

ROTARY COMPRESSOR SPECIFICATION



MODEL : UX0T011ZNAE5

SPEC. NO : **SS - 00696**

DRAFT	CHECK	APPROVE
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Approved by internal system

APPLICATION

Type	Cooling & Heating Type with Inverter System
Refrigerant	R-134a
Electrics Source	Inverter for BLDC motor

RATED PERFORMANCE

Conditions	HBP	LBP	Note
Revolution (rps)	3,480	3,480	
Capacity (Btu/h)	1,100	275	±7%
Input (W)	113	74	±7%
Current (A)	6.30	4.40	±7%
EER (Btu/Wh)	9.7	3.7	COP : HBP 2.85, LBP : 1.12
Noise (dBA)	Less than 42dB(A)		Max. Noise of 4 Point measurement with 90cm from compressor surface
Vibration (µm)	Less than 20 µm		Max. tangential vibration displacement

RATING CONDITION

	HBP	LBP
Condensing Temperature	130 °F (54.4 °C)	130 °F (54.4 °C)
Evaporating Temperature	45 °F (7.2 °C)	-10 °F (-23.3 °C)
Return Gas Temperature	95 °F (35.0 °C)	90 °F (32.2 °C)
Liquid Temperature	115 °F (46.1 °C)	90 °F (32.2 °C)
Ambient Temperature	95 °F (35.0 °C)	90 °F (32.2 °C)
Compressor Cooling	1 m/s air cooling	
Controller	Samsung Inverter	

COMPRESSOR

Type	Hermetic motor compressor
Compression Type	Rotary type (Rolling 2 piston type)
Displacement	2.40 cc/rev
Oil Type	POE
Oil Charg Amount	50 cc
Painting	Black Color
Net Weight	1.2 kg (Including Oil)
Suction Tube I.D	6.54 mm
Discharge Tube I.D	4.95 mm

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MOTOR TYPE

Motor Type	DC Brushless Motor
Starting Type	DC Inverter Starting
Pole Number, Phase Number	6 Pole 3 Phase
Insulation Class	E Class
Winding Resistance	0.220Ω ± 7%
Winding Type	-

ELECTRICAL COMPONENTS

Protective Device	N/A
Operation Inverter	Driver, D.C. voltage 24V (refer.)

POWER SUPPLY OF DRVIER

Rated Voltage	3Ph BLDC, DC 24V (Driver input)
Rated Frequency	-

CHARACTERISTICS

Hydrostatic Strength Pressure (No Leakage)	High Pressure Side : 16.2MPa (165 kg/cm ²) Low Pressure Side : 7.45MPa (76 kg/cm ²)
Residual moisture / Residual impurities	80mg Max / 50mg Max
Insulation Resistance	50 MΩ min. (with 500V D.C mega tester)
Withstand Voltage	at 1800 V/sec (1250 V/min) Leakage current is less than 2.5 mA

ROTARY COMPRESSOR APPLICATION



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No	Item	Operational standards and limits
1	Rated frequency range	20 ~ 100 rps
2	Refrigerant charging amount	Max. 100 g (Need to discuss with engineer in case of the additional refrigerant charging)
3	Operating range at standards condition	Discharge Pressure : Less than 1.37MPa (13.96 kg/cm ²) Discharge Temp. : Less than 100 °C Motor Winding Temp. : Less than 100 °C
4	Operating range at overload condition	Refer to pressure guarantee range (Page 5~6) Discharge Temp. : Less than 115 °C Motor Winding Temp. : Less than 130 °C
5	ΔT(Comp bottom Temp. - condensing Temp.)	Continuous Running : more than 5 °C Intermittent Running(On/Off) : more than 0 °C When the outdoor temp is below 0 °C, compressor should be operated at revolution over about 26rps.
6	On-Off operating cycle	Over 30rps : Operating more than 5 min. for each cycle (On : 2minutes Min. Off : 1minutes Min.) Under 30rps : Operating more than 8 min. for each cycle (On : 5minutes Min. Off : 1minutes Min.)
7	Liquid flood back (Suction Gas Temp.)	No liquid refrigerant back and strange noise (Superheat 1 °C min.)
8	Vibration of tubing	Tubing vibration displacement : 0.8mm Max
9	Tube Stress (Operation)	Less than 15MPa (1.5 kg f/mm ²)
10	Tube Stress (Starting & Stop)	Less than 29.5MPa (3 kg f/mm ²)
11	The allowable tilt of compressor in operation	Less than 30°
12	Length of tubing	2.0m Max. between indoor and outdoor unit
13	Height difference of tubing	1.0m Max. between indoor and outdoor unit
14	Residual moisture in the system	100ppm Max.
15	Residual air in the system	0.1% Max for the internal volume of unit
16	Refrigerant charging	Inject from the outlet of condenser
17	Impact at the time of transportation	Do not impact over 60G during transportation
18	Storage	Do not open Compressor plugs more than 10 minutes before use Maximum allowable storage period : 1 year from production date
19	Terminal Cover & Nut Fasten Torque	15±5 kgf-cm
20	Pressure at start-up	Pressure should be balanced between high & low pressure side
21	(Recommend) defrost revolution	Less than 80 rps when defrosting
22	Pump Down	Running time when temperature of compressor middle body is over 130 °C: Max. 3min Temperature of compressor middle body : Max 135 °C

PRESSURE GUARANTEE RANGE ACCORDING TO ROTATION NUMBER

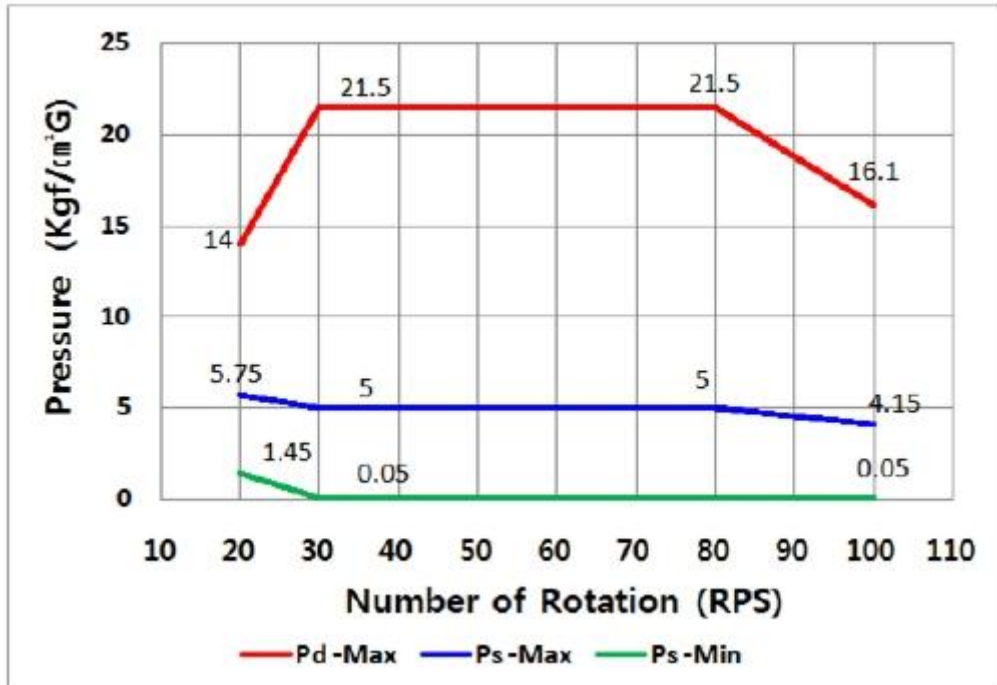


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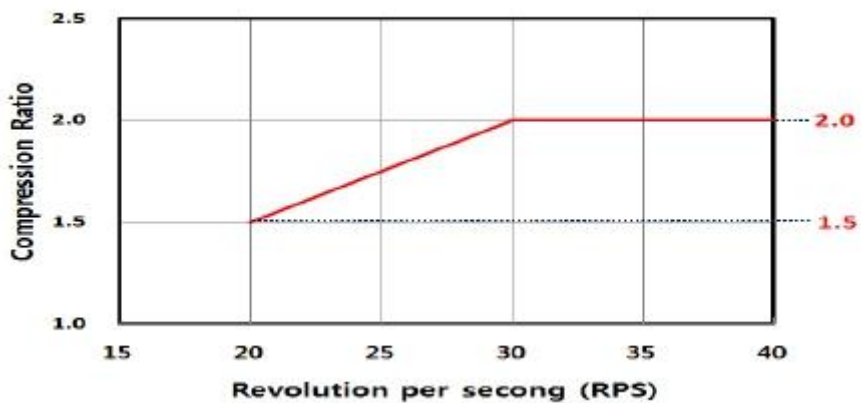
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Rotation Number (rps)	20	30	80	100
High Pressure (Kgf/cm²·G)	Max 14	Max 21.5	Max 21.5	Max 16.1
Low Pressure (Kgf/cm²·G)	1.45~5.75	0.05~5.0	0.05~5.0	0.05~4.15
Compression Rate	Min 1.5	2 ~ 13	2 ~ 13	2 ~ 13

Min. Compression Ratio at Low RPS



ROTARY COMPRESSOR APPLICATION ENVELOPE

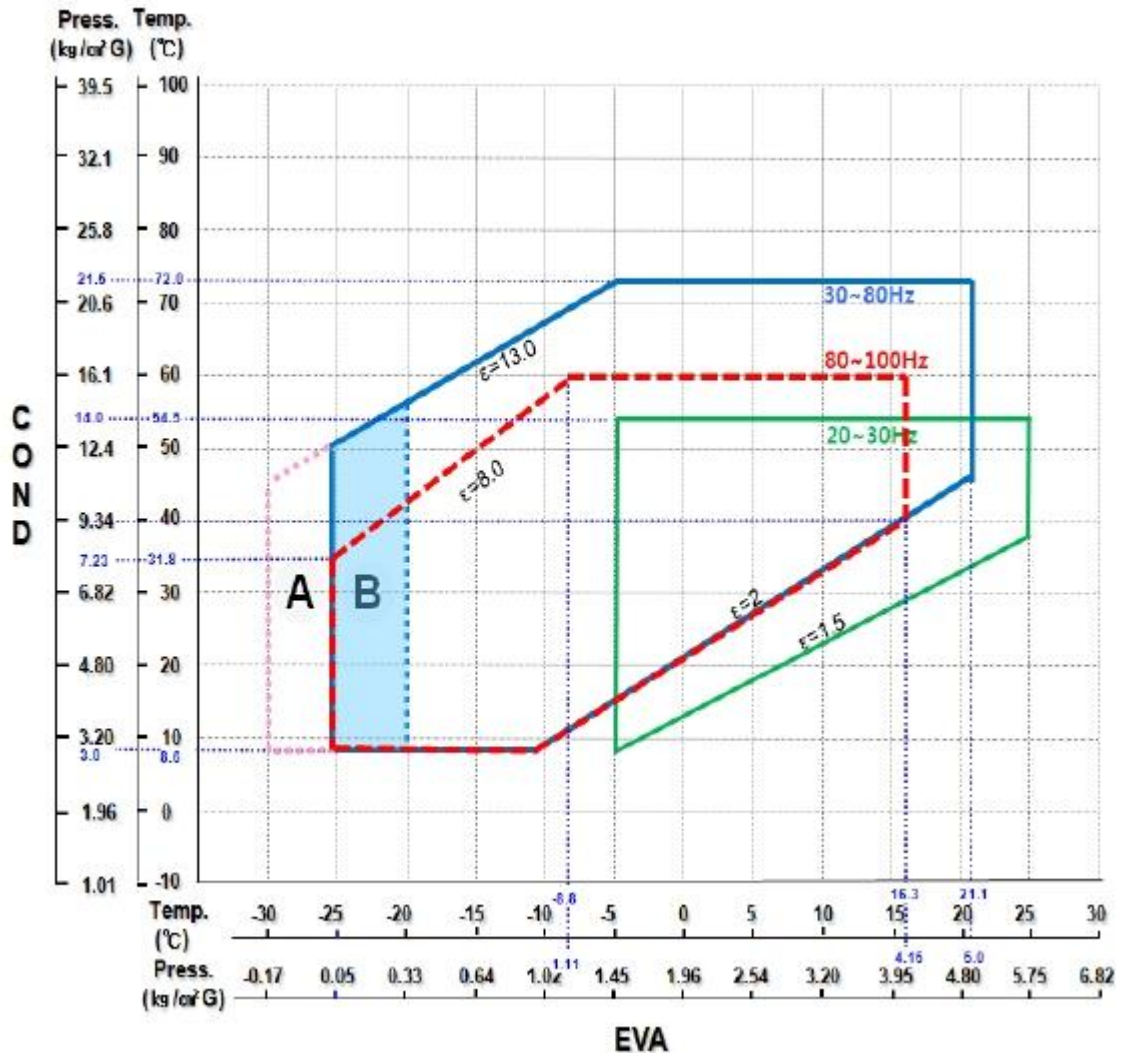


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- ☞ Range "A" : Starting at soaking out. (limit 5 min)
- ☞ Range "B" : Pressure range at transient condition like as starting, defrost running etc.
- ☞ Surface temperature of the compressor necessarily must be maintained below 115 degrees.
- ☞ When applied to the freezing and refrigerating systems of using the evaporation temperature of -5 degrees or less, compressor suction temperature is kept below 20 degrees out.

ROTARY COMPRESSOR PERFORMANCE CURVE



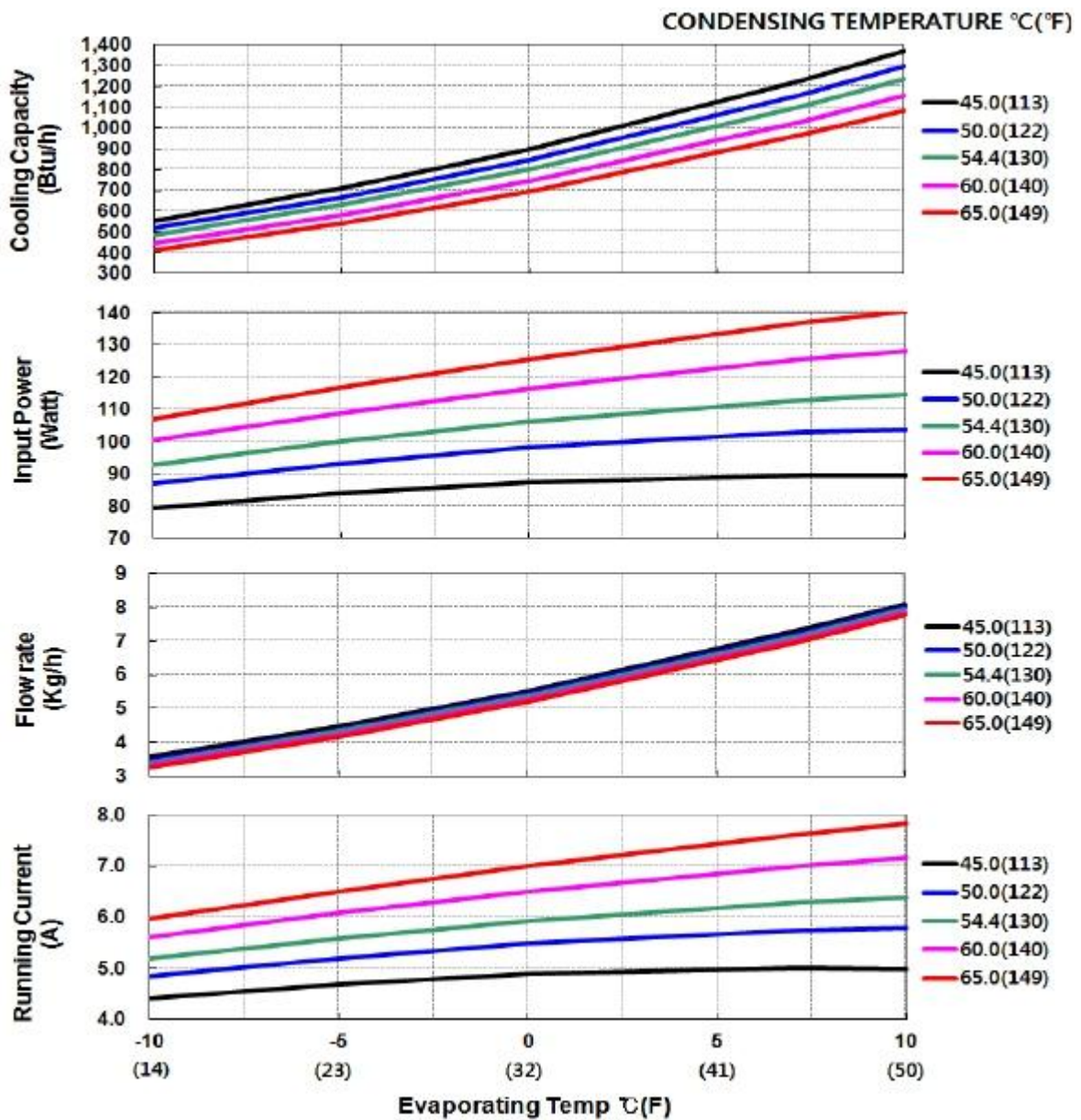
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BASED ON
 SUPER HEAT TEMP 27.8°C
 SUB COOL TEMP. 8.3°C
 REVOLUTION 24V, 3480 rpm



ROTARY COMPRESSOR OIL LEVEL IN OPERATION



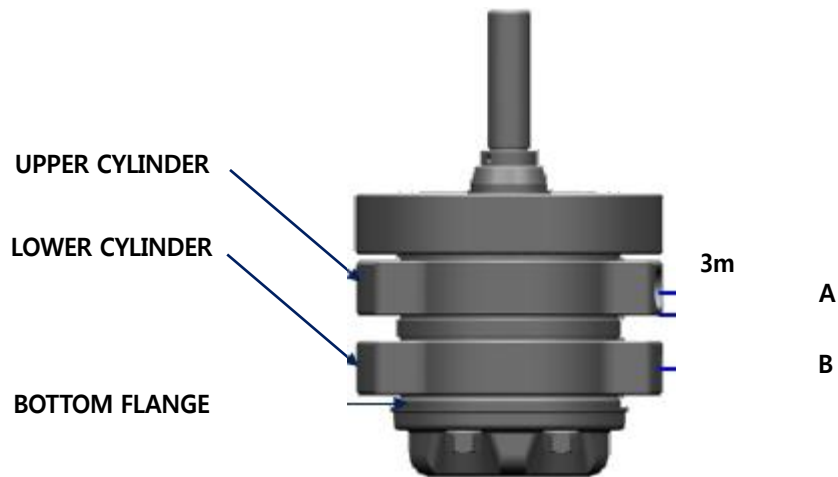
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Oil level test should be checked about abnormal conditions through sight glass which is installed on compressor (Overload & Low load running, refrigerant soaking starting, defrost starting, long line reliability test)



A : Above 3 mm from the bottom plane of a upper cylinder

B : The center of a lower cylinder

1. Normal operating condition : Oil level should be higher than A line.
2. Within 5min. after starting under soaking-out condition : Oil level should be higher than B line.
3. Within 3min. On defrosting and after change from defrosting to heating mode : Oil level should be higher than B line
4. Operating below 30 rps : Oil level should be higher than A line

ROTARY COMPRESSOR INVERTER AND CONTROL RELATION (1)



MODEL : UX0T011ZNAE5

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DRAFT CHECK APPROVE

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1. Variation of speed

Rising speed of the number of rotations must be 1 rps/s or more slowly

In case the rising speed is fast, a lubricating part will be not good.

Descend speed of the number of rotations must be 1 rps/s or more slowly.

In case the descend speed is fast, it can be easily an excess current, then the compressor is stopped.

2. Low rotation frequency

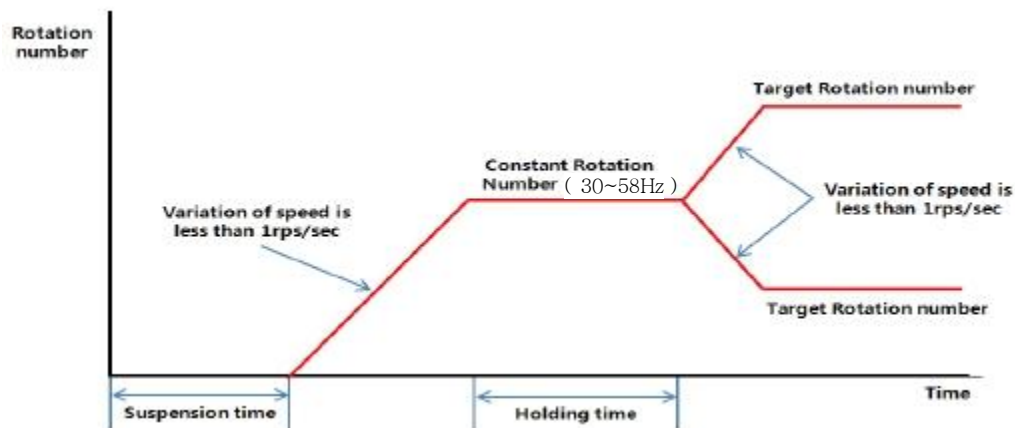
The vibration of compressor is so large at low rps operation, that we recommend the device of vibration protector like torque control.

3. Start control

① If it reaches the target number of rotations, it must keep the 30~58 rps , number of rotation over 1 minute.(see below graph)

② After operation, restarting needs over 1 minutes for pressure balance between high and low side

③ Try to start over 3 times.



4. Stand-by control

In case an small electric current flows to motor and heat compressor, it must consider the following points.

① Don't make a rotation in the compressor.

② Keep below 80 °C at shell and below 100 °C at coil in compressor.

ROTARY COMPRESSOR INVERTER AND CONTROL RELATION (2)



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5. Carrier frequency

Carrier frequency and resonance frequency of compressor part must be differently controlled each other, that is, both of them have different value of frequency.

6. Excessive current control

Motor coil temperature must be set below 130°C by the electricity current control.
(Phase current or total current control)

7. Reduction of magnetic intensity

It can be reduction magnet current if the current flow is over 340A at the high temperature (130°C, 3% Demagnetized Level).

It must protect against momentary heavy current. (DC Peak current control)

MOTOR SPECIFICATION



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ITEM	MODEL	UX0T011ZNAE5
		DC rink V
Resistance (L-L)	Ω (at 20°C)	0.22
Winding Spec	Turn	-
Flux	MMx.t	2.40
Ke	Vps/rad/s	0.007
Kt	N·m/Arms	0.039
B-EMF (At 1,000rpm)	Line to Neutral(Vrms)	1.56
	Line to Line (Vrms)	2.7
Inductance [Ld / Lq]	60Hz 7A (mH)	0.41/0.43
Demagnetized Current	At 130°C, 3%	340

- Resistance & Inductance : Measured by U-V phase (line to line) at 20°C
- Number of motor Poles : 6, Direction of Rotation : Clockwise
- Demagnetized current is measured at -10°C

ROTARY COMPRESSOR WINDING DIAGRAM

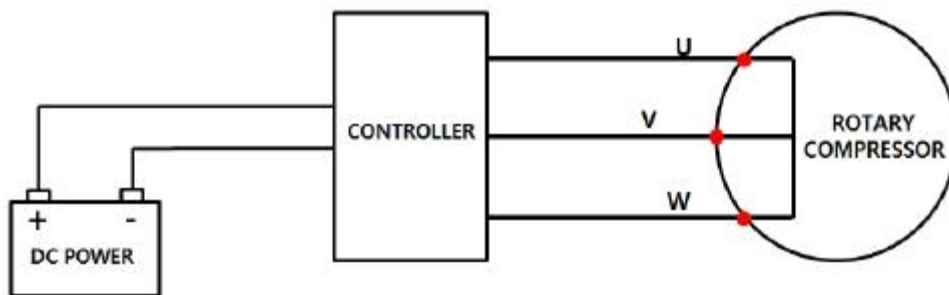


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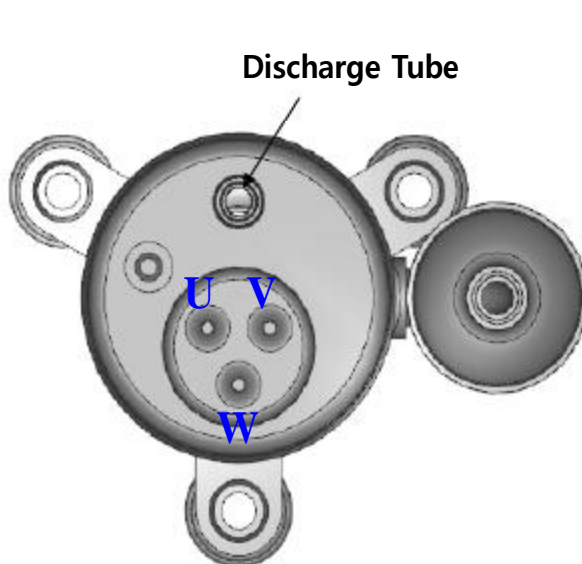
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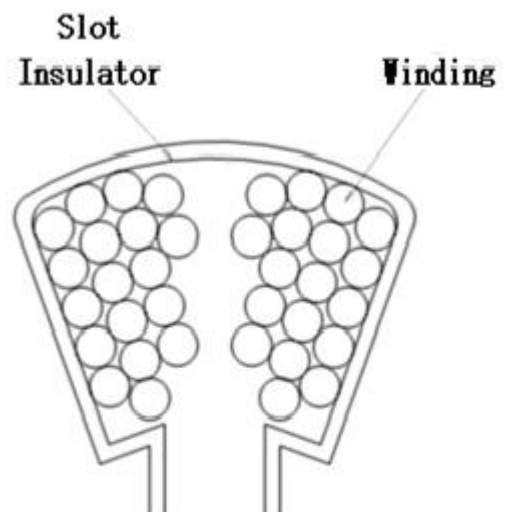


[CIRCUIT DIAGRAM]

※ The controller is available upon the customer's request.



[A plane figure of comp top]



[Insulation and winding drawing of stator slot]

ROTARY COMPRESSOR OUTLINE DRAWING

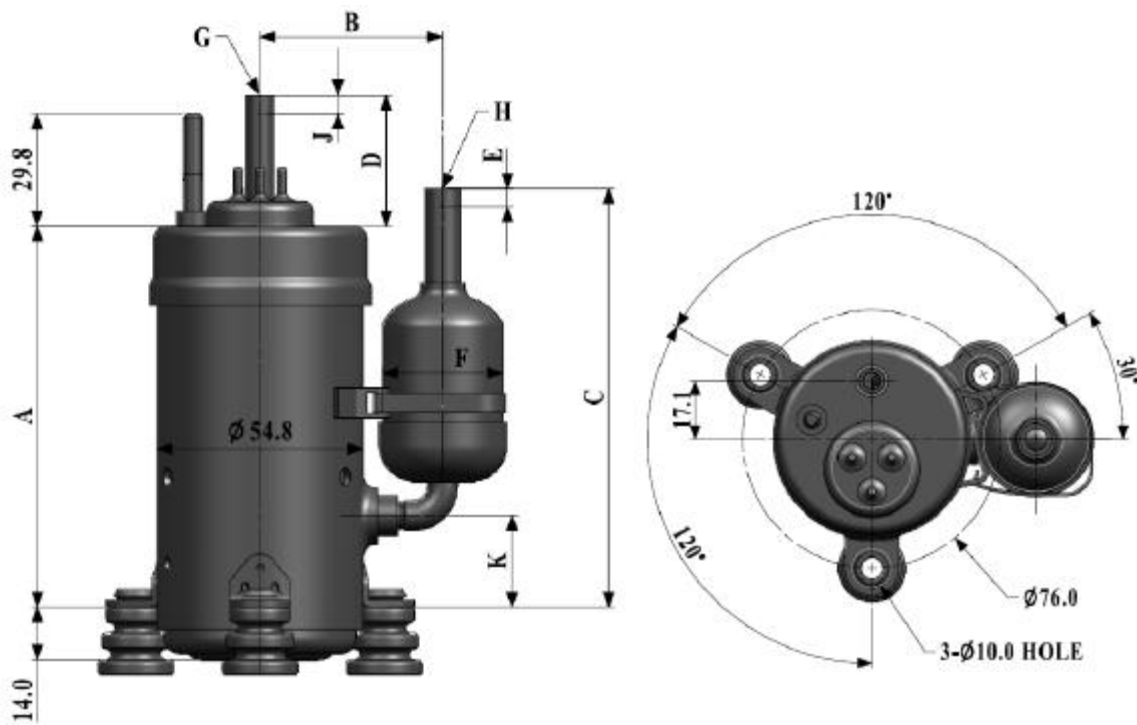


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UNIT: mm

MODEL NO.	DIMENSIONS							Accum (O.D) F	TUBE (LD)	
	A	B(±3.0)	C	D	E	J	K		G(±0.15)	H(±0.15)
UX0T011ZNAE5	101.3	48.4	111.3	34.8	5.0	5.0	24.3	31.8	4.95	6.54

ROTARY COMPRESSOR ACCESSORIES



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ITEM	COVER TERMINAL	PART NO.	DB63-03584A	Q'TY	1	REMARK
<ul style="list-style-type: none"> - Material : SABIC N1250 - Color : Black - UL 94, 5VA 						

ROTARY COMPRESSOR ACCESSORIES



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DRAFT CHECK APPROVE

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ITEM	NUT	PART NO.	6021-001142	Q'TY	1	REMARK
<p>-Material : SWCH10A Trichrom-Chromate</p>						

ITEM	GASKET	PART NO.	DB63-03580A	Q'TY	1	REMARK
<p>- Material : EPDM - Hardness : 80~85 - Thickness : 0.8 ± 0.2</p>						

ROTARY COMPRESSOR ACCESSORIES



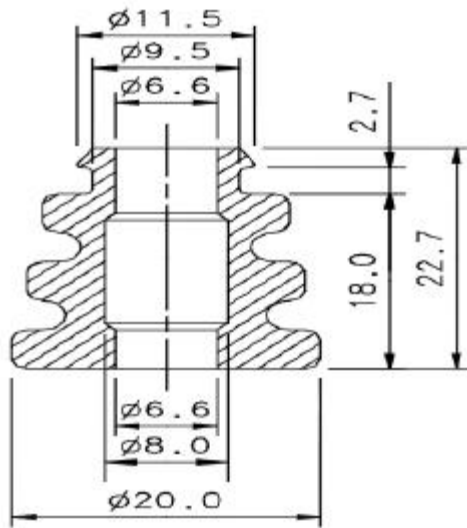
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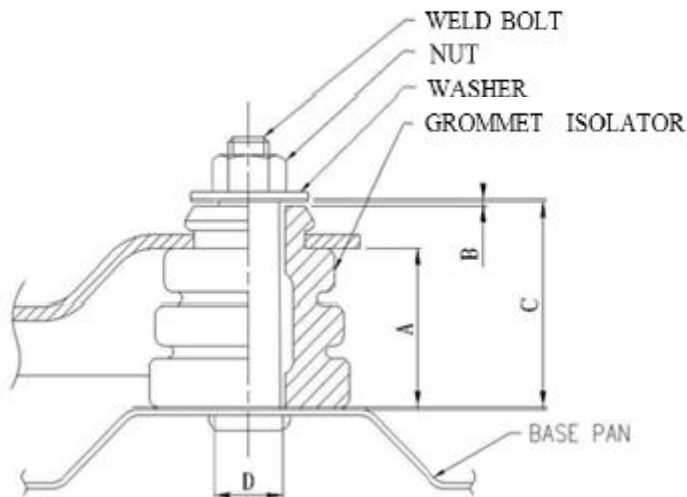
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ITEM	GROMMET ISOLATOR	PART NO.	DB63-03589A	Q'TY	3	REMARK	
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- Material : RUBBER CB
- Hardness : 35/50±4°

ITEM	MOUNTING TYPE	PART NO.		Q'TY	1	REMARK	
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A	18.0 mm
B	0.5 ~ 1.5 mm
C	23.7 mm
D	6.6 mm

DC CONTROLLER SPECIFICATION



MODEL : SBMC1

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Sort	Unit		Specification	
Power Supply	Rated Voltage	V	DC 24	
	Voltage Range	V	DC 16 - 32	
	Frequency	Hz	-	
Inverter Control	Position Sensing	-	Sensorless & Estimation	
	Current Sensing	-	1-Shunt Sensing	
	Carrier Frequency	kHz	16	
	Max. Input Power	W	250	
	Operating Range	rps	20 ~ 100	
Dimension	PBA type	Length	104	
		Width	mm	58.2
		Height	34.9	
		Weight	g	140.9
	Case type	Length	107.6	
		Width	mm	62.4
		Height	39.6	
		Weight	g	200.6
Interface	Square-wave pulse frequency	Input	40Hz ~ 200Hz	
	Variable Resistor input	Input	2kΩ ~ 10kΩ	
	Open Collector Output	Output	Fault indicator(Refer to 3. CONNECTION & INTERFACE DIAGRAM)	
Protection	-	-	Comp. locking & abnormal , Comp connection loss, Over Current , Under/over Voltage, Over Heat ref) 5. TYPE OF ERRORS	

DC CONTROLLER OUTLINE DRAWING



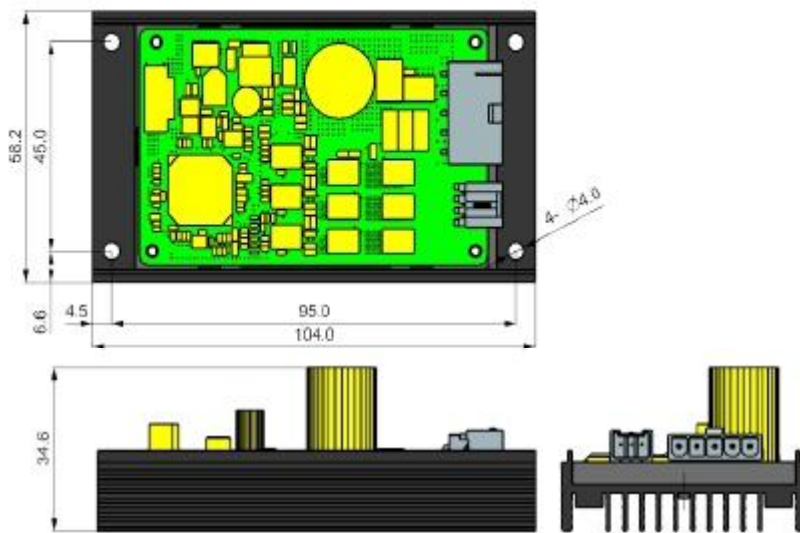
MODEL : SBMC1

SPEC. NO : SS - 00696

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ITEM	PBA	PART NO.	DB92-03104A	Q'TY	1	REMARK
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Reference :

The controller must be away from corrosion or moisture place with ideal temperature. In addition, there should be distance between controller and heat sink to ensure sufficient ventilation .

ITEM	-	PART NO.	-	Q'TY	-	REMARK
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DC CONTROLLER CONNECTION & INTERFACE DIAGRAM

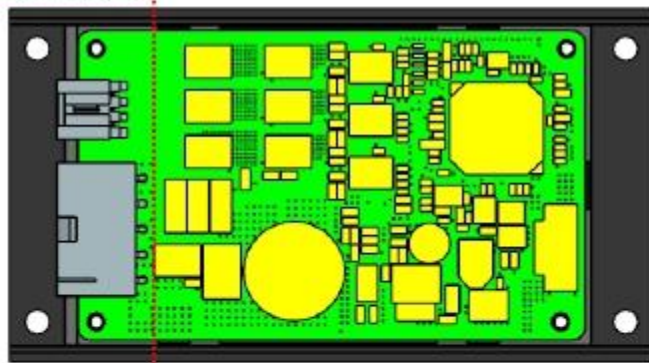
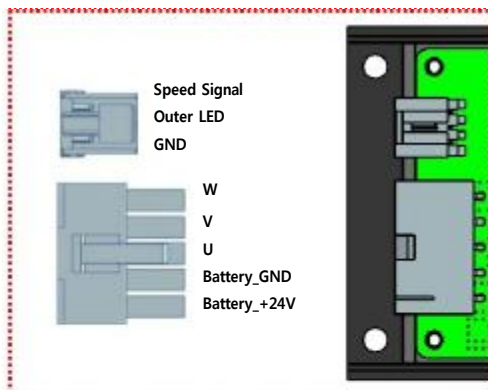
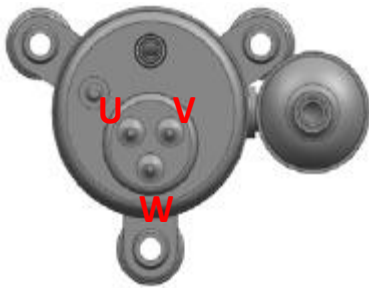


MODEL : SBMC1

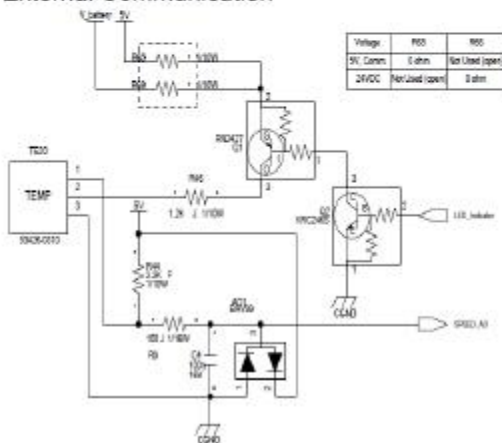
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External Communication



Target Speed	Speed Signal		
	Digital	Variable Resistor	
RPS	Hz	V	kΩ
20	40	1.89	2
26	52	2.20	2.6
32	64	2.46	3.2
38	76	2.68	3.8
44	88	2.86	4.4
50	100	3.01	5
56	112	3.15	5.6
62	124	3.26	6.2
68	136	3.37	6.8
74	148	3.46	7.4
80	160	3.54	8
100	200	3.76	10

The supply voltage is +24V and fuse is 15 A
 Connector for communication uses Speed Signal and GND terminal pin. As Table 1 shows, it can apply the digital(square wave) signal and variable resistor.
 If digital signal apply, duty rate is 50%.

DC CONTROLLER SPECIFICATION UNDER OPERATION

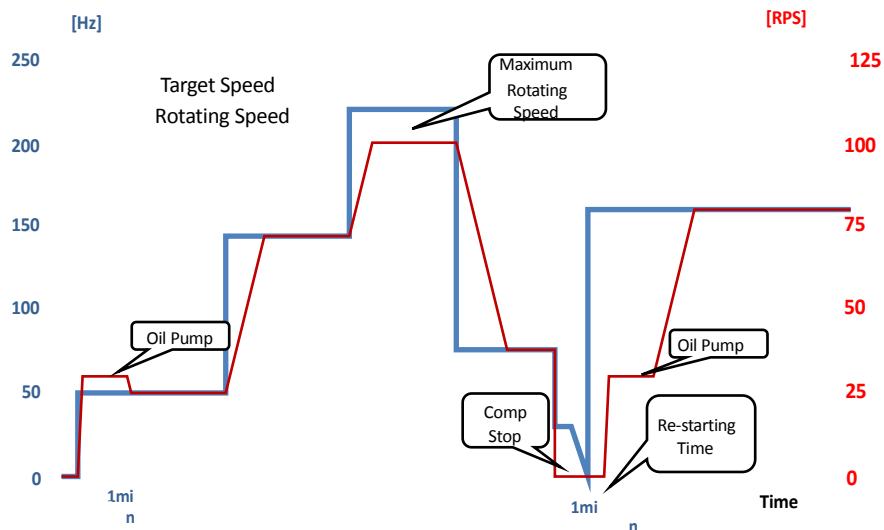


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Reference

① Target Speed :

Digital(square wave) signal over 40[Hz] need to be inserted to run compressor
 Target Speed [RPS] = Digital(square wave) Signal Frequency[Hz]×1/2

② Oil Flow Rate :

When compressor start to run, compressor should run for 1 minute due to reliable oil flow.

③ Maximum Rotating Speed:

Maximum rotating speed is 100[RPS]. Maximum speed is not over 100 RPS even if 220[Hz] is inserted

④ Decelerate/Accelerate rate :

When new digital(square wave) signal is inserted to SBMC1 during compressor is running, rotating speed is changed to new target speed at ± 1[RPS] per a second

⑤ Automatical Compressor Stop :

Compressor will stop if the digital(square wave) signal frequency is below 34[Hz].

⑥ Restarting Time :

If compressor stop, pressure balance between suction and discharge is needed for starting
 Re-starting time of SBMC1 is 1 minute

DC CONTROLLER ERRORS & BATTERY PROTECTION SETTING



MODEL : SBMC1

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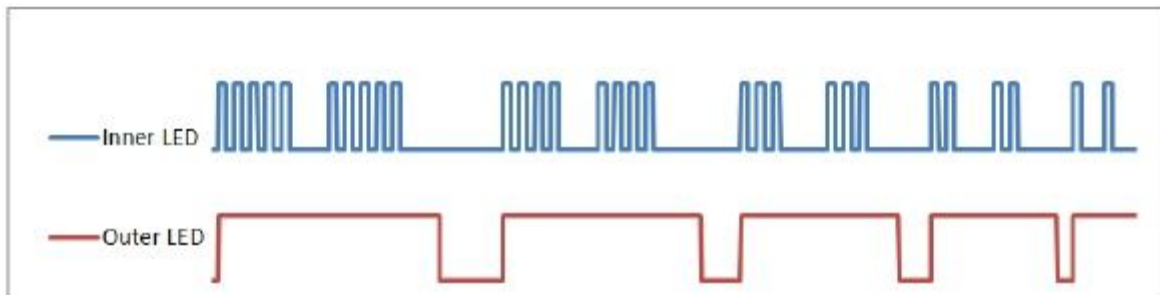
5. TYPE OF ERRORS



Outer LED source in
Molex 53426-0310 #2 Pin

Counts of LED-flashes	Type of Errors
1	Comp. locking or overload
2	Disconnection of Comp. line or an error of sensing current
3	Short-circuit on motor parts or over-current
4	Abnormal DC voltage
5	Overheat of the controller

Compressor will stop if the errors occur
Errors can be checked up by the Counts of LED flashes
Through Molex Housing #2 pin, SBMC1 can supply the outer LED.



6. BATTERY PROTECTION SETTING(Under Development)

STANDARD BATTERY PROTECTION SETTING			
Over voltage	Cut out	VDC	38
	Cut in	VDC	35
Under voltage	Cut out	VDC	8.2
	Cut in	VDC	9

**DC CONTROLLER
PORWE LEAD WIRE ASSY**



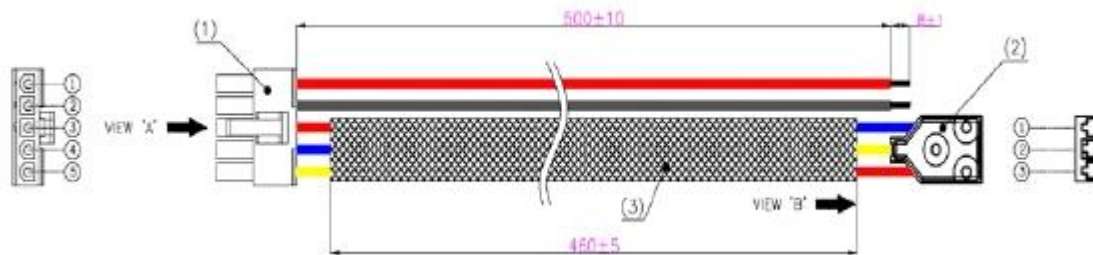
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ITEM	WIRE HARNESS-POWER	PART NO.	DB39-01351A	Q'TY	1	REMARK	
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WIRE SPECIFICATION

Pin No.	Wire Spec.	COLOR	LENGTH	Description	Pin No.
①	UL1015 AWG#16	RED	500mm	POWER	/
②		BLACK		GROUND	/
③		RED		PHASE 'U'	③
④		BLUE		PHASE 'V'	①
⑤		YELLOW		PHASE 'W'	②

COMPONENTS SPECIFICATION

No.	PART NAME	PART No.	MAKER	Q'ty	COLOR
(1)	HOUSING	39-01-4051	MOLEX	1	WHITE
	TERMINAL	39-00-0079		5	-
(2)	CLUSTER BLOCK HOUSING	171370-5	AMP	1	GRAY
	RECEPTACLE	170063-2		3	-
(3)	PVC TUBE	∅11.0,105°C,L460	-	1	BLACK

**DC CONTROLLER
SIGNAL LEAD WIRE ASSY**



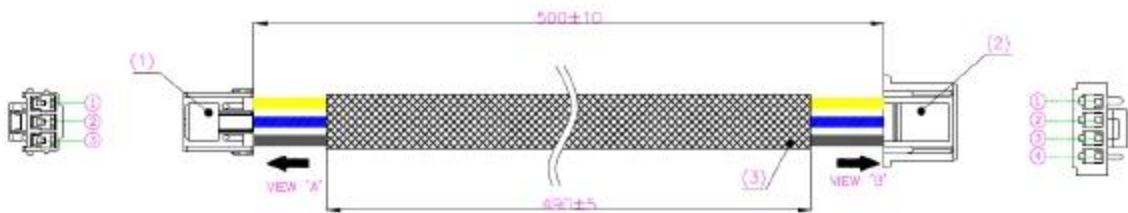
MODEL : SBMC1

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ITEM	WIRE HARNESS-SIGNAL	PART NO.	DB39-01350A	Q'TY	1	REMARK
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WIRE SPECIFICATION

Pin No.	Wire Spec.	COLOR	LENGTH	Description	Pin No.
①	UL1007 AWG#24	YELLOW	500mm	GROUND	③
②		BLUE		LED	①
③		BLACK		SPEED	②
					④

COMPONENTS SPECIFICATION

No.	PART NAME	PART No.	MAKER	Q'ty	COLOR
(1)	HOUSING	0511630300	MOLEX	1	WHITE
	TERMINAL	0503518000		3	-
	RETAINER	0511640305		1	GRAY
(2)	HOUSING	SMH250-04L	YEONHO	1	WHITE
	TERMINAL	YST025L3		3	-
	RETAINER	SMH250-04RT		1	RED
(3)	PVC TUBE	φ5.0,105°C,L490	-	1	BLACK

STANDARD EXPORT PACKING IN 20 FEET CONTAINER



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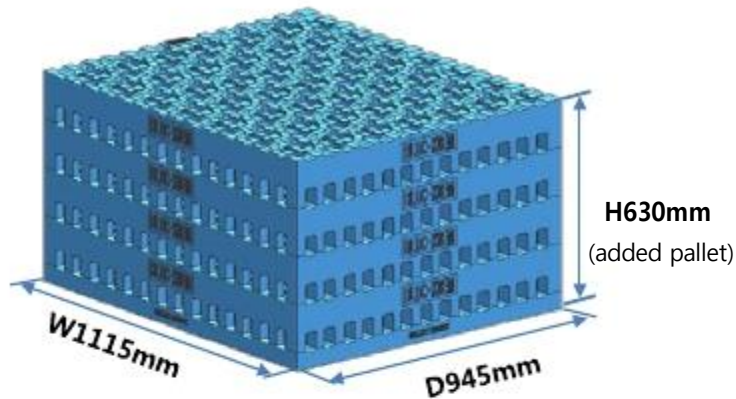
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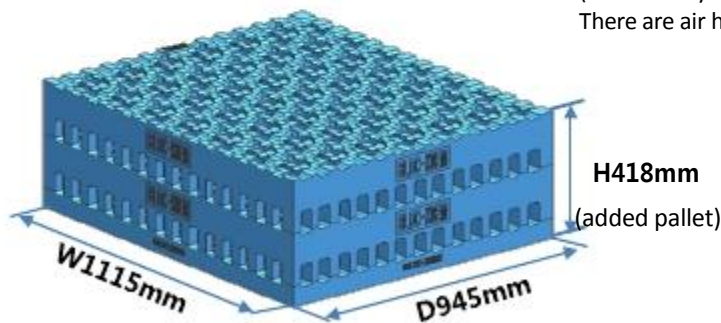
FRAME	Compressor Q'ty / Carton		Carton Q'ty (20Ft)		Accessory Box ⑤ (Carton)	Loading Quantity ⑥ (pcs)
	Type 1 ① (pcs)	Type 2 ② (pcs)	Type 1 ③ (Carton)	Type 2 ④ (Carton)		
20F	182	364	6	12	42	5,460
Unit Packing (Included Driver)	182	364	1	0	2	182
	182	364	0	1	3	364

Total Compressor Q'ty = ① * ③ + ② * ④ = ⑥ (5,460 pcs)



TYPE 2 PACKING

Pallet packing is covered with paper cover and plastic bags. (Low Density Polyethylene) There are air holes at each side.



TYPE 1 PACKING