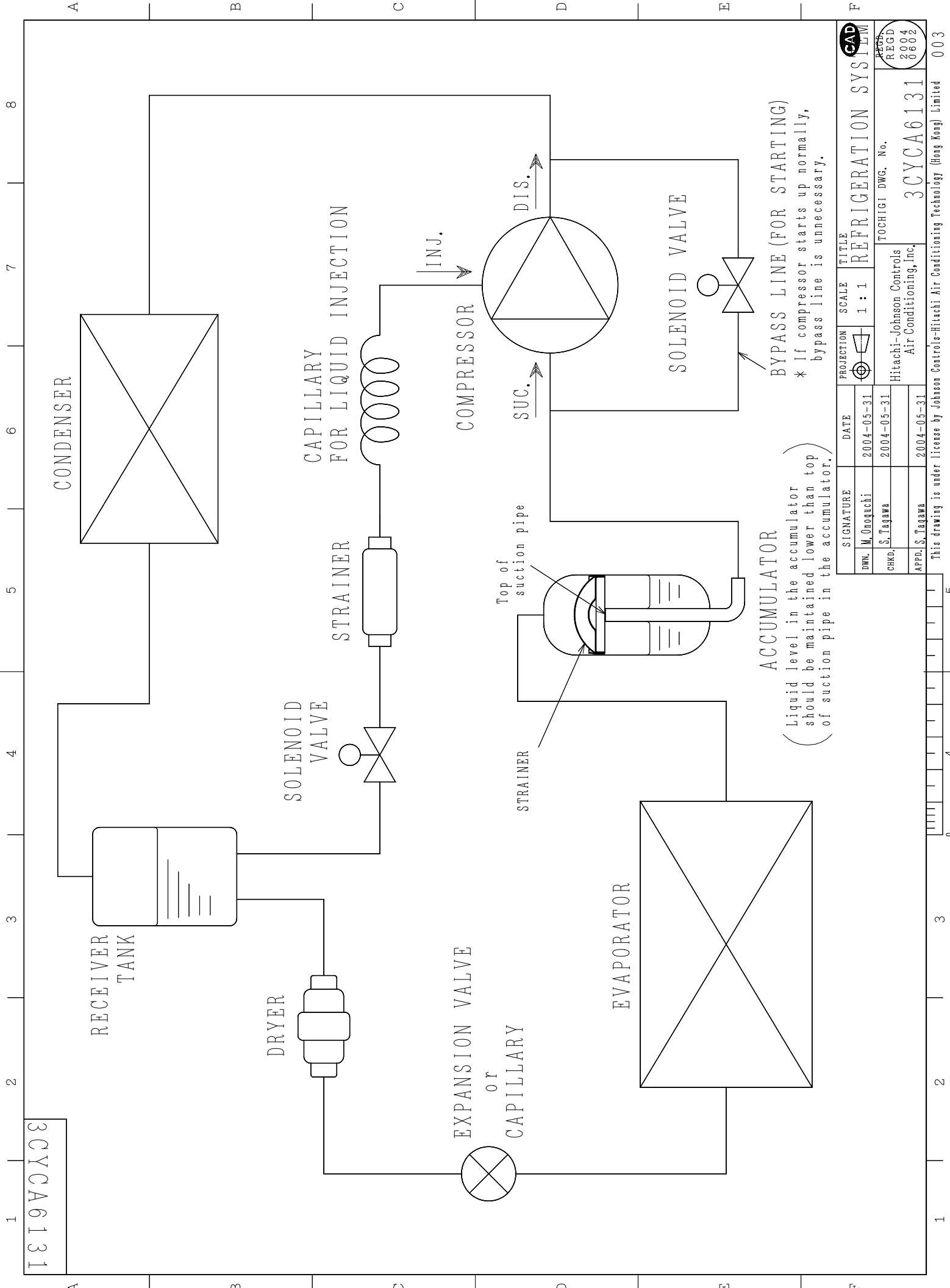


SIGNATURE		DATE	PROJECTION	SCALE	TITLE
DWN.	K. Habu	2013-11-28		NTS	CIRCUIT DIAGRAM
CHKD.	K. Matsunaga	2013-11-28			
APPD.	M. Onoouchi	2013-11-28			

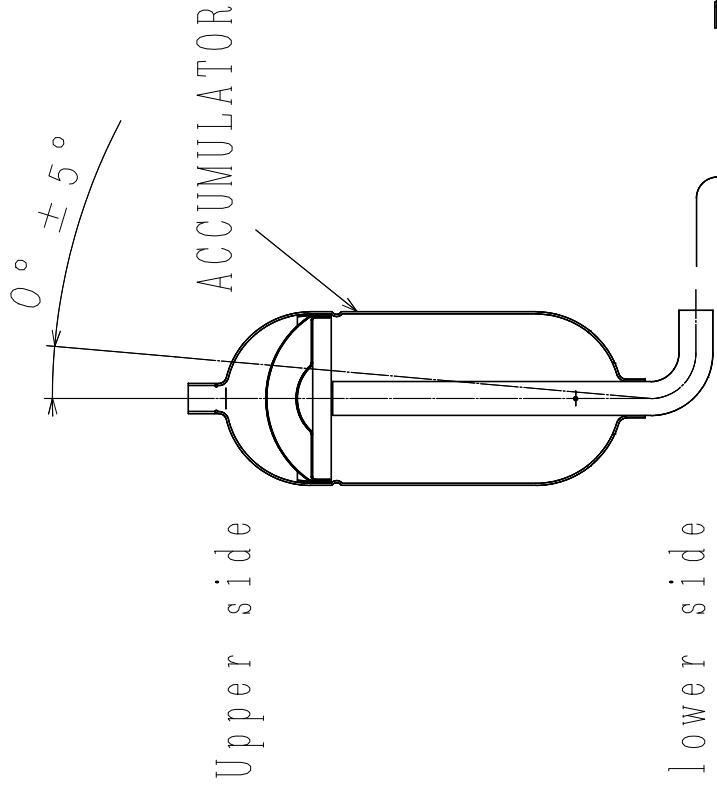
This drawing is under license by Johnson Controls-Hitachi Air Conditioning Technology (Hong Kong) Limited

CAD
REGD
2013
1128

TOCHIGI DWG. No.
Hitachi-Johnson Controls
Air Conditioning, Inc.
3CYCBB0041918

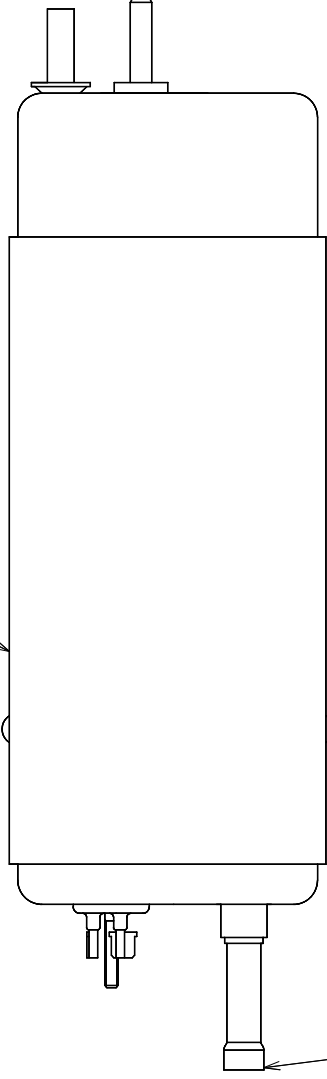


3CYCA1588



The accumulator should be connected between discharge pipe of evaporator and suction pipe of compressor. The allowable incline should be less than 5°.

COMPRESSOR



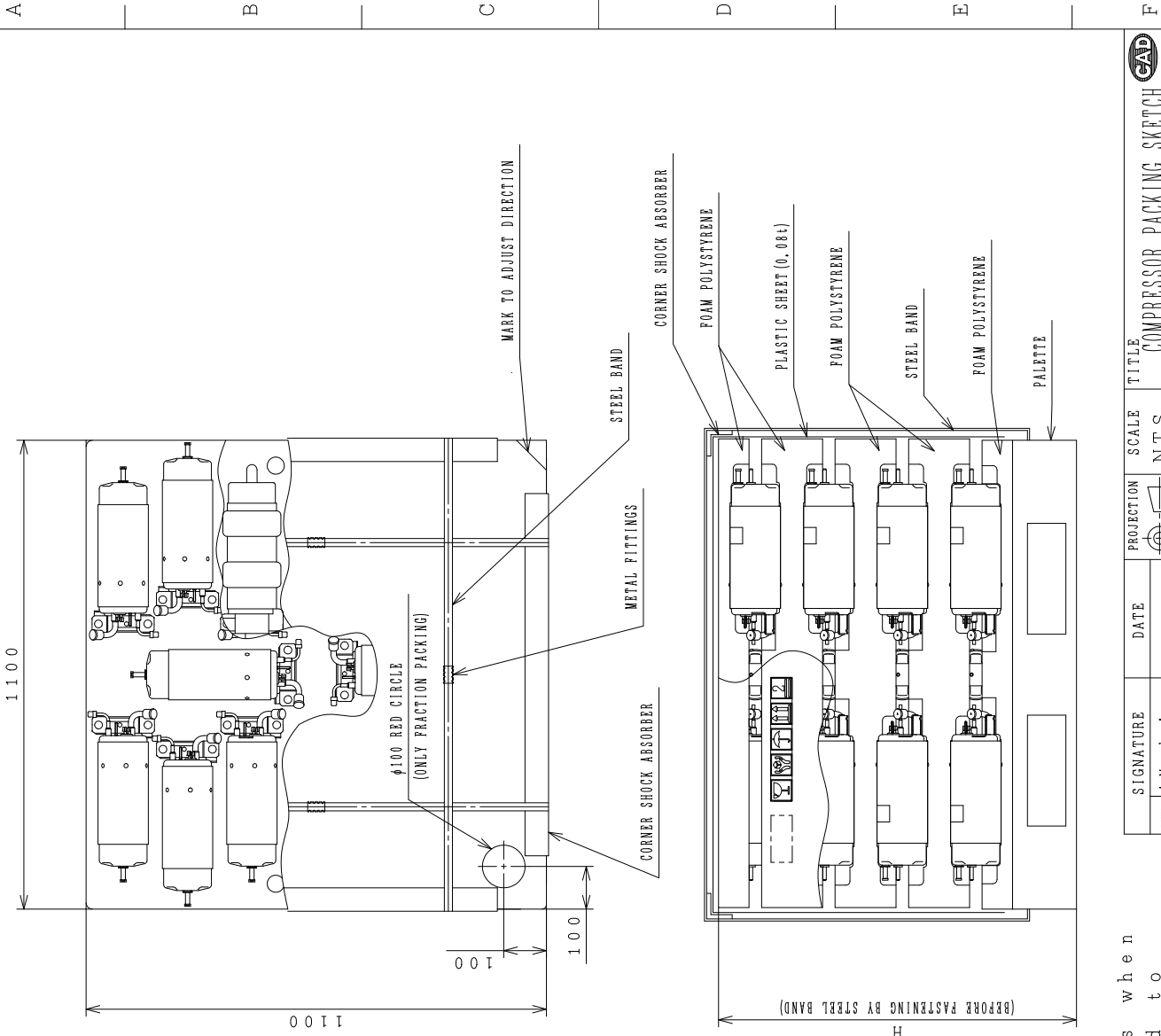
Suction pipe of compressor

SIGNATURE		DATE	PROJECTION	SCALE	TITLE	REGD 2001 0830
DWN. A. Oshima	2001-08-29	1:2	Hitachi-Johnson Controls Air Conditioning, Inc.	1:2	CONNECTING SKETCH OF ACCUMULATOR	
CHKD. A. Simada	2001-08-29		Hitachi-Johnson Controls Air Conditioning, Inc.		TOCHIGI DWG. No.	3CYCA1588
APPD. Y. Sasaki	2001-08-29		Hitachi-Johnson Controls-Hitachi Air Conditioning Technology (Hong Kong) Limited			

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002

B0001805



	INCLUDED NUMBER	H (STEP PILE)	GROSS WEIGHT (kg)
A	4 9 ~ 6 4	814 (4STEP)	8 5 7
B	3 3 ~ 4 8	641 (3STEP)	6 4 6
C	1 7 ~ 3 2	468 (2STEP)	4 3 6
D	6 ~ 1 6	296 (1STEP)	2 2 5

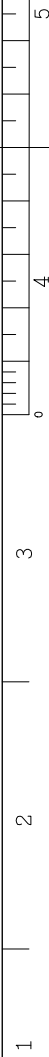
Do not pile them up more than two packages when keeping. The package should not be exposed to rain after delivery. Please dispose of the packing parts on your responsibility.

SIGNATURE	DATE	PROJECTION	SCALE	TITLE
DWG. A. Murakami	2005-11-11		NTS	COMPRESSOR PACKING SKETCH
CHKD. M. Unoquchi	2005-11-11			
APPD. A. Simada	2005-11-11	Hitachi-Johnson Controls Air Conditioning, Inc.		

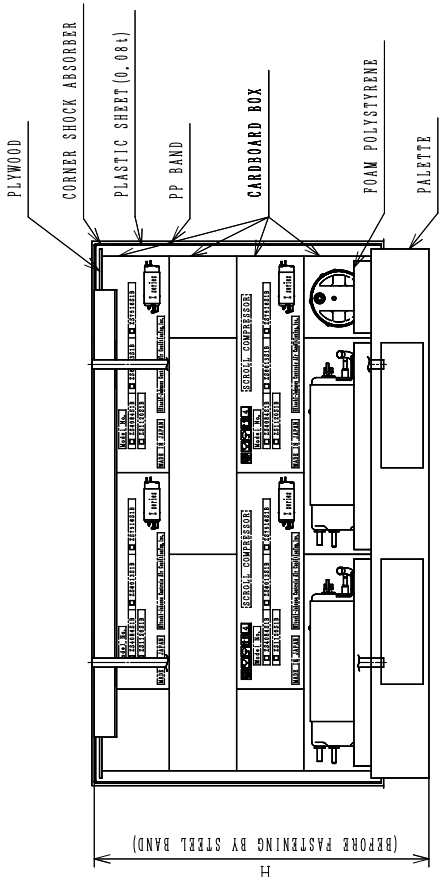
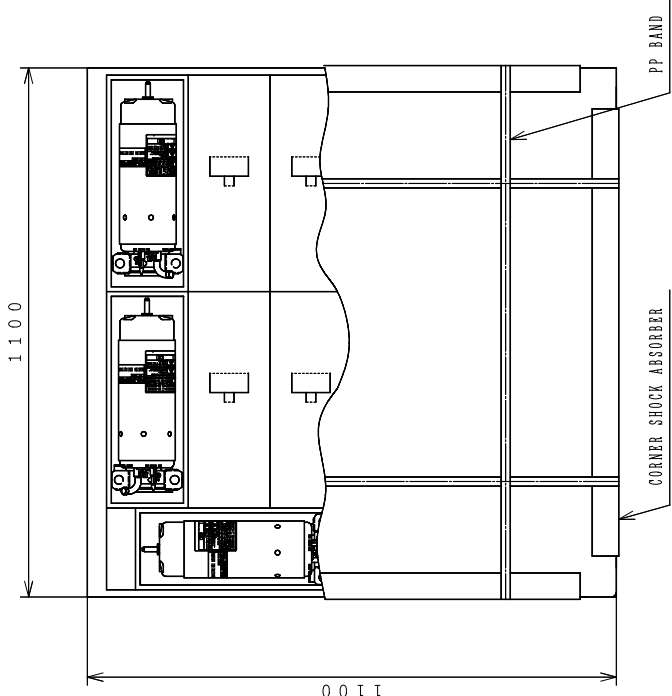


TOCHIGI DWG. No. 3CYCBB0001805

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B0044221



	INCLUDED NUMBER	H (STEP PILE)	GROSS WEIGHT (kg)
A	43~56	689(4STEP)	760
B	29~42	549(3STEP)	574
C	15~28	409(2STEP)	388
D	1~14	269(1STEP)	202

Do not pile them up more than two packages when keeping. The package should not be exposed to rain after delivery. Please dispose of the packing parts on your responsibility.

SIGNATURE	DATE	PROJECTION	SCALE	TITLE
DWN. K. Echigoya	2014-04-17	⊕	NTS	COMPRESSOR PACKING SKETCH
CHKD. K. Matsunaga	2014-04-18			
APPD. M. Onoduchi	2014-04-18			

Hitachi-Johnson Controls Air Conditioning, Inc.

TOCHIGI DWG. No. 3CYCBB0044221

REGD 2014 0418

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3CYCA4303

RUBBER PLATE

RUBBER GROMMET

PIPE

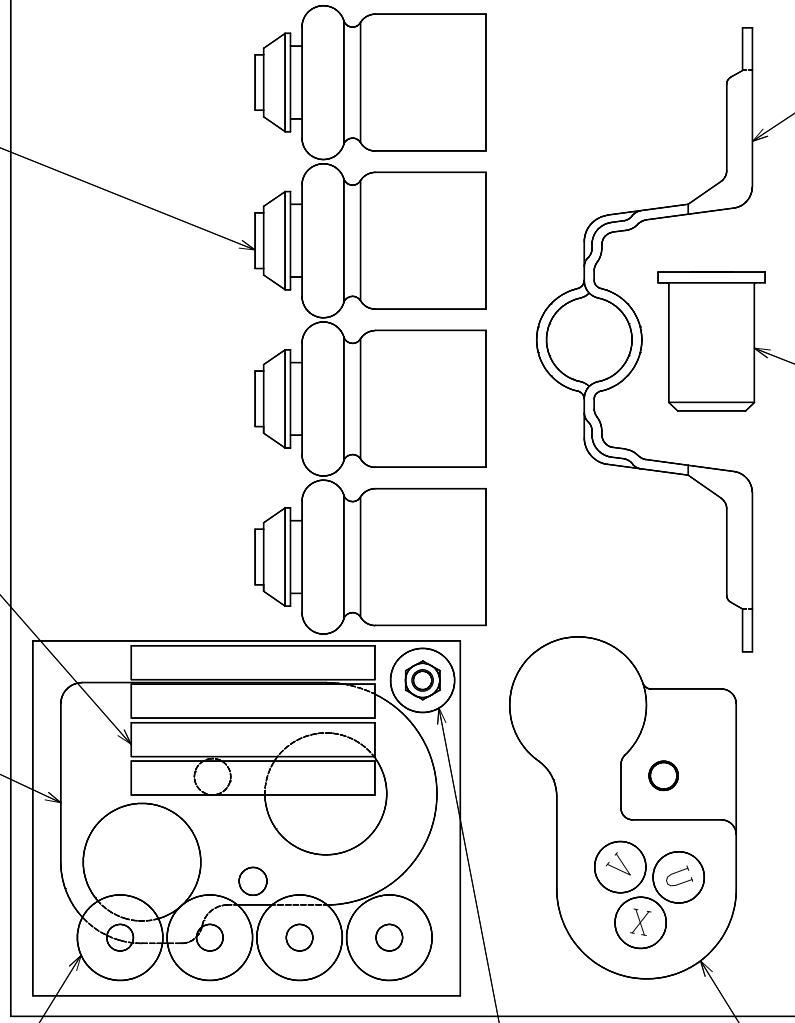
WASHER

NUT

OLR-COVER

HOLDER

BRACKET

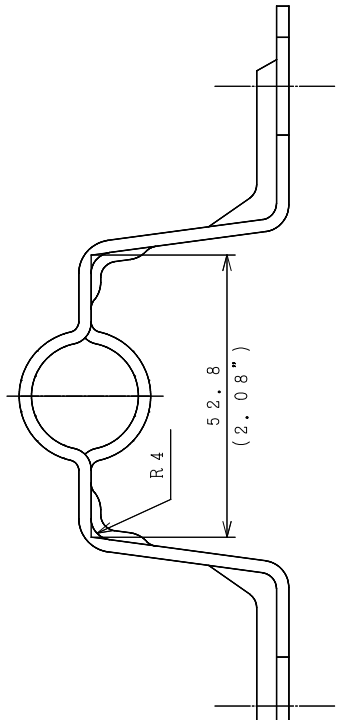
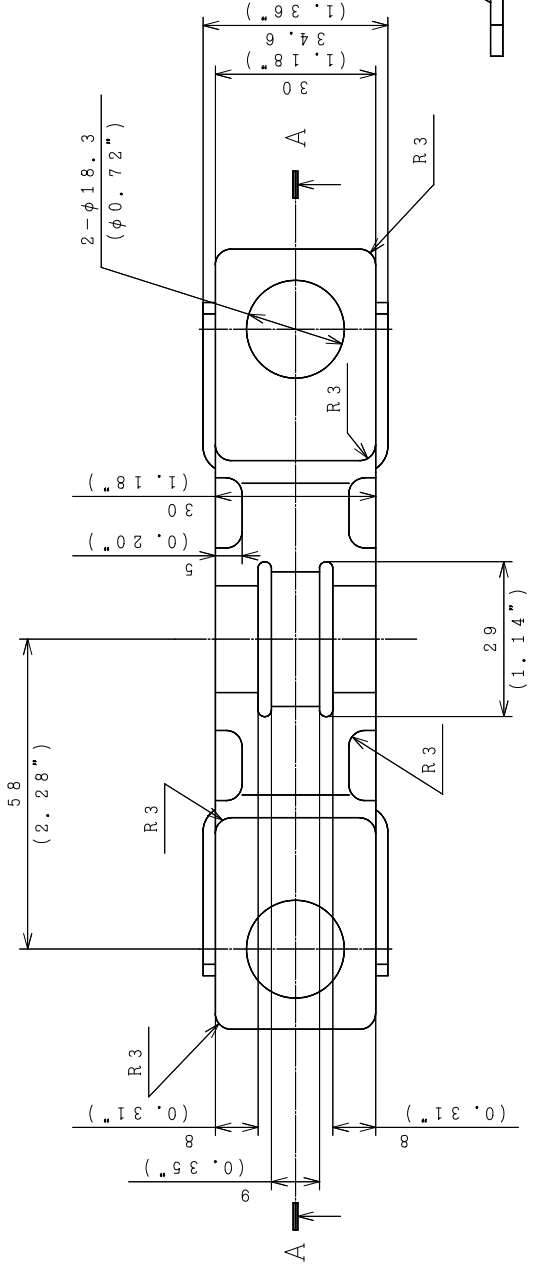


SIGNATURE	DATE	PROJECTION	SCALE	TITLE
DWN. M. Goto	2003-03-25	⊕	NTS	PARTS SET
CHKD. M. Koyama	2003-03-25			TOCHIGI DWG. No.
APPD. Y. Nakada	2003-03-26			Hitachi-Johnson Controls Air Conditioning, Inc.
				3CYCA4303

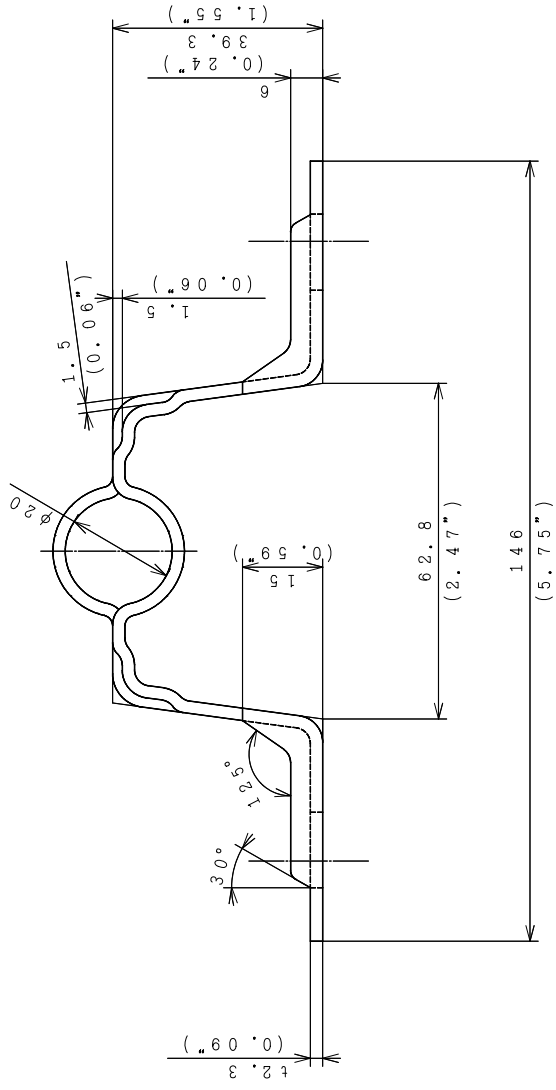
CAD
REGD
2003
0331

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3CYCA1589



A - A



MATERIAL : SPHC

DIMENSION : mm (in)

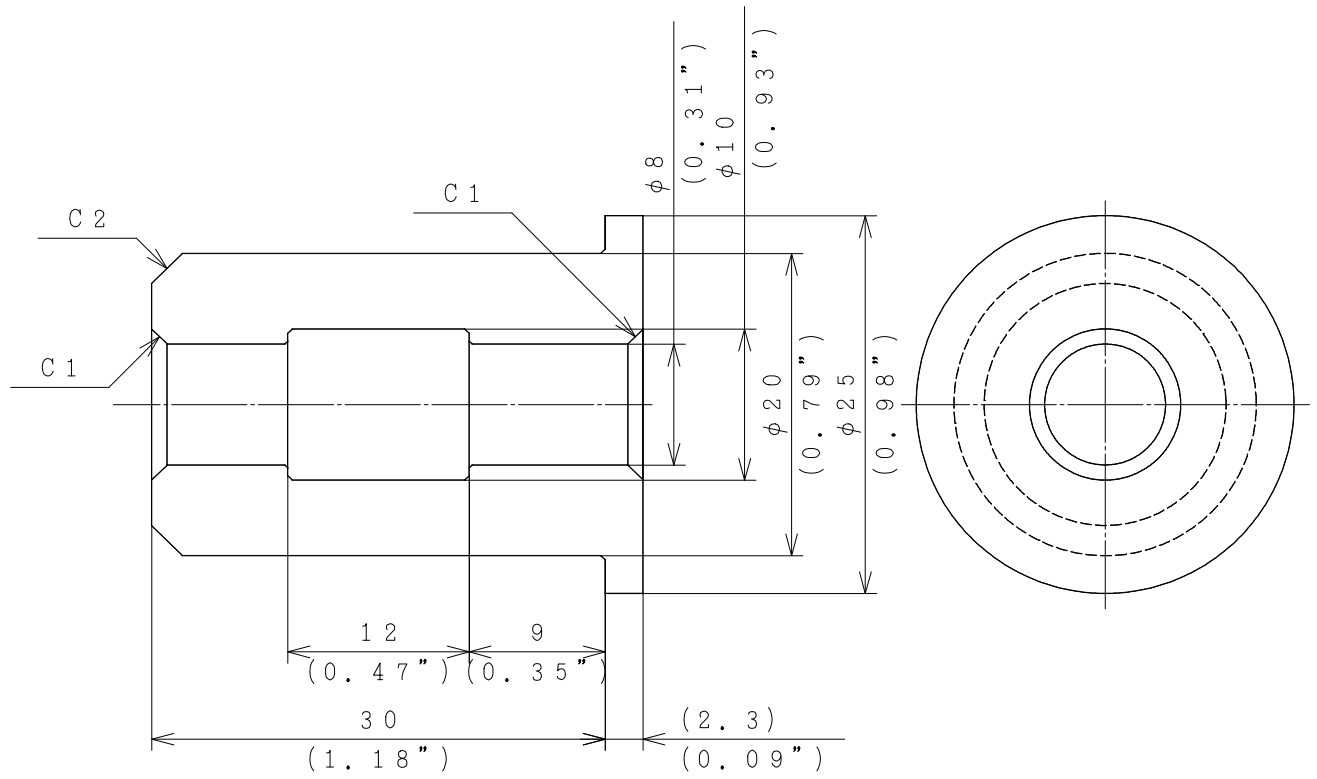
SIGNATURE		DATE	PROJECTION	SCALE	TITLE
DWN.	A. Ohma	2001-08-29		1 : 1	BRACKET
CHKD.	A. Simada	2001-08-29			
APPD.	Y. Sasaki	2001-08-29			

Hitachi-Johnson Controls Air Conditioning, Inc.		TOCHIGI DWG. No.
3CYCA1589		

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REGD 2001 0830
003

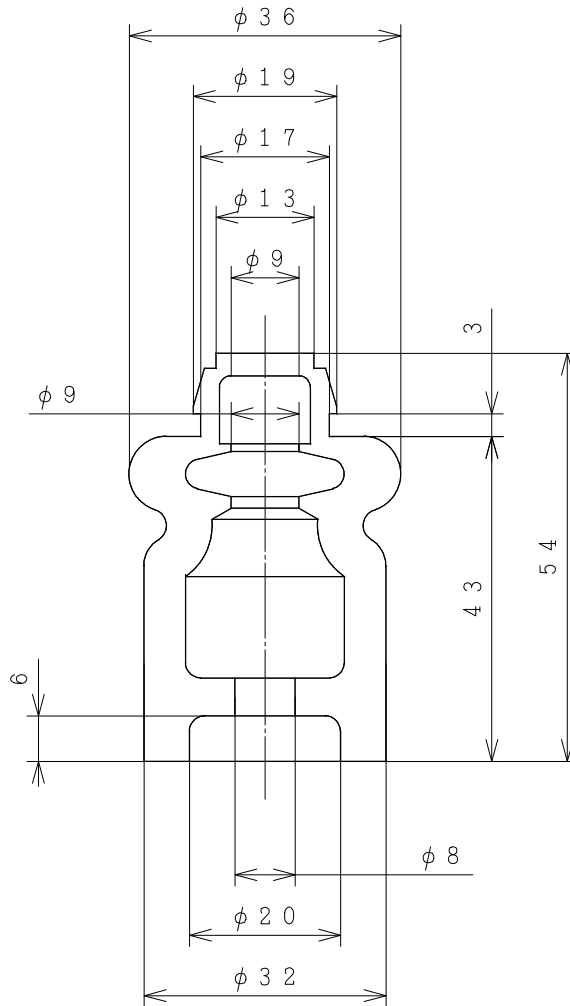
4CYC11184



MATERIAL: EPDM
 DIMENSION : mm (in)

SIGNATURE		DATE	PROJECTION	SCALE	TITLE
DWN.	A. Onuma	2001-08-29		2 : 1	HOLDER TOCHIGI DWG. No. 4CYC11184
CHKD.	A. Simada	2001-08-29			
APPD.	Y. Sasaki	2001-08-29			
			Hitachi-Johnson Controls Air Conditioning, Inc.		


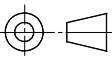
BB0014618



D I M E N S I O N : m m

M A T E R I A L : N A T U R A L R U B B E R

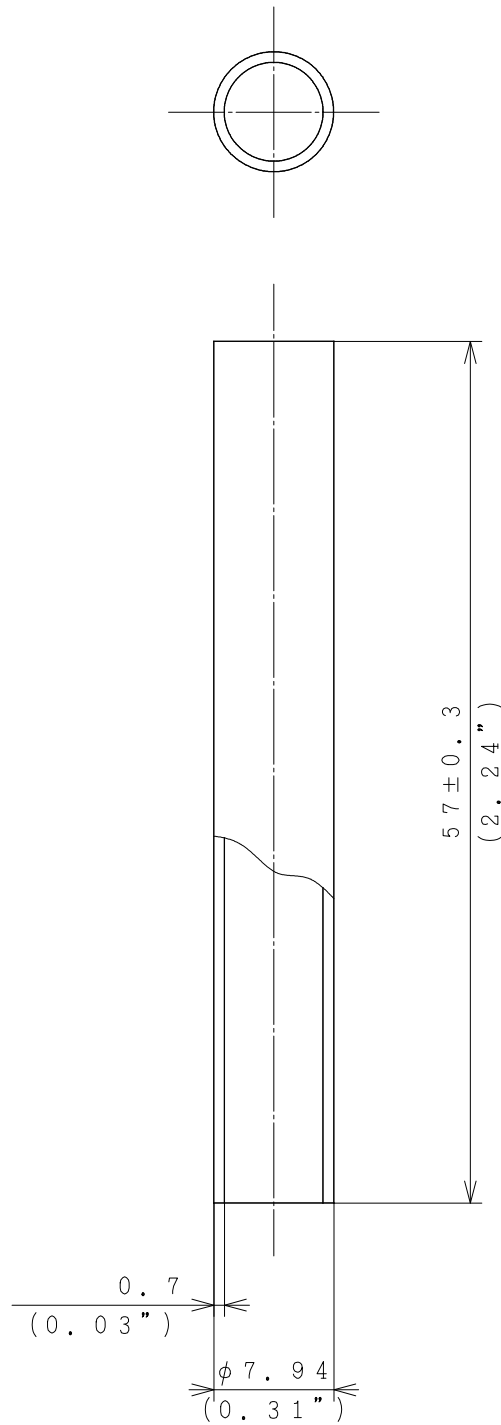
H A R D N E S S : H S 4 0 ± 5

SIGNATURE		DATE	PROJECTION	SCALE	TITLE	
DWN.	W. Sugawara	2008-08-06		1 : 1	RUBBER GROMMET	
CHKD.	M. Onoguchi	2008-08-06				
APPD.	A. Simada	2008-08-08				
			Hitachi-Johnson Controls Air Conditioning, Inc.		TOCHIGI DWG. No.	
					4CYC BB0014618	


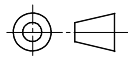
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003

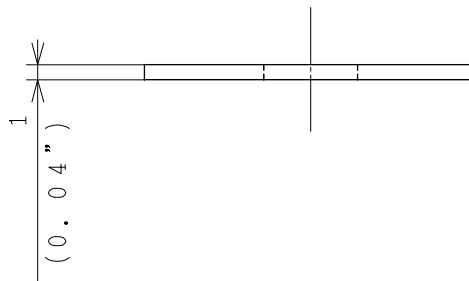
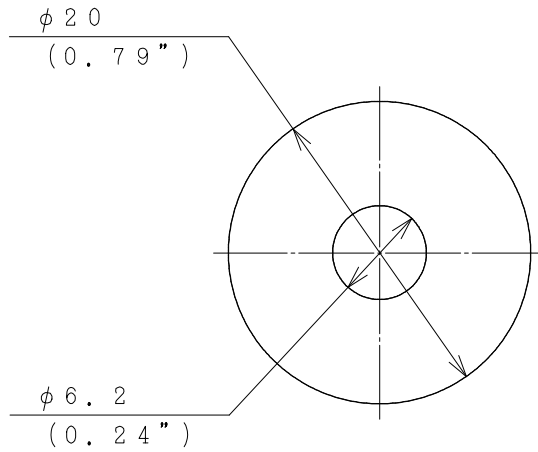
4CYC11191



MATERIAL : STEEL PIPE
 DIMENSION : mm (i n)


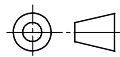
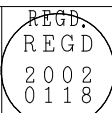
SIGNATURE		DATE	PROJECTION	SCALE	TITLE	
DWN.	M. Goto	2002-01-11		2 : 1	PIPE	
CHKD.	K. Ishigami	2002-01-11				
APPD.	Y. Sasaki	2002-01-11				
			Hitachi-Johnson Controls Air Conditioning, Inc.		TOCHIGI DWG. No.	
					4CYC11191	

4CYC11192

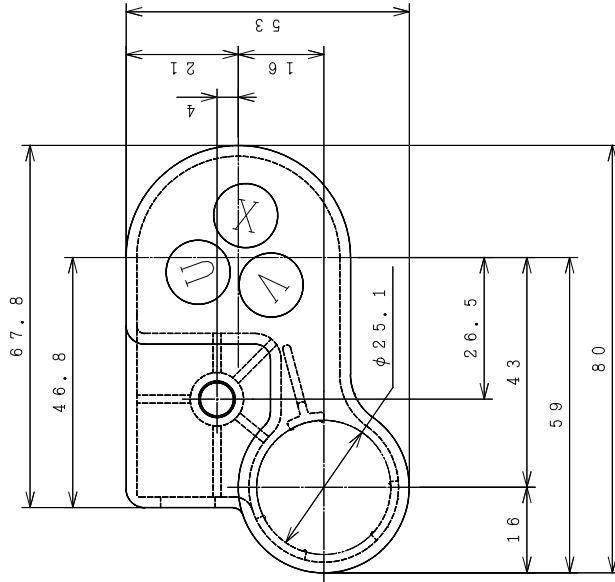
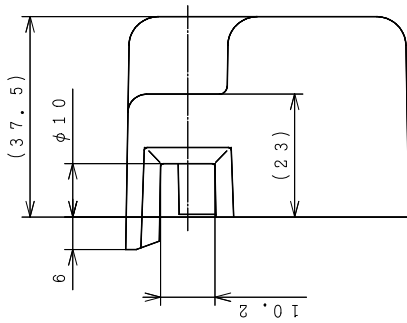
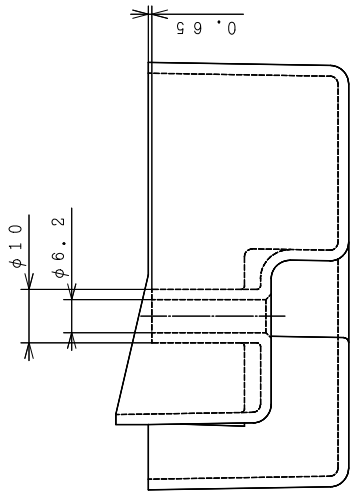


NOTES

MATERIAL: COLD ROLLED CARBON STEEL SHEETS
AND STRIP
SURFACE : ZINC-COATED
DIMENSION: mm (in)

SIGNATURE		DATE	PROJECTION	SCALE	TITLE	
DWN.	M. Goto	2002-01-17		2 : 1	WASHER	
CHKD.	K. Ishigami	2002-01-17				
APPD.	Y. Sasaki	2002-01-17				
			Hitachi-Johnson Controls Air Conditioning, Inc.		TOCHIGI DWG. No.	
					4CYC11192	

3CYCA1824



UL Flame Class of Material: 94-V0
 Material: PA-66 or MPPE

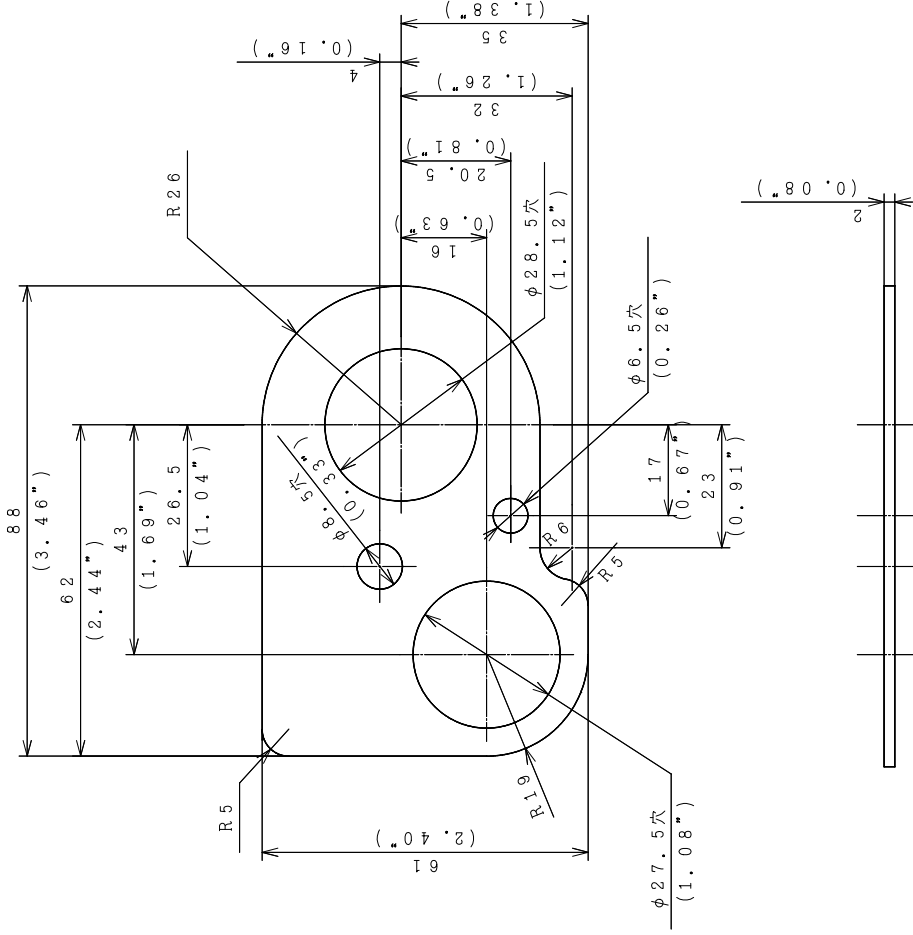
(This molding part was tested to
 comply with the UL flame class of
 94-5V by us.)

SIGNATURE		DATE	PROJECTION	SCALE	TITLE
DWN.	M. Goto	2001-10-23		1 : 1	OLR-COVER TOCHIGI DWG. No. Hitachi-Johnson Controls Air Conditioning, Inc. 3CYCA1824
CHKD.	K. Ishigami	2001-10-24			
	M. Onoguchi	2001-10-24			
APPD.	Y. Sasaki	2001-10-24			

CAD
 REGD
 2001
 1024

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3CYCA1825



MATERIAL: SR
 DIMENSION: mm (in)

SIGNATURE		DATE	PROJECTION	SCALE	TITLE
DWN.	M. Goto	2001-10-23		1 : 1	GOMUITA
CHKD.	K. Ishigami	2001-10-24			
	M. Onouchi	2001-10-24			
APPD.	Y. Sasaki	2001-10-24			

REGD
2001
1024

Hitachi-Johnson Controls
Air Conditioning, Inc.

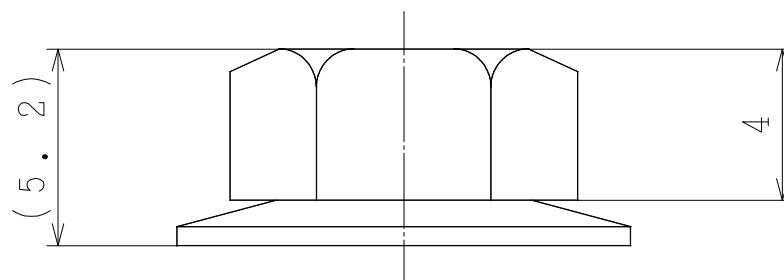
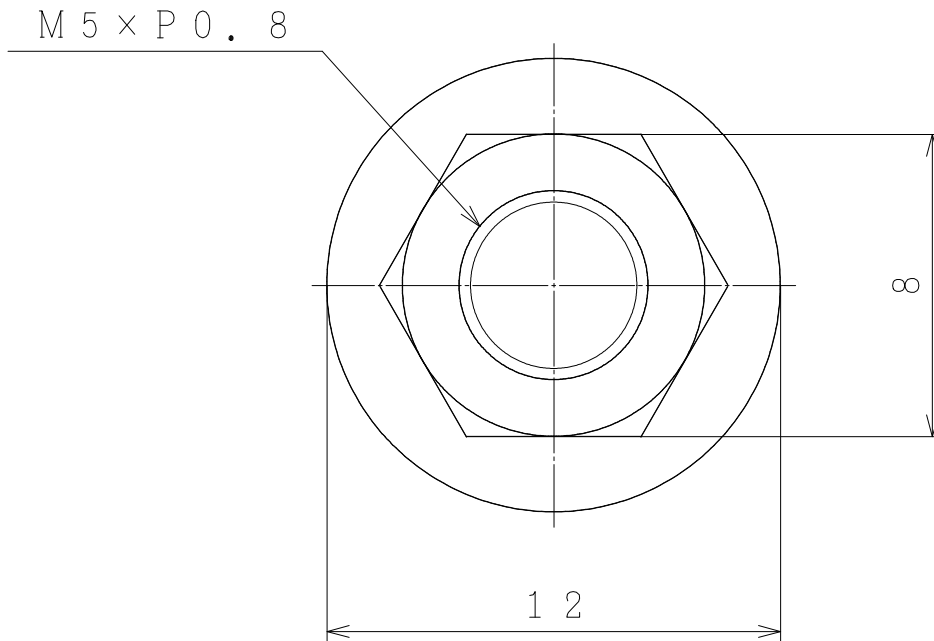
TOCHIGI DWG. No.
3CYCA1825

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(株) 東芝: 3TJKEA1501-A

003

4CYC11177

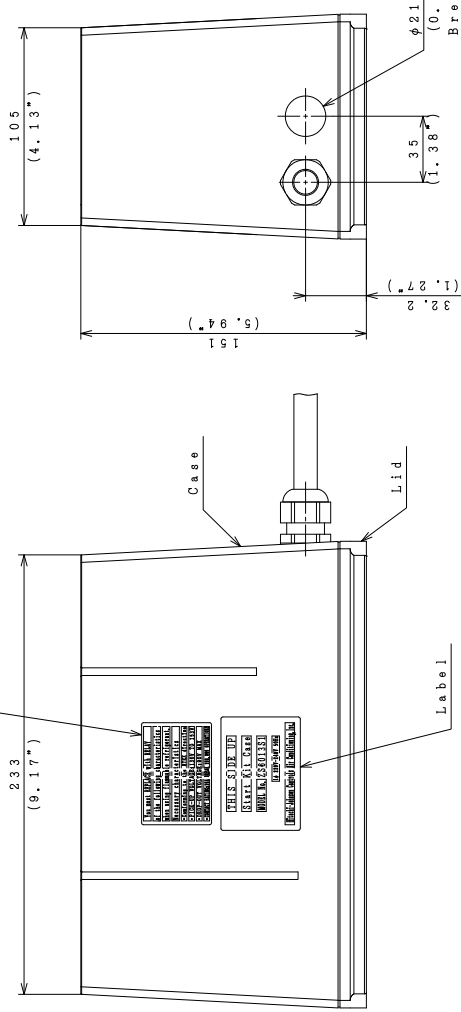


DIMENSION [mm]

SIGNATURE		DATE	PROJECTION	SCALE	TITLE	TOCHIGI DWG. No. 4CYC11177	REGD. REGD 2000 0707
DWN.	H. Owada	2000-07-06		5 : 1	M5-NUT		
CHKD.	K. Sekigami	2000-07-06					
APPD.	K. Sekigami	2000-07-06					

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R-Label (E-BOX Type: C, D, E only)
 You must REPLACE with RELAY of the following characteristics when using flammable refrigerant. Necessary characteristics
 • Comforming to the ATEX directive
 • PICK-UP VOLTAGE: 130V TO 153V
 • DROP-OUT VOLTAGE: 90V MAX
 • CONTACT RATING: 20A BREAK 200,000 OPERATIONS



THIS SIDE UP
 Indicate compressor type number and installation direction
 Comp. Model: ZS*****
 Power source: 1φ 220V-240V 50Hz

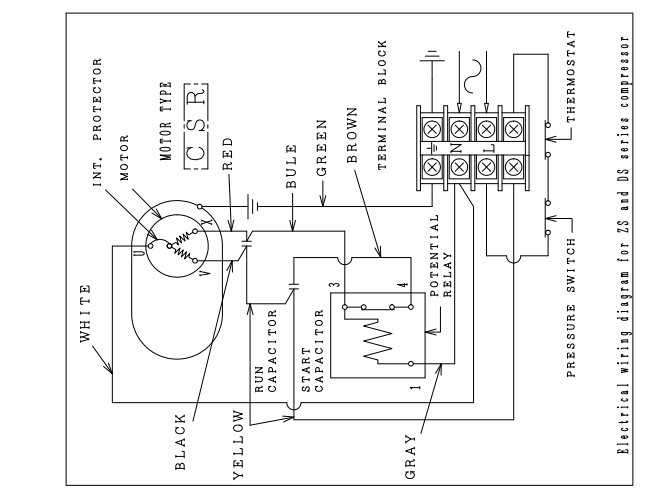
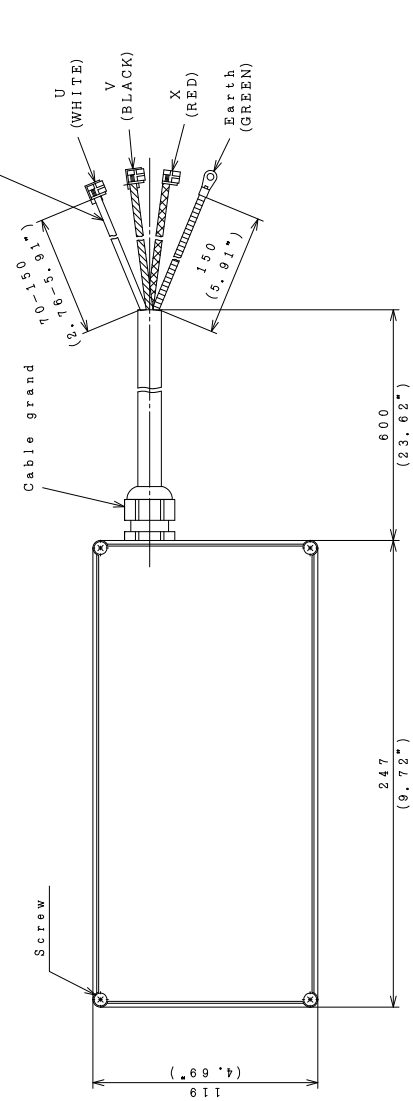


Fig. 1 Diagram
 Electrical wiring diagram for ZS and DS series compressor

R-BOX Type	Comp. type	Power source	Potential relay	Running Capacitor	Starting Capacitor
A	ZS4084S1	1φ 220-240V 50Hz	AMVL-145V1	30μF/400V	30μF/400V 68kQ-2W
B	ZS6013S1	1φ 220-240V 50Hz	AMVL-240V1	25μF/400V	40μF/400V 68kQ-2W
C	ZS7516S1	1φ 220-240V 50Hz	AMVL-240V1	30μF/450V	40μF/400V 68kQ-2W
D	ZS1120S1	1φ 220-240V 50Hz	AMVL-240V1	40μF/450V	40μF/450V 68kQ-2W
E	ZS1334S1	1φ 220-240V 50Hz	AMVL-240V1	55μF/450V	75μF/400V 68kQ-2W
F	DS1834X1	1φ 220-230V 60Hz	AMVL-250V2	55μF/450V	75μF/400V 68kQ-2W
G	ZS4084P1	1φ 115V 60Hz	AMVL-195V2	30μF/400V	60μF/400V 68kQ/2W
H	ZS6013P1	1φ 115V 60Hz	AMVL-195V2	30μF/400V	60μF/400V 68kQ/2W
J	ZS6013X1	1φ 208-230V 60Hz	AMVL-250V2	30μF/450V	40μF/450V 68kQ/2W
K	ZS7516X1	1φ 208-230V 60Hz	AMVL-250V2	30μF/450V	40μF/450V 68kQ/2W
L	ZS1120X1	1φ 208-230V 60Hz	AMVL-250V2	45μF/450V	60μF/450V 68kQ/2W
M	DS1529X1	1φ 208-230V 60Hz	AMVL-250V2	45μF/450V	60μF/450V 68kQ/2W

- Notes
- Material of Case and Lid: Polybutylene terephthalate
 - Water tight label: IP44
 - Case and Lid Flame resistance level: 94-5V
 - Potential relay operation is influenced by setting direction. Box installing direction should comply with upward label indication.
 - The circuit diagram of Fig. 1 is indicated inside a lid.
 - Dimension: mm (in)

SIGNATURE	DATE	PROJECTION	SCALE	TITLE
DWL W. Saitoh	2005-07-26	1:2	E-BOX	
CHKD M. Uotachi	2005-07-26			
APPD A. Saitoh	2005-07-26			

Hitachi-Johnson Controls
 Air Conditioning, Inc. 2CVCB0000406

9687VJCE

STARTING CAPACITOR and DISCHARGE RESISTANCE
始動用キャパシタと放電抵抗

1. CAPACITOR TYPE
METALLIZED FILM CAPACITOR

メタライズド フィルム コンデンサ

Please do not ALUMINUM ELECTROLYTIC CAPACITOR.
Because, starting capacitor turn on continuity
electrify when the contact point of the relay
deposited.

電圧リレーの接点が溶着した場合、始動キャパシタに連続通電される恐れがあるため、
アルミ電解コンデンサは使用しないでください。

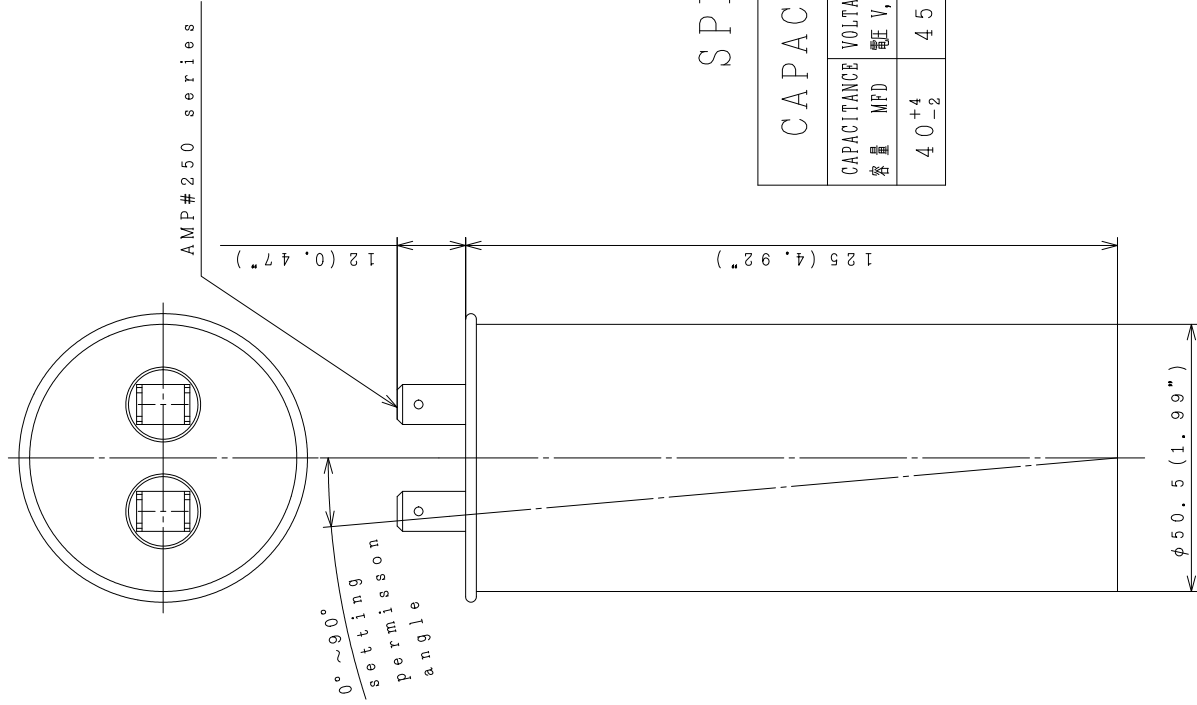
2. You need to attach a discharge resistance to the
starting capacitor

始動キャパシタには放電抵抗を取付けて下さい。

Large amount of currency which was charged in the
starting capacitor may go into the contact point
of the relay, and the contact part might be
deposited.

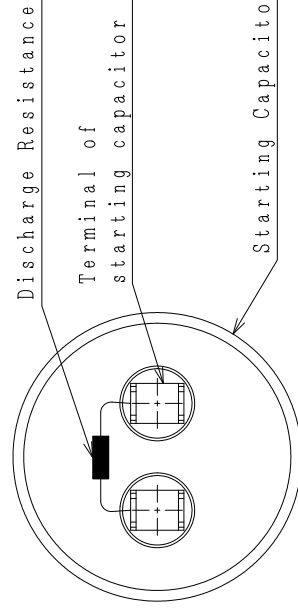
Therefore, you are required to attach a discharge
resistance to the starting capacitor with the
specification below.

Csに蓄えられた電荷により、リレーの接点に大電流が流れ、接点が溶着する恐れがありますので、
下記仕様の放電抵抗をCsに取付けて下さい。



SPECIFICATION 仕様

CAPACITOR		DISCHARGE RESISTANCE	
CAPACITANCE 容量 MFD	VOLTAGE 電圧 V, AC	FREQUENCY 周波数 Hz	NOMAL POWER RESISTANCE
40 ⁺⁴ ₋₂	450	50/60	2W
			68kΩ



DIMENSION:mm (in)

SIGNATURE	DATE	PROJECTION	SCALE	TITLE
DWG. A. Murakami	2003-10-18		NTS	STARTING CAPACITOR
CHKD. M. Koyama	2003-10-22			
APPD. Y. Nakada	2003-10-22			

Hitachi-Johnson Controls
Air Conditioning, Inc.

TOCHIGI DWG. No.

3CYCA4896

REGD
2003
1023

3CYCA2077

STARTING CAPACITOR and DISCHARGE RESISTANCE
始動用キャパシタと放電抵抗

1. CAPACITOR TYPE
METALLIZED FILM CAPACITOR

メタライズド フィルム コンデンサ

Please do not ALUMINUM ELECTROLYTIC CAPACITOR.
Because, starting capacitor turn on continuity
electrify when the contact point of the relay
deposited.

電圧リレーの接点が溶着した場合、始動キャパシタに連続通電される恐れがあるため、
アルミ電解コンデンサは使用しないでください。

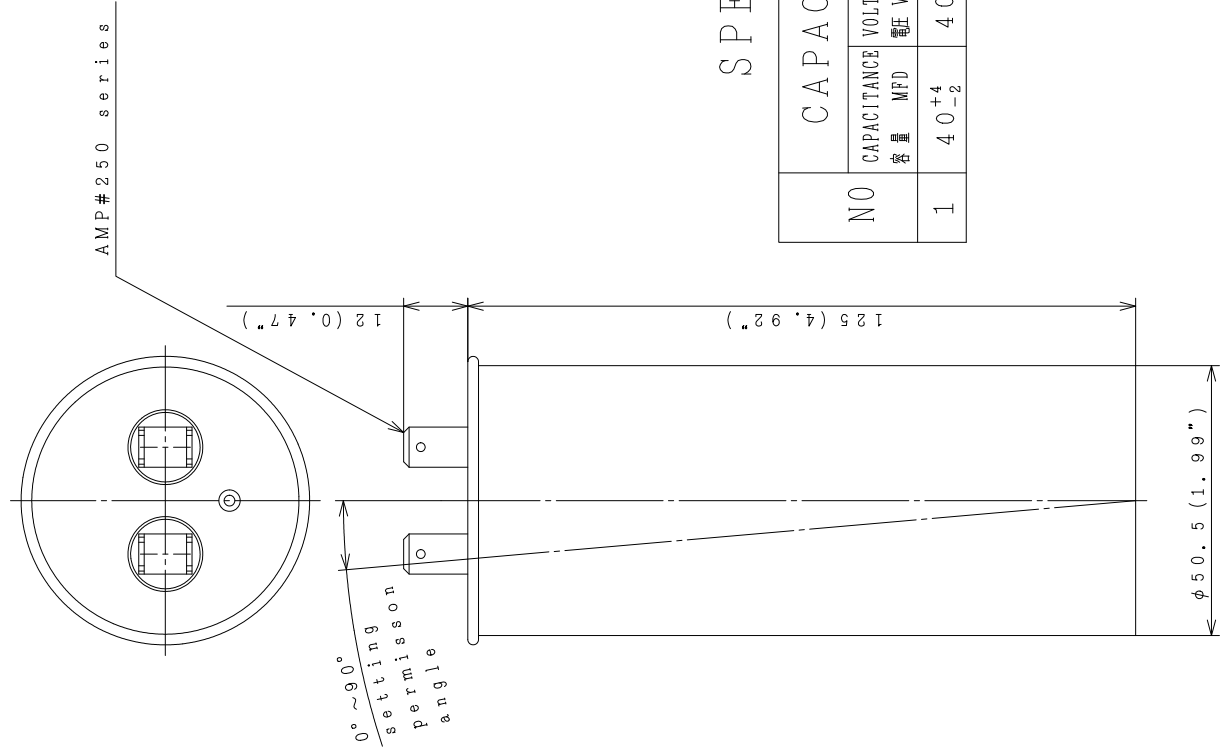
2. You need to attach a discharge resistance to the
starting capacitor

始動キャパシタには放電抵抗を取付けて下さい。

Large amount of current which was charged in the
starting capacitor may go into the contact point
of the relay, and the contact part might be
deposited.

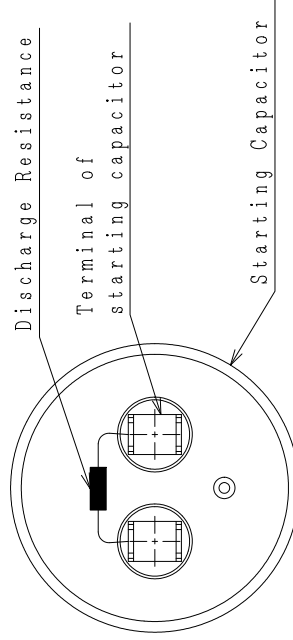
Therefore, you are required to attach a discharge
resistance to the starting capacitor with the
specification below.

Csに蓄えられた電荷により、リレーの接点に大電流が流れ、接点が溶着する恐れがありますので、
下記仕様の放電抵抗をCsに取付けて下さい。



SPECIFICATION 仕様

NO	CAPACITOR		DISCHARGE RESISTANCE	
	CAPACITANCE 容量 MFD	VOLTAGE 電圧 V, AC	FREQUENCY 周波数 Hz	NOMAL POWER RESISTANCE
1	40 ⁺⁴ ₋₂	400	50/60	2W
				68kΩ



DIMENSION:mm (in)

SIGNATURE		DATE	PROJECTION	SCALE	TITLE
DWG. K. Morita		2002-01-15		1 : 1	STARTING CAPACITOR
CHKD. M. Udaguchi		2002-01-16			
APPD. Y. Sasaki		2002-01-16			

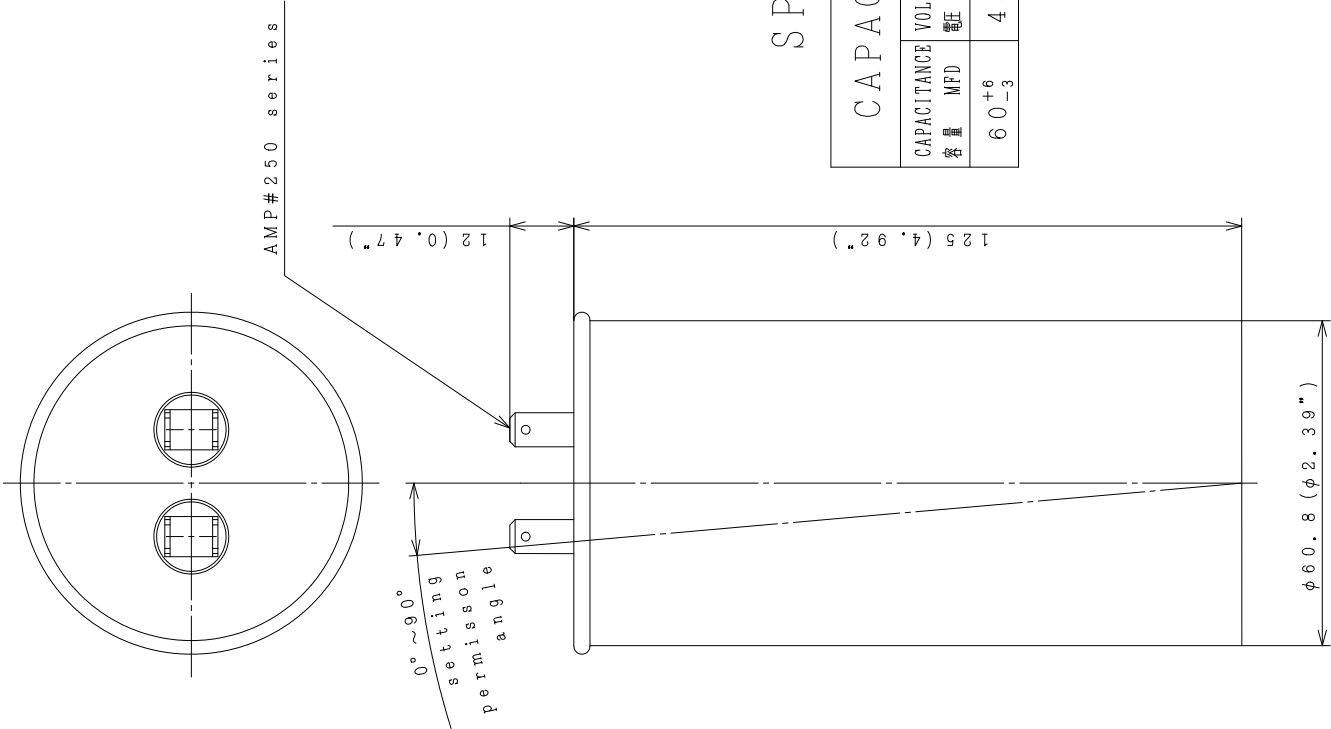
Hitachi-Johnson Controls
Air Conditioning, Inc.

TOCHIGI DWG. No.
3CYCA2077

REGD
2002
0117

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3CYCA3791



AMP#250 series

0° ~ 90°
setting
permission
angle

STARTING CAPACITOR and DISCHARGE RESISTANCE
始動用キャパシタと放電抵抗

1. CAPACITOR TYPE
METALLIZED FILM CAPACITOR

メタライズド フィルム コンデンサ

Please do not ALUMINUM ELECTROLYTIC CAPACITOR. Because, starting capacitor turn on continuity electrify when the contact point of the relay deposited.

電圧リレーの接点が溶着した場合、始動キャパシタに連続通電される恐れがあるため、アルミ電解コンデンサは使用しないでください。

2. You need to attach a discharge resistance to the starting capacitor

始動キャパシタには放電抵抗を取付けて下さい。

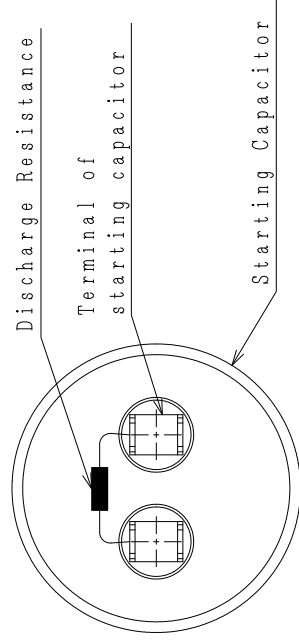
Large amount of currency which was charged in the starting capacitor may go into the contact point of the relay, and the contact part might be deposited.

Therefore, you are required to attach a discharge resistance to the starting capacitor with the specification below.

Csに蓄えられた電荷により、リレーの接点に大電流が流れ、接点が溶着する恐れがありますので、下記仕様の放電抵抗をCsに取付けて下さい。

SPECIFICATION 仕様

CAPACITOR		DISCHARGE RESISTANCE	
CAPACITANCE 容量	VOLTAGE 電圧 V, AC	FREQUENCY 周波数 Hz	NORMAL POWER RESISTANCE
60 ⁺⁶ ₋₃	450	50/60	2W
			68kΩ



DIMENSION: mm (in)

SIGNATURE	DATE	PROJECTION	SCALE	TITLE
DWG. A. Murakami	2003-02-18		1 : 1	STARTING CAPACITOR
CHKD. M. Koyama	2003-02-18			
APPD. Y. Nakada	2003-02-19			

Hitachi-Johnson Controls
Air Conditioning, Inc.
TOCHIGI DWG. No.
3CYCA3791

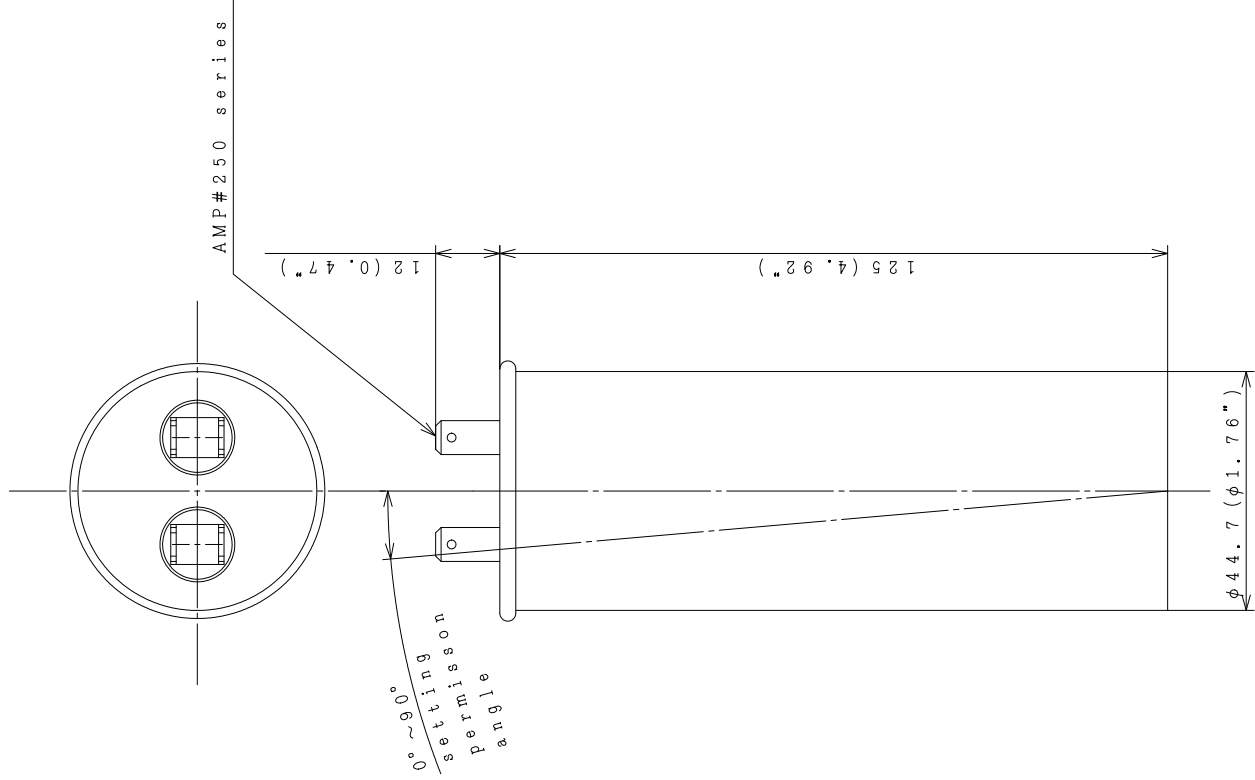
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679ZVCYCE

RUNNING CAPACITOR 運転用キャパシタ

- 1. TYPE 種類
METALLIZED FILM CAPACITOR
メタライズド フィルム コンデンサ
- 2. SPECIFICATION 仕様

CAPACITOR	
CAPACITANCE 容量	VOLTAGE 電圧 V, AC
30 ⁺³ _{-1.5}	450
FREQUENCY 周波数	Hz
50/60	



DIMENSION: mm (in)

SIGNATURE	DATE	PROJECTION	SCALE	TITLE
DWN. M. Goto	2002-05-08		1 : 1	運転用キャパシタ
CHKD. M. Unoquchi	2002-05-13			RUNNING CAPACITOR
APPD. A. Simeda	2002-05-13			TOCHIGI DWG. No. Hitachi-Johnson Controls Air Conditioning, Inc.

REGD
2002
0514

3CYCA2679

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06LEVCJCE

RUNNING CAPACITOR 運転用キャパシタ

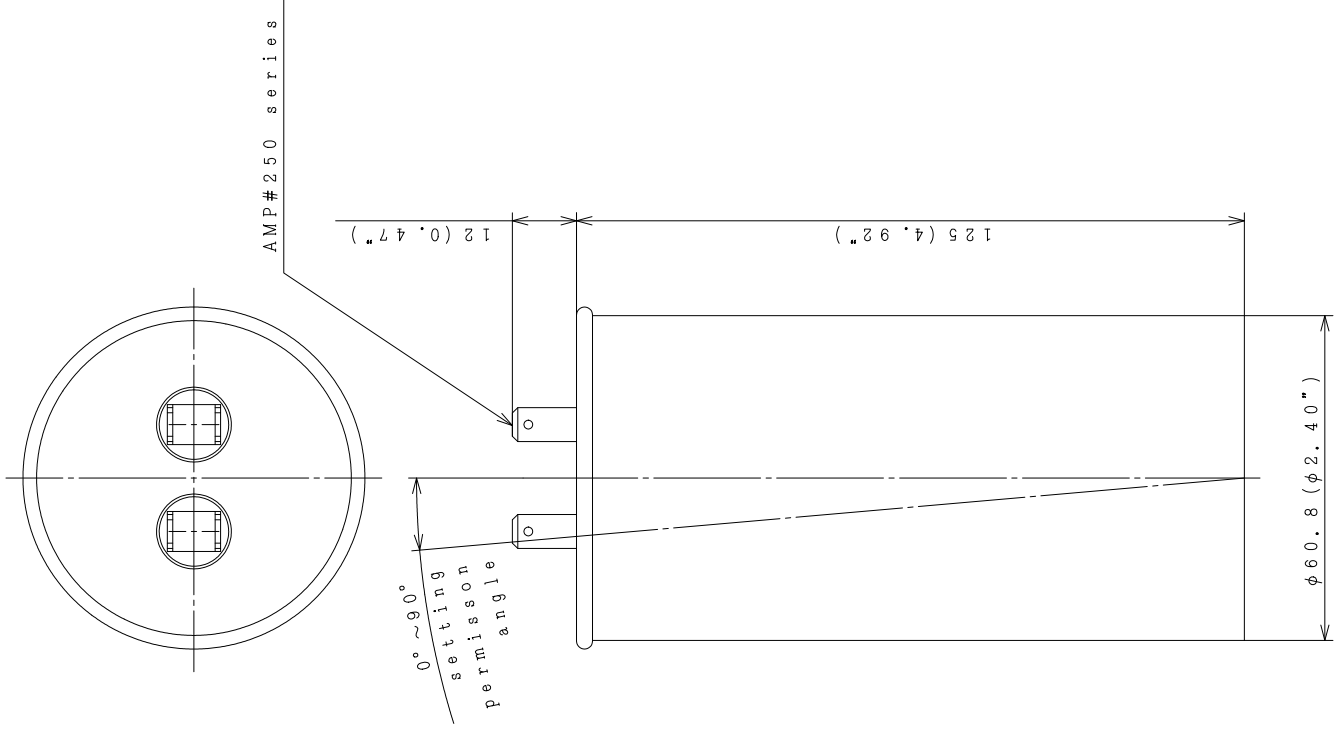
1. TYPE 種類

METALLIZED FILM CAPACITOR

メタライズド フィルム コンデンサ

2. SPECIFICATION 仕様

CAPACITOR	
CAPACITANCE 容量	VOLTAGE 電圧 V, AC
45 ^{+4.5} _{-2.3}	450
FREQUENCY 周波数	Hz
50/60	



DIMENSION: mm (in)

SIGNATURE	DATE	PROJECTION	SCALE	TITLE
DWN. A. Murakami	2003-02-18		1 : 1	RUNNING CAPACITOR
CHKD. M. Koyama	2003-02-18			
APPD. Y. Nakada	2003-02-19			

TOCHIGI DWG. No.	REGD
3CYCA3790	2003 0224

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SPECIFICATION

RELAY TYPE	AMVL-250V2
FREQUENCY	60Hz
NOMAL VOLTAGE	AC250V
OPERATING VOLTAGE	AC165±10V
RECOVERY VOLTAGE	AC90 or less
CONTACT CAPACITY	20A
CONTACT TYPE	type b

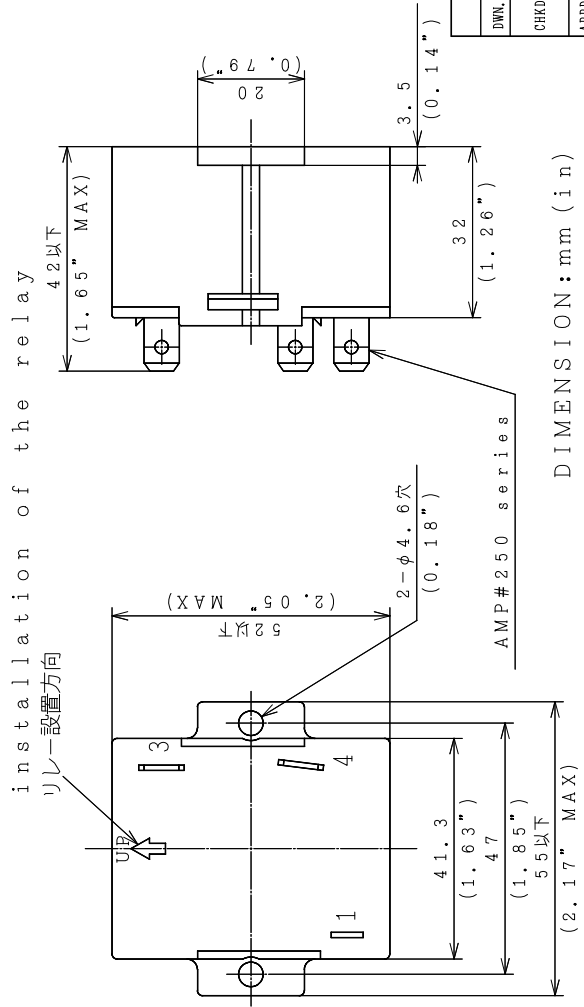
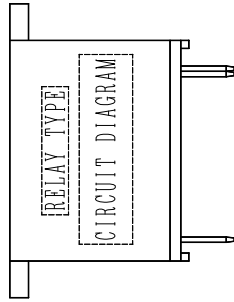
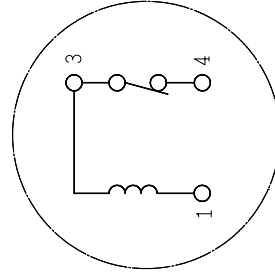
1. Please keep the direction of the installation of the relay.
 There is a case not to operate normally when installing in the direction which is different from the direction.

リレー設置方向を守って使用下さい。
 図示方向と異なる向きに取付けると正常に作動しない恐れがあります。

*CONTACT TYPE b (ON→OFF)



CIRCUIT DIAGRAM



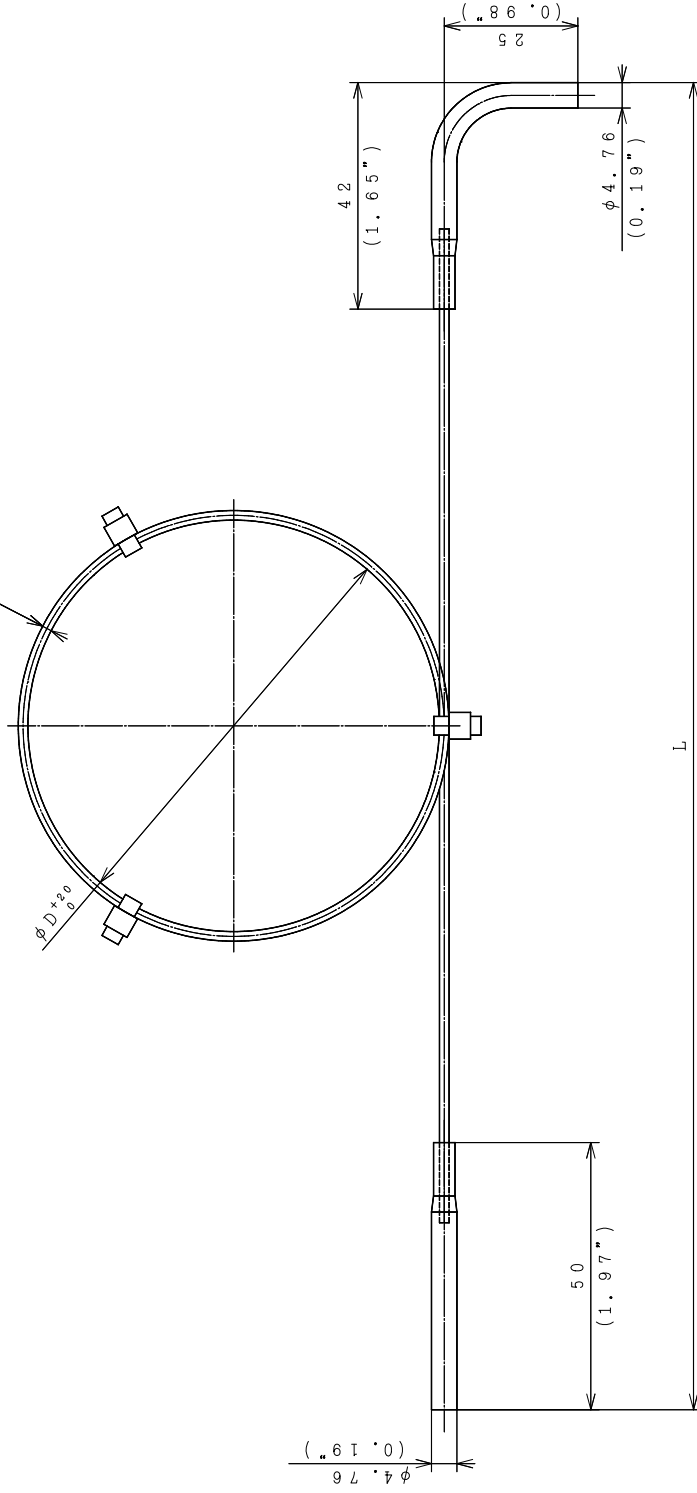
DIMENSION : mm (in)

SIGNATURE	DATE	PROJECTION	SCALE	TITLE
DWN. K. Morita	2001-12-05	⊕	1 : 1	STARTING VOLTAGE CONTROL RELAY
CHKD. M. Onoguchi	2001-12-05			TOCHIGI DWG. No.
APPD. K. Ishigami	2001-12-05			Hitachi-Johnson Controls Air Conditioning, Inc.
	2001-12-06			3CYCA1986

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332000BB

$\phi 0.68 \text{ ID} \times \phi 1.80 \text{ D}$
($0.03 \text{ ID} \times 0.070 \text{ D}$)

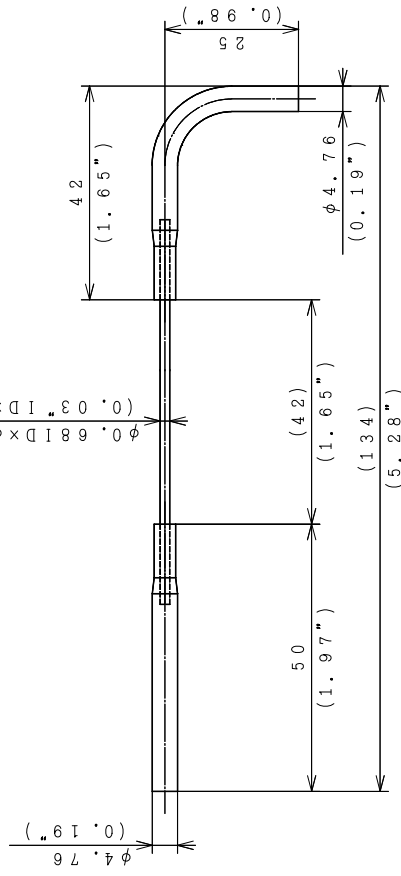


TYPE	RESISTANCE VALUE	L	ϕD	NUMBER OF TURNS
A	79.8 kPa	250 (9.84")	45 (1.77")	19
B	13.3 kPa	155 (6.10")	47 (1.85")	1
C	26.6 kPa	206 (8.11")	71 (2.80")	2
D	53.3 kPa	246 (9.69")	77 (3.03")	6
E	39.9 kPa	206 (8.11")	77 (3.03")	4
F	6.67 kPa	142 (5.59")	10 (0.39")	1

D I M E N S I O N : m m (i n)

SIGNATURE	DATE	PROJECTION	SCALE	TITLE
	DWN. K. Echigoya	2012-05-10	NTS	
CHKD. M. Unoouchi	2012-05-10	Hitachi Appliances, Inc.		
APPD. A. Simeda	2012-05-12	Tokyo Japan		
TOCHIGI DWG. No.		3CYCBB0032682		
REGD		2012		
0512		004		

3CYCA4165



NOTES

1. RESISTANCE VALUE: 2.67 KPa

(THE LENGTH OF THE PIPE IS APPROXIMATELY 72 (2.83") MILLIMETERS.)

D I M E N S I O N : m m (i n)

SIGNATURE		DATE	PROJECTION	SCALE	TITLE
DWN.	A. Murakami	2003-04-14		1 : 1	CAPILLARY FOR LIQUID INJECTION
CHKD.	M. Koyama	2003-04-14			
APPD.	Y. Nakada	2003-04-14	Hitachi-Johnson Controls Air Conditioning, Inc.		TOCHIGI DWG. No.
					3CYCA4165

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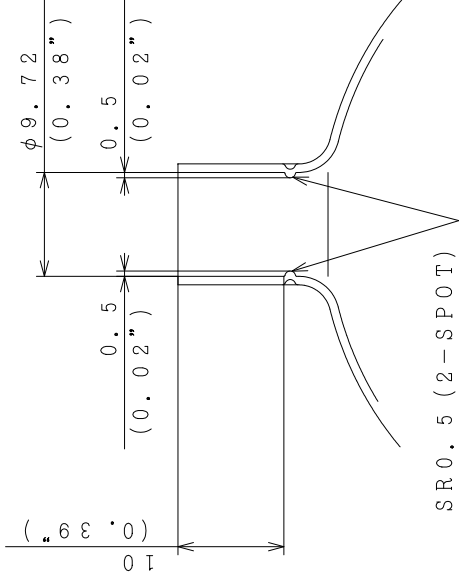
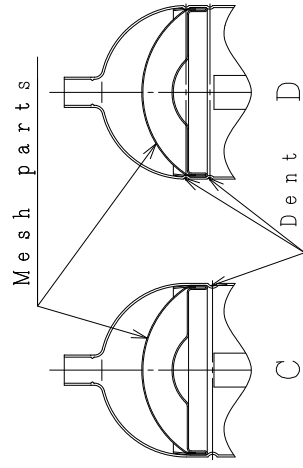
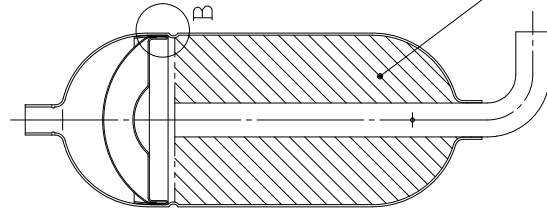
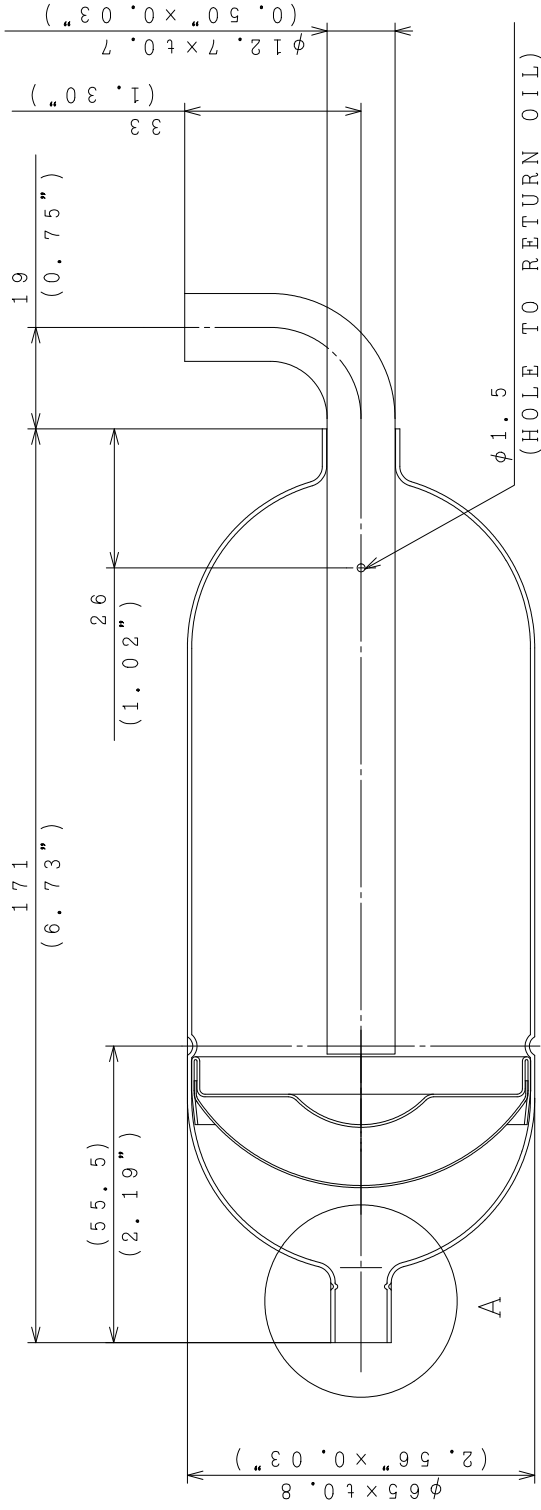
CAD
REGD
2003
0415



3CYCA1592

UPPER SIDE

LOWER SIDE



Note

1. Use to stand upper A side vertically.
2. The phosphor copper brazing be done while blowing or being full of N₂ gas.

B (NTS)

Dent for fixing the mesh parts (C or D)

A (2 : 1)

DIMENSION: mm (in)

SIGNATURE	DATE	PROJECTION	SCALE	TITLE
DWN. A. Onuma	2001-08-29		1 : 1	ACCUMULATOR
CHKD. A. Simada	2001-08-29			
APPD. Y. Sasaki	2001-08-29			

Valid volume: 307mL (10.3800Z)

TOCHIGI DWG. No.	
Hitachi-Johnson Controls Air Conditioning, Inc.	3CYCA1592

REGD
2001
0830

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005

3CYCA4166

UPPER SIDE

LOWER SIDE

221
(8.70")

19
(0.75")

(62)
(2.44")

(57)
(2.24")

26
(1.02")

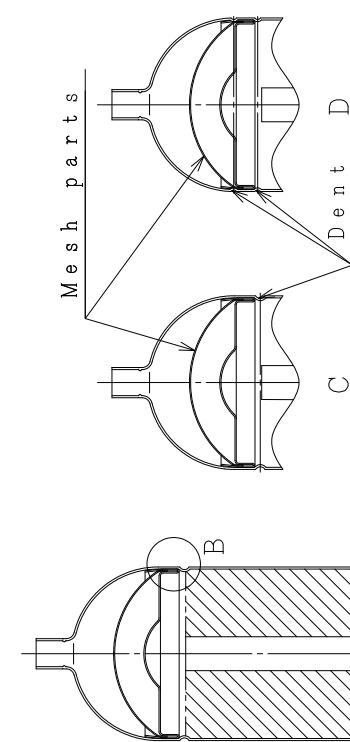
46
(1.81")

$\phi 12.7 \times t 0.7$
(0.50" x 0.03")

$\phi 80 \times t 1$
(3.15" x 0.04")

$\phi 1.5$
(HOLE TO RETURN OIL)

Mesh parts



B (NTS)

Dent for fixing
the mesh parts (C or D)

Valid volume: 650mL (21.9790Z)

(NTS)

Note

1. Use to stand upper A side vertically.
2. The phosphor copper brazing be done while blowing or being full of N₂ gas.

SR0.5 (2-SPOT)

A (2:1)

DIMENSION: mm (in)

SIGNATURE	DATE	PROJECTION	SCALE	TITLE
DWN. A. Murakami	2003-02-22		1:1	ACCUMULATOR
CHKD. M. Koyama	2003-02-22			
APPD. Y. Nakada	2003-04-11			

TOCHIGI DWG. No. 3CYCA4166
REGD 2003 0415