

Hitachi Highly

Rollkolbenverdichter

Rotary Compressors

Spezifikation

Installation Manual

WHP32900VSKTQ9JK

R 410A - R 452B - R 454B - R 454C - R 290

75,2 cm³/rev

900 - 7200 min⁻¹

DC/ BLDC

RIES GmbH, Rudolf-Diesel-Str. 10, D 64569 Nauheim, GERMANY

Phone: +49 6152 9741 0, Fax: +49 6152 9741 21, Email: info@ries-gmbh.de, Website: www.ries-gmbh.de

Table of Contents

I: WHP 32900VSKTQ9JK Specifications	—————	1 ~ 4
1. Application range		
2. Compressor specifications		
3. Motor parameters		
4. General characteristics		
5. Parts and drawings list		
II. Heat pump water heater dedicated compressor use benchmark	—————	5 ~ 15
III. Acceptance basis and rules	—————	16
1. Acceptance basis		
2. Acceptance rule		
IV. drawing	—————	17 ~ 27
V. Modified experience	—————	
Appendix		

SUBJECT

Model WHP32900VSKTQ9JK SPECIFICATION

PAGE: 1/28

1. SCOPE

This specification is applied to SHANGHAI HIGHLY Heat pump water heater compressor.

2. SPECIFICATION OF THE MODEL

Item		Spec	
2.1 Model Type		WHP32900VSKTQ9JK	
2.2 Power source input to inverter		Rated voltage / Rated frequency/Phase 380V/50Hz/3 Φ	
2.3 Output		7070W/6890W/4570W(R410A/R452B/R454C @3600min ⁻¹)	
2.4 Application		Heat pump water heater	
2.5 Performance			
Refrigerant	R410A	R452B	R454C
Item	Rated Condition	Rated Condition	Rated Condition
Rotational speed	3600 min ⁻¹	3600 min ⁻¹	3600 min ⁻¹
Nominal Heating Capacity	32280W	32030W	23120W
Motor input	7645W	7450W	4940W
Current	21.8A	21.6A	14.3A
COP(see*)	4.22	4.30	4.68
Test Conditions			
Evaporating temp.	7.2℃	7.2℃	7.2℃
Condensing temp.	54.4℃	54.4℃	54.4℃
Liquid temp. entering expansion valve.	46.1℃	46.1℃	46.1℃
Return gas temp.	35℃	35℃	35℃
Ambient temp.	35℃	35℃	35℃
Wind speed	2m/s	2m/s	2m/s

	SUBJECT Model WHP32900VSKTQ9JK SPECIFICATION	PAGE: 2/28
--	--	------------

*.COP= Heating capacity (W)

Motor input (W)

*.Rated Capacity and input are measured with HIGHLY inverter circuit by secondary Refrigerant calorimeter Methods of JIS B8606 by Shanghai HIGHLY Electrical Appliances Co., Ltd.
Allowable capacity should be more than 95% of the rated capacity and allowable input should be less than 107% of rated motor input.

2.6 Refrigerant	R410A/R452B/R454C
2.7 Displacement	75.2ml /rev (Double-cylinder)
2.8 Allowable frequency range	900~7200 min ⁻¹
2.9 Oil	FW68 or equivalent 2000±20ml
2.10 Allowable amount of refrigerant charge	Below 5300g
2.11 Compressor cooling	Forced air
2.12 Hermetic Terminal	
2.13 Space volume of inner case	5000cm ³
2.14 Compressor weight	29.1kg incl. Oil
2.15 Motor Type Insulation class	Direct current brushless motor E class

3. THE PARAMETER OF MOTOR

Item	Spec	explanation
1、Rotor Pole (Pole)	6	——
2、Rated Frequency Range (Hz)	45-330	Electrical Frequency, Relating to VDCmax of Inverter
3、Demagnetizing Curren (A)	85.00	Peak Current, at 130℃, -5% Demagnetizing Rate

		SUBJECT Model WHP32900VSKTQ9JK SPECIFICATION		PAGE: 4/28
5 PARTS AND DRAWING LIST				
PARTS NAME		QTY/SET	DRAWING NO.	REMARKS
Compressor		1	4CYCE****	Dimensioned sketch
Mounting Parts	Rubber grommet	4	4CYC00643	* *
	Bolt	--	4CYC00700	
	Nut	--	M8	
Electrical Parts	Terminal cover	1	4CYC01128	
	Fix-spring	1	4CYC01129	
	Gasket	1	4CYC01264	
	Bolt	1	4CYC01246	
			4CYC0****	Lead routing
			1	Pressure guarantee Chart
			2	Oil level datum
			3	Notes for rotational speed change Performance curve Appendix
*. Out of supply, for reference.				

COMPRESSOR CRITERIA

1 Strictly observe the specification

The compressor should be used in specifications written in this “compressor specification” and not be used in specifications outside it.. The main circuit must link up with fuse or breaker.

2 Source voltage

Specified inverter is linked up with compressor terminals . Applied voltage of this inverter should be voltage specified in this “compressor specification”. Alternating voltage should never be applied on terminals (for example: commercial alternating voltage of 1 ϕ 100V, 200V, 3 ϕ 200V). This is because that if applied alternating current the direct current motor will demagnetize.

3 Operating voltage range

The compressor should be operated in the range of rated voltage $\pm 10\%$, under standard condition and overload condition of rated frequency (applied voltage to inverter).It must be satisfied with item 5 ,6,7.

4 Operating temperatures and pressures

The operating temperatures and pressures of a compressor should be within the range shown in the table 2 and graph 1.

5 Oil Back and oil level

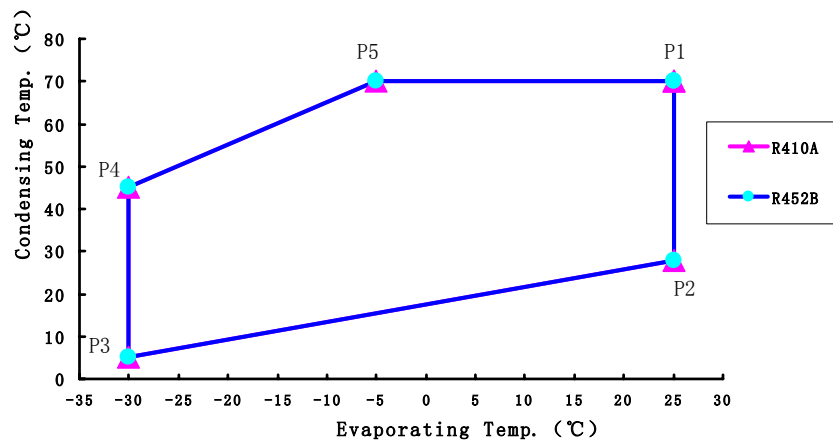
The oil should be returned continuously to the compressor and the structure of the refrigerating system should not make oil stay in the system. The oil level in compressor should be satisfied with chart 2. If not keep the oil level, the shortage will occur, and influence the reliability of the compressor. (please check the oil level in the compressor with the sight glass which supplied from SHEC.

The compressor should be continuously oiled back, and there should be no oil storage part in the refrigeration system configuration. Moreover, the oil level in the compressor should meet the requirements of Figure 2 conditions of. However, when the foam state occurs and the liquid becomes foamy, this portion does not belong to the oil level. If you can't meet the oil surface

The height will cause insufficient oil supply to the sliding part, which seriously affects reliability. (It can be confirmed by a compressor with a sight glass for observing the oil level).

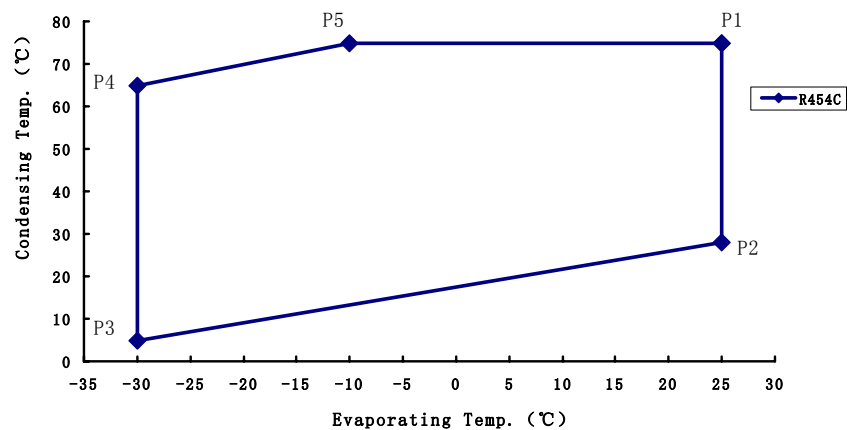
Table 2

Item	Operating Envelope (see graph 1)		
Refrigerant	R410A	R452B	R454C
Discharge pressure MPa	4.762 MAX (condensing temperature :70℃)	4.492 MAX (condensing temperature :70℃)	3.465 MAX (condensing temperature :75℃)
Suction Pressure MPa	0.272~1.652	0.254~1.562	0.172~1.084
	(Evaporation Temperature: -30℃~25℃) It can also be 0.101~0.172 MPa when in transition, but should not be used when it is less than 0.101MPa 0.101~0.172 MPa,		
Compressor case bottom temp	99℃ or below and 6 degrees higher than condensing temperature ℃		
Motor winding temp	Rated voltage: : 105℃ MAX		R. Voltage±10%: 120℃ MAX
Accumulator temp	Higher than outlet pipe of evaporator		
Ambient temp	Meet for the condition of above mentioned motor winding temp.		



Graph 1(a)

	P1	P2	P3	P4	P5
Condensing temperature	70°C	28°C	5°C	45°C	70°C
Evaporation Temperature	25°C	25°C	-30°C	-30°C	-5°C



Graph 1(b) 图 1(b)

	P1	P2	P3	P4	P5
Condensing temperature	75°C	28°C	5°C	65°C	75°C
Evaporation Temperature	25°C	25°C	-30°C	-30°C	-10°C

6 Current limitation

Current peak among motor terminals (include instantaneous current peak) should be below demagnetizing current in order to prevent magnet in motor from demagnetization.

7 Pressure difference between suction and discharge

In all allowable rotational speed range, the difference of pressure should be more than 0.39MPa{4kgf/cm²}. But if there is no problem of noise when assembled in air conditioner, it can also below this value.

8 Discharge pipe temperature

Discharge pipe temperature is measured at a distance 300mm from the surface of compressor and should be less than 110°C. The tip of the thermocouple is fixed by soldering when measuring discharge pipe temperature .Furthermore, soldering point is covered with urethane foam to prevent the effect of wind.

9 Dust of compressor hermetic terminals

Compressor hermetic terminals should be mounted with specified cover in right way to prevent dust entering, and should be used in direction which dust is hard to enter in.

10 Lead wire of compressor hermetic terminals

Measuring the temperature of hermetic terminals , lead wire should be resist to the temperature and be clamped so as not in touch with the surface of compressor and pipe.

11 Start-stop frequency

The frequency should be less than 6 times per hour. Operating time from start to stop should be more than 3 minutes. Stopping time should be more than 3minutes.

12 Rate of rotational speed change

The rate of compressor rotational speed (acceleration) should be less than 133min⁻¹/s, But if The variable range is below 120min⁻¹, rate can also be less than 600min⁻¹ when rotational speed is reduced to avoid temporary over- current.

13 Air and moisture in refrigerating system

The degree of vacuum in refrigerating system should be less than 20Pa (150×10^{-3} mmHg) at room temperature just before charging refrigerant. The quantity of water should be less than 0.15ml.

14 Impurities in refrigerating system

(1) The weight of residue on the inside surface of the heat exchanger and tube should be less than 0.01g/m^2 . But metallic dust should not be permitted in the system. This value means the weight of foreign residue collected by filter paper after washing inside surface of the heat exchanger tubes with R-11.

(2) Prevent the impurities from entering into the enclosed unit system used refrigerant. When the impurities entered into the enclosed system, it will damage the moving mechanism parts and result in the capillary depositing.

(3) Eliminate all system contaminants such as trichlorethylene, alkalies, soaps, oil, acids & washing fluid used at machining heat exchanger and tubes.

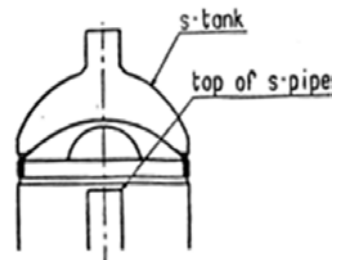
15 Compressor vacuum operation

Compressor should never be operated while under vacuum. Otherwise, internal arcing can cause damaging parts.

16 The compressor should be operated for more than 20 seconds within 15 minutes after charging refrigerant into the system so proper lubrication results.

17 Liquid refrigerant return limitations

(1) Liquid refrigerant level in s-tank should be lower than the top of s-pipe in s-tank. (see chart at right)



(2) There should not exist noise of the liquid refrigerant compression, current and vibrancy increase. System can append the assistant tank or reduce the amount of refrigerant to prevent from liquid refrigerant compression. Refrigerant system forbid liquid refrigerant from flowing back compressor in any case. In normal condition the overheat gas refrigerant should flow back compressor.

No liquid compression sound, increased current, increased vibration, etc. In order to prevent liquid compression, an auxiliary reservoir can be added or the amount of refrigerant enclosed can be reduced. No matter what the conditions, the refrigeration system should not have liquid returning to the compressor. Under normal operating conditions, there should be superheated gas flowing back to the compressor.

- 18 Purge parts with dry nitrogen or dry air to remove remains in parts (dust, detergent, etc.) before assembly of system. Time for purging: over one second for pipe; over three seconds for heat exchanger. Purging pressure: $0.9 \pm 0.1 \text{ MPaG}$. Dew point of dry air: Below -20°C .

The motor winding temperature should be less than 149°C and hermetic terminal body temperature should be less than 177°C in process of manufacturing.

- 19 Apply for vehicle

The compressor should not be used on moving equipment such as automobiles, trains, ships, etc.

- 20 Installation

The rotational axis of compressor should be kept vertical during operation. But in actual application the axis incline must be within 5° at all directions during operation.

- 21 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 allowable rotational speed range and voltage range of rated $\pm 10\%$.

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

- 22 Connecting tube design

In designing and routing tubing that connect from the compressor to the other parts of the air conditioner, following should be considered.

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

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

Moving tubes never touch to lead wire.

23 Avoid refrigerant migration

The refrigerant migration to compressor shell should be avoided during the heat pump water heater system shut down periods, It's suggested that the electric heating belt should be used around the shell bottom when necessary.

24 Miscellany

(1) The compressor should be carried carefully to avoid drop, drag, impact and should not apply partial force on projection parts such as pipe, hermetic terminals, foot during carrying and processing.

(2) The compressor should not be operated to form a vacuum and to absorb air. The compressor only can run in one direction which according to lead routing wiring diagram. Never reversion otherwise the compressor will be in trouble.

(3) The compressor should not be left opened in the atmosphere for more than 5 minutes.

When the air entered into the unit system with refrigerant, it will expedite the deterioration of the oil and result in the capillary depositing and the reducing of insulation resistance.

(4) Electric pulse should not be applied to compressor when it is in vacuum.

(5) The compressor should be kept in the place with low-dust, low-moisture.

- (6) The compressor can't be used in the place with corrosive atmosphere such as hot spring and chemical warehouse. It should not be the structure often splash water on the surface of the compressor forcibly.
- (7) The trouble of cross valve, electromagnetic valve, defroster, refrigerant controller, fan motor used in refrigerating system may cause compressor accident. So their reliability should be ensured completely. Moreover, the way of design, manufacture, application of refrigeration cycle with less-leak should be adopted.
- (8) The main electric circuit should be equipped with fuse or breaker.
- (9) Refrigerant should be charged from the end of condenser of refrigerating systems. Never Charge refrigerant to the compressor directly.
- The refrigerant should always be charged in liquid state. When the refrigerant is charged in gas state. The percent component will possibly be changed.
- (10) Temperatures within systems during stable compressor operation should not be less than -35°C to prevent wax precipitation from the oil.
- (11) The units of refrigerating system should be connected to earth.
- (12) Compressor mounting
- Rubber grommets are designed soft to provide the 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.
- (13) There should be adequate clearance between the under—surface of Push-Nut and the upper surface of rubber grommets.

- (14) SHEC will not take any responsibility against accident that is caused by the accessories equipped by yourselves.
- (15) The hermetic terminals of compressor should not be inserted slantingly and not be applied twisting force after inserting so as to avoid reducing of terminal fixed force.
- (16) The pipe and hermetic pens attached to the compressor should not be bent.
- (17) The dropped compressor can't be used anymore.
.
- (18) Compressor can be used when ambient temperature is higher than -10°C . Confirm the start-up of compressor if the temperature of compressor surface is below -10°C . Heat up compressor to reach the temperature higher than -10°C with heater if the ambient temperature is below -10°C .
- (19) Set a thermistor on the case cover of compressor to prevent from accident of leakage of refrigerant. The thermistor can stop the operation of compressor when compressor in abnormal temperature. The lead wires of thermostat is enveloped with tube, as same as that of the terminals, to avoid directcontact with the compressor and pipe.
- (20) The compressor should not be splashed with water intentionally. Prevent moisture from entering into the enclosed unit system. When the moisture entered into the unit of the refrigerant, the refrigerant oil and the organic compound material presented in the hermetic motor will possibly decompose on the affecting of water. It will result in the capillary depositing and the reducing of insulation resistance.

It is necessary to install a dryer to dehumidify the residual moisture mixed in the refrigerant in the cycling system. The specially defined molecular-sieve dryer is advised.

(21) Use the refrigerant of specified brand. When the refrigerant not specified used, it will possibly cause trouble of the performance and reliability of the compressor by the impurities in the refrigerant.

(22) The lead wires should be connected to hermetic terminals without being touched on the surface of the compressor.

(23) Be careful of avoiding oxide scale while soldering during assembly of refrigerating system.

(for example: flow or fulfill dry nitrogen)

(24) 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.

(25) To avoid water and impurity into the refrigeration system and make sure no leakage of refrigerant during the operating course. It's required to direct the erector and maintenance man .

(26) The start-up current and torsion of compressor

Adjust the start-up current of the compressor to get enough torsion by inverter. Confirm and measure the start-up current if change the parts and design.

(27) The fuse or/and breaker should be equipped in the main circuit.

(28) The thickness of the refrigerating system using tube
the tube thickness as followed

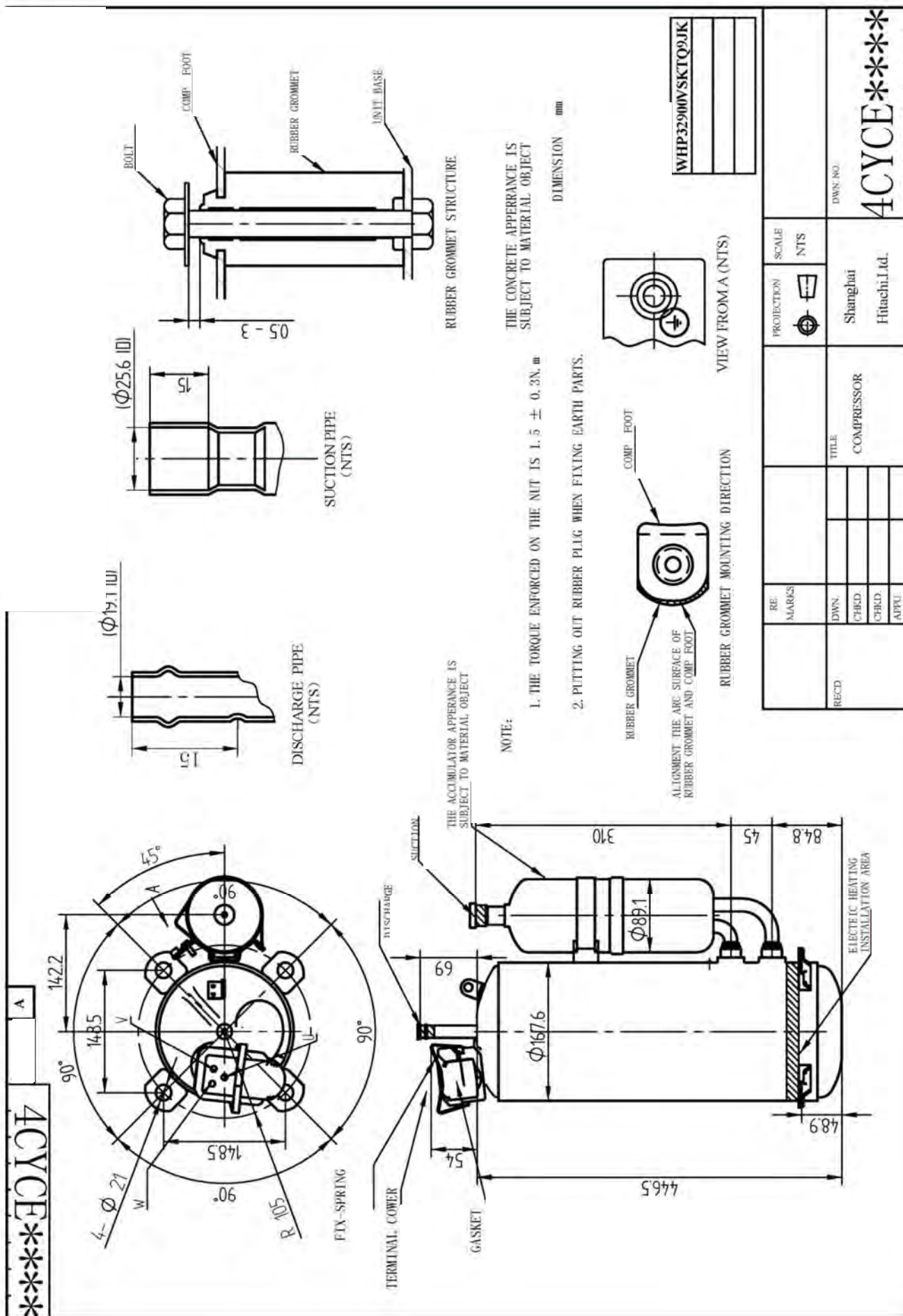
external diameter(mm)	6.35	9.52	12.7	15.88	19.05	22.2	25.4	31.75	38.1	44.45
Thickness (mm)	0.8	0.8	0.8	1	1	1	1	1.1	1.4	1.5

1. Basis for Checking upon Delivery

The Performance test will be carried out in accordance with this “compressor Specification”.
The Safety Performance in accordance with GB4706.1 Safety of household and similar electrical appliances General requirements and GB 4706.17 Safety of household and similar electrical appliances Particular requirements for motor-compressor.

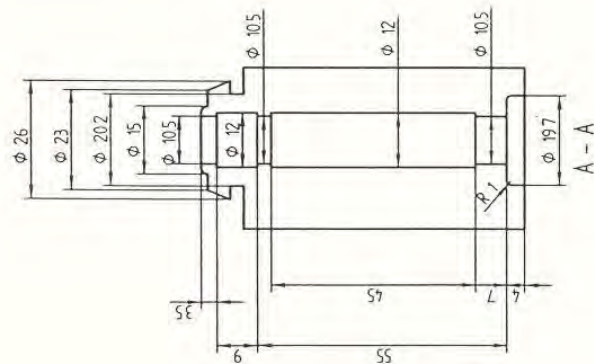
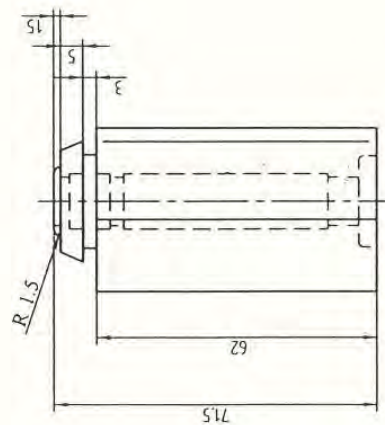
2. Rule for Checking upon Delivery

If come across any quality problem, please notify the company in written form within 30 days after the arrival of the cargo, the company shall exchange exactly the number of the products, otherwise they shall be regarded as being up to standard.



A

A



MATERIAL: NATURAL RUBBER

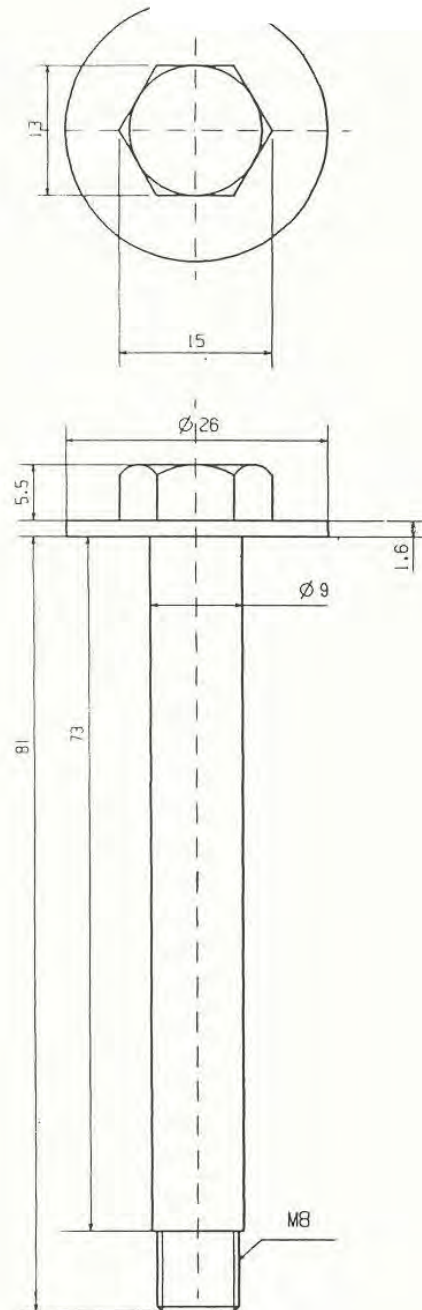
$$\text{Hs}47 \pm 5^\circ$$

DIMENSION: mm

	RE. MARKS					PROJECTION 	SCALE NTS	DWN NO.
REC'D	DWN	 01.07.02	TITLE			Shanghai		
	CHKD	 01.02.02	DIMENSIONED					
	CHKD		SKETCH					
	APPU	 01.07.02				Hitachi, Ltd.		4CYC00643

4CYC00700

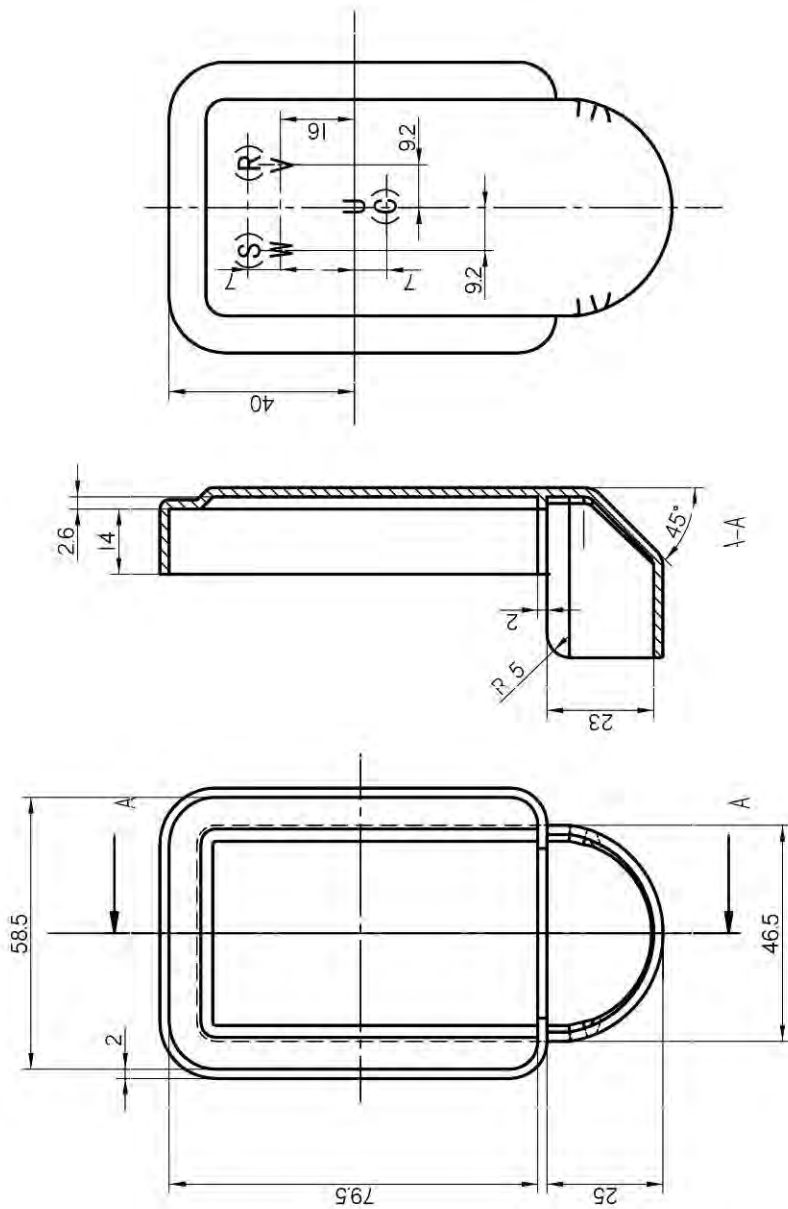
A



	RE- MARKS			PROJECTION 	SCALE NTS	
REGD.	DWN.	00.08.14	TITLE BOLT	Shanghai Hitachi, Ltd.		DWN. NO. 4CYC00700
	CHKD.	00.08.14				
	CHKD.					
	APPD.	00.10.8				

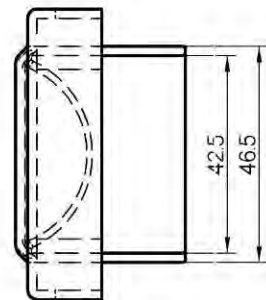
A

4CYC01128



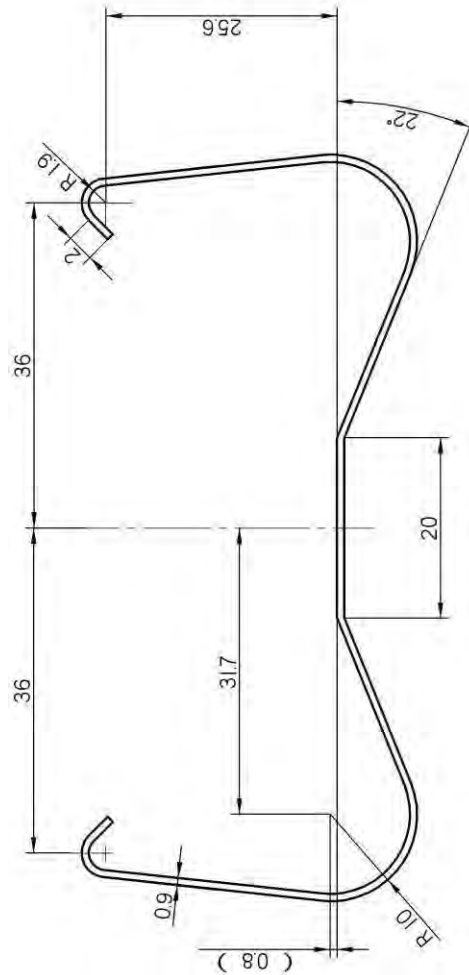
MATERIAL: PBT

DIMENSION: MM



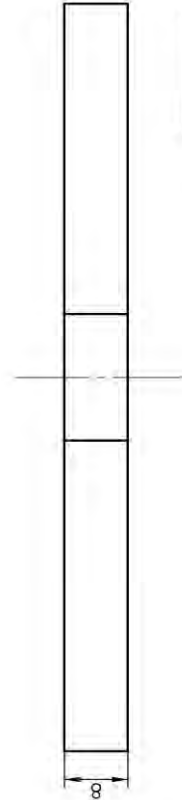
REC'D	RE MARKS				PROJECTION  NTS	SCALE NTS	DWN NO 4CYC01128
		TITLE					
		TERMINAL COVER					
		14.12.24					
		14.12.24	14.12.24	14.12.24	Shanghai Hitachi Ltd.		
		14.12.24	14.12.24	14.12.24			
		14.12.24	14.12.24	14.12.24			
		14.12.24	14.12.24	14.12.24			

4CYC01129



MATERIAL: J4

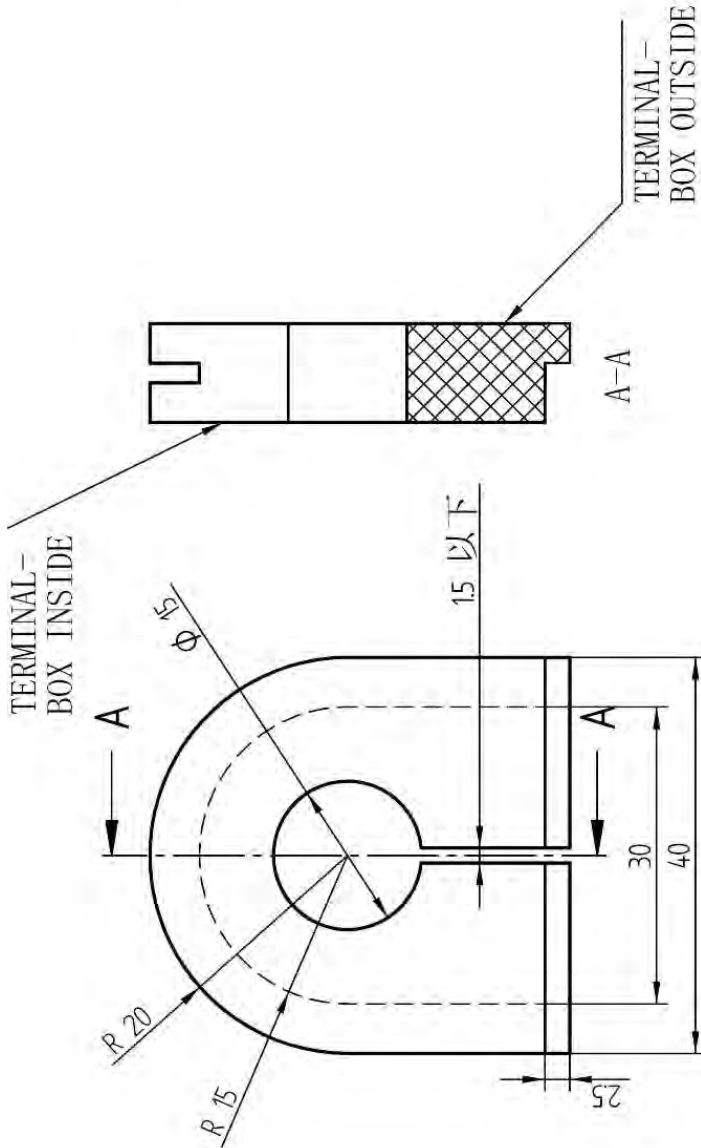
DIMENSION: MM



REC'D	RE MARKS	JUL 12 21 AUG 12 21 OCT 12 21 NOV 12 21	TITLE FIX-SPRING	PROJECTION 	SCALE NTS	DWN. NO. 4CYC01129
	DWN.					
	CHKD.					
	APPR.					

A

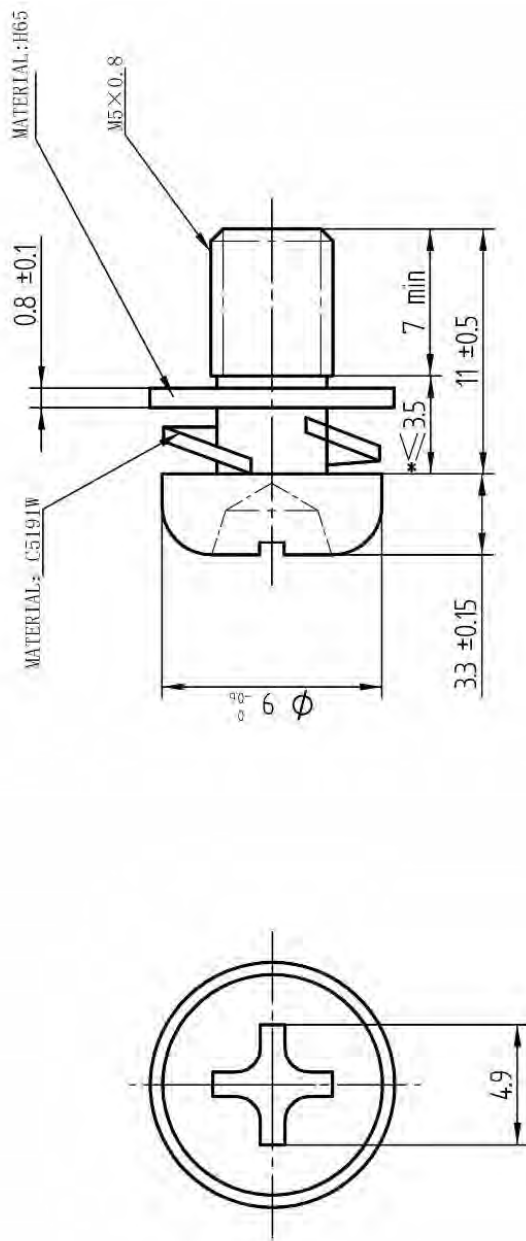
4CYC01264



MATERIAL: EPDM

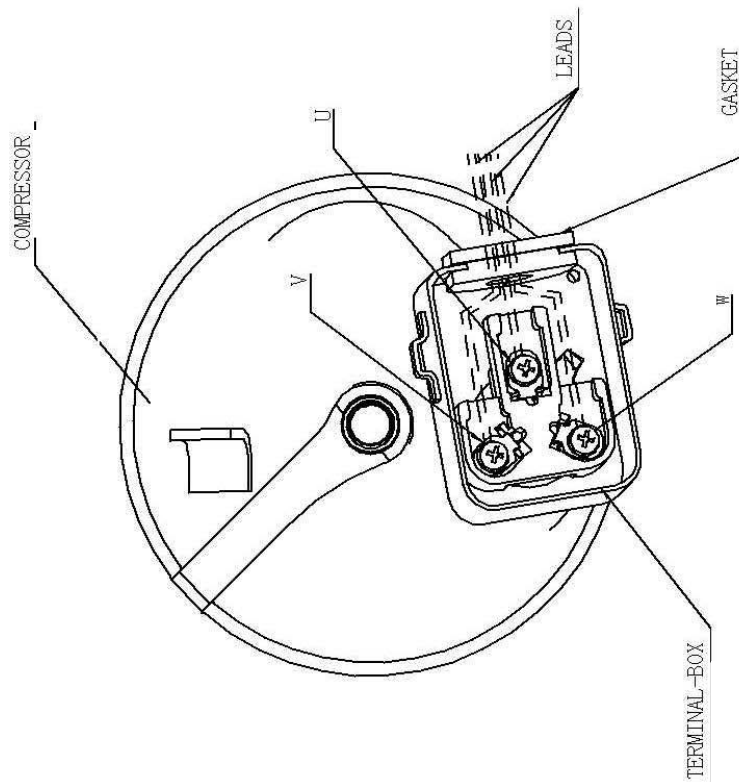
DIMENSION: MM

RECD	RE MARKS						
DWN	CHKD.	CHKD.	APPR	17.05.02	17.05.02	17.05.02	17.05.02
				杨沈平	王宏	张松	李强
TITLE				GASKET			
PRODUCTION				Shanghai Hitachi Ltd.			
SCALE				N1S			
				DWN NO.			
				4CYC01264			

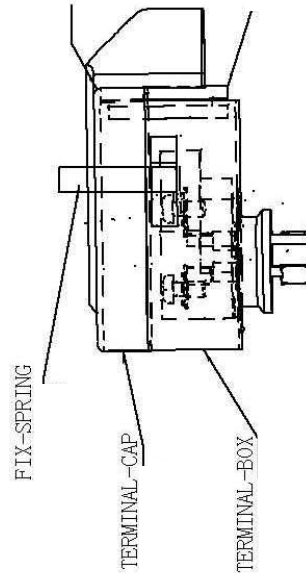
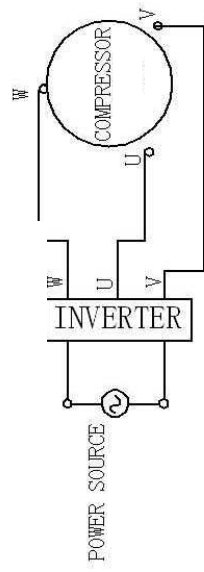


DIMENSION: mm

RE. MARKS		PROJECTION		SCALE		DWN. NO	
NTS		Shanghai Hitachi, Ltd.		4CYC01246			
TITLE		BOLT		16.11.26			
DWN.		16.11.26		16.11.26			
CHKD.		16.11.26		16.11.26			
APPU		16.11.26					

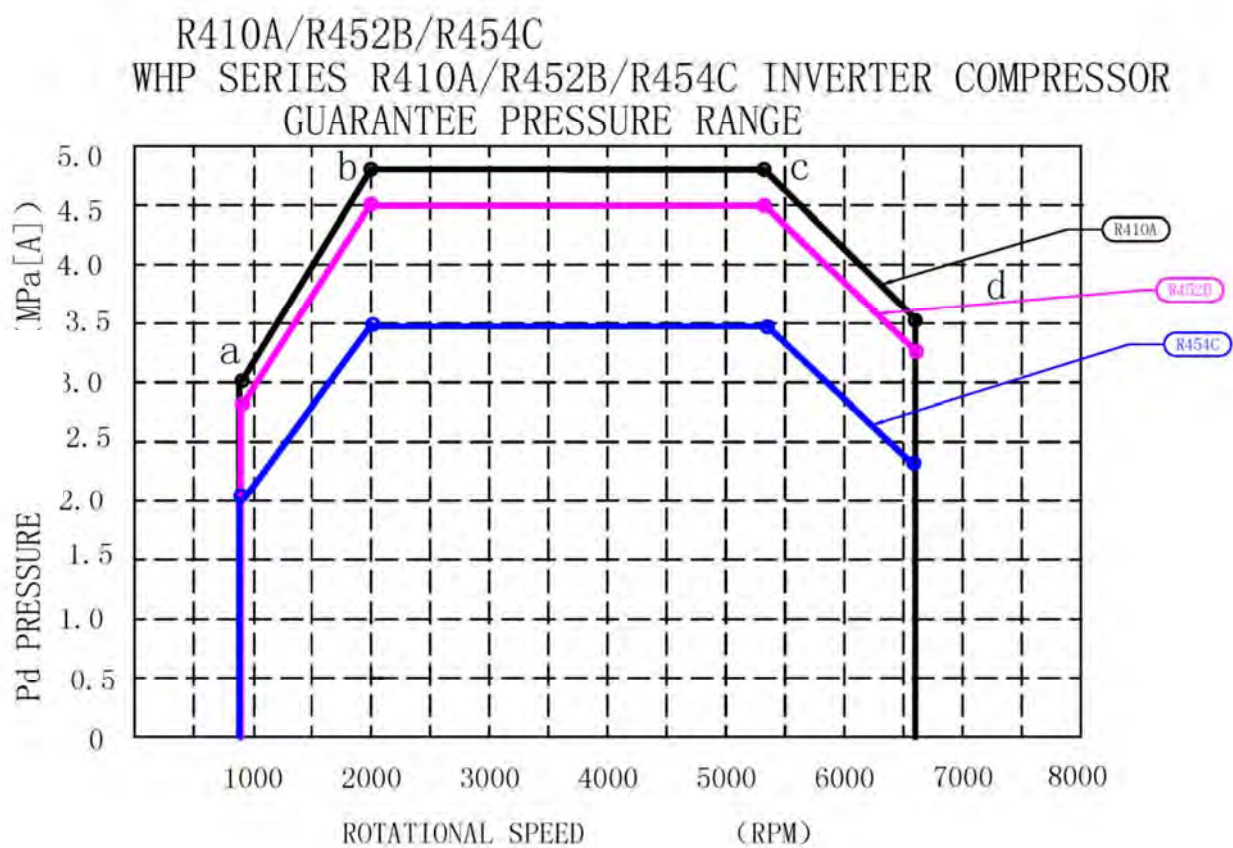


WIRING DIAGRAM



- NOTES:
1. PLEASE PREPARE LEADS BY YOURSELF.
 2. THE LETTER U, V OR W STANDS FOR EACH TERMINAL.

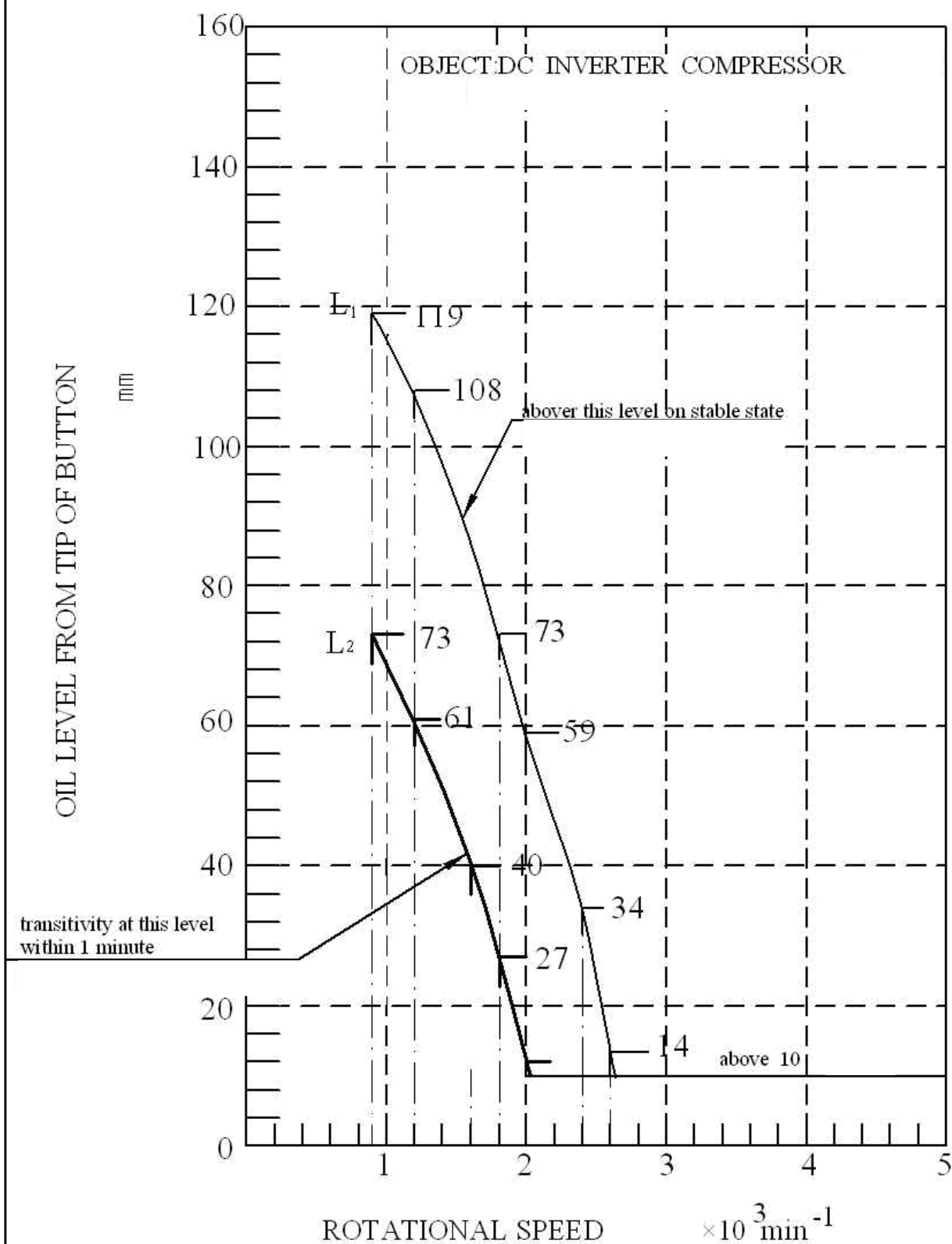
REL. MARKS	PROJECTION	SCALE	NTS	OWN NO.
				
REC'D	TITLE			4CYCO*****
DWG.	17.08.30			
CHKD.				
CHKD.	17.08.30			
APPD.	17.08.30			
LEAD ROUTING WIRING DIAGRAM				
shanghai Hachi Ltd.				



Graph 1

	Rotational speed (rpm)	Pd limit (MPa)		
		R410A	R452B	R454C
a	900	3.07	2.90	2.02
b	2000	4.76	4.49	3.47
c	5400	4.76	4.49	3.47
d	6600	3.51	3.32	2.31

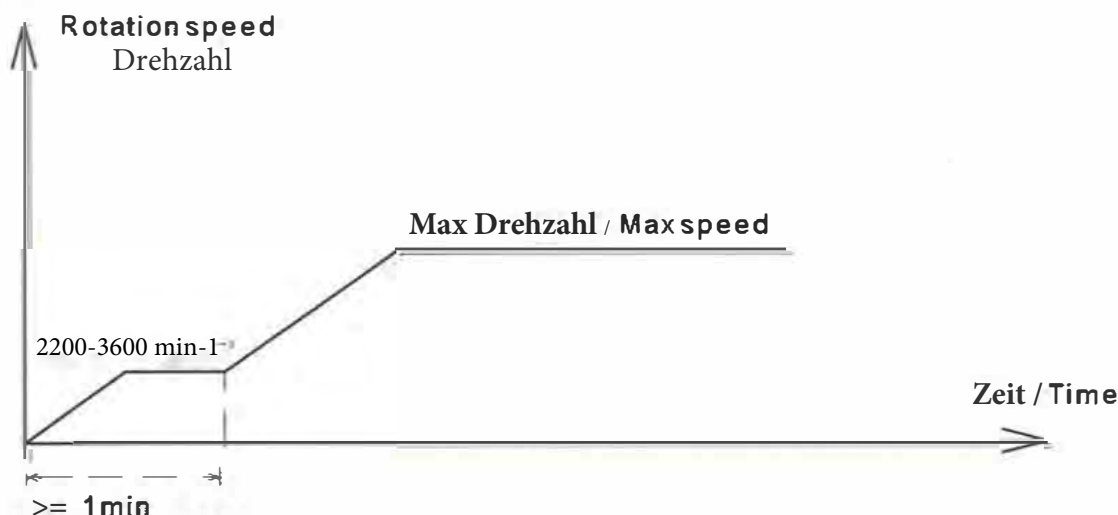
CHART2 WHP DC INVERTER COMPRESSOR OIL LEVEL DATUM



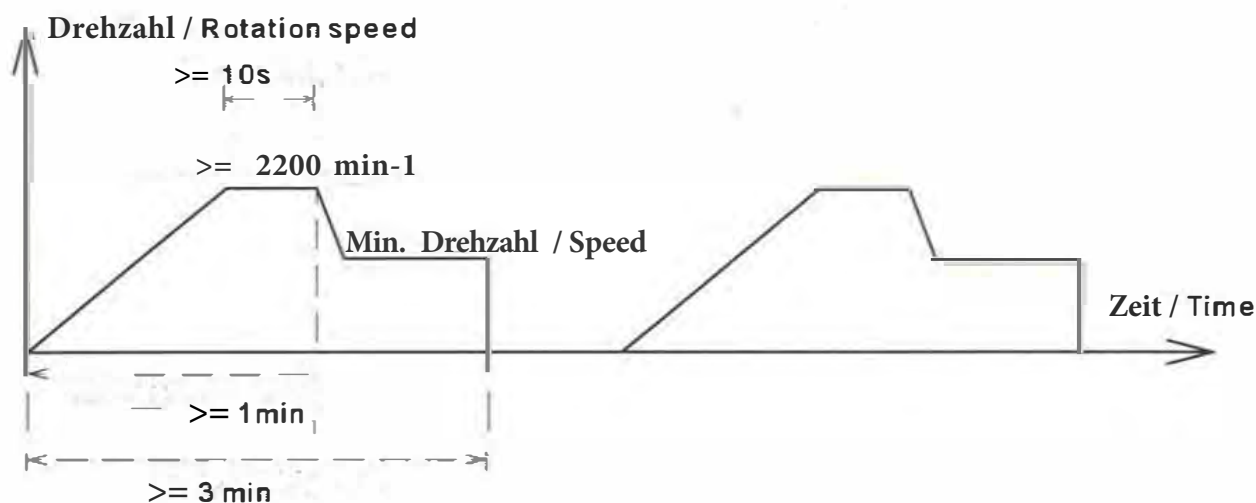
Anwendungshinweise für DC Inverter Kompressoren zur Drehzahlregelung Instruction for DC inverter compressor rotation speed control

Drehzahländerung / Speed change rate: $\leq 133 \text{ min}^{-1}/\text{s}$
 Max und Min Drehzahl in den einzelnen Spezifikationen
 Max and min speed is showed in the specification

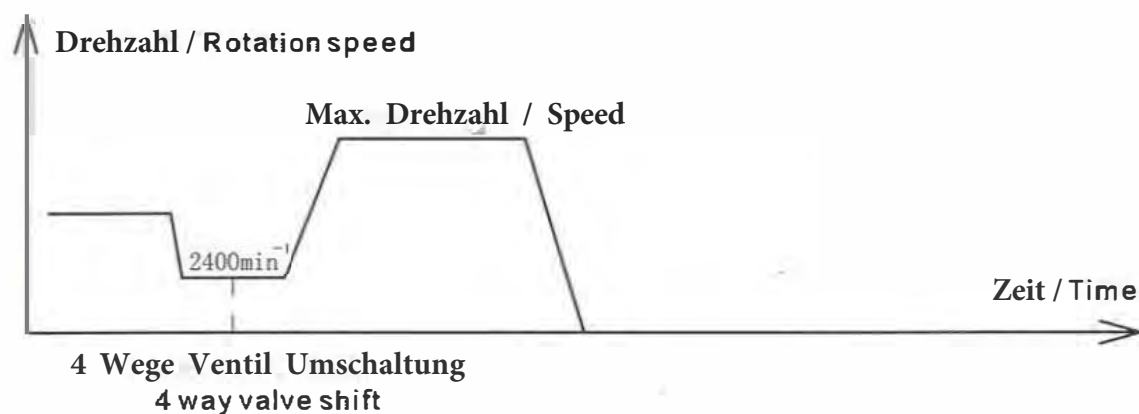
(1) Vom Start zur gewünschten Drehzahl / From starting to normal running



(2) Niedrige Drehzahl und unregelmäßiger Betrieb / Low speed un-continuously running



(3) Abtauung / Defrost mode (unter Verwendung eines 4 Wege Ventiles / by using 4 way valve)



Performance curve

(Capacity measuring condition)

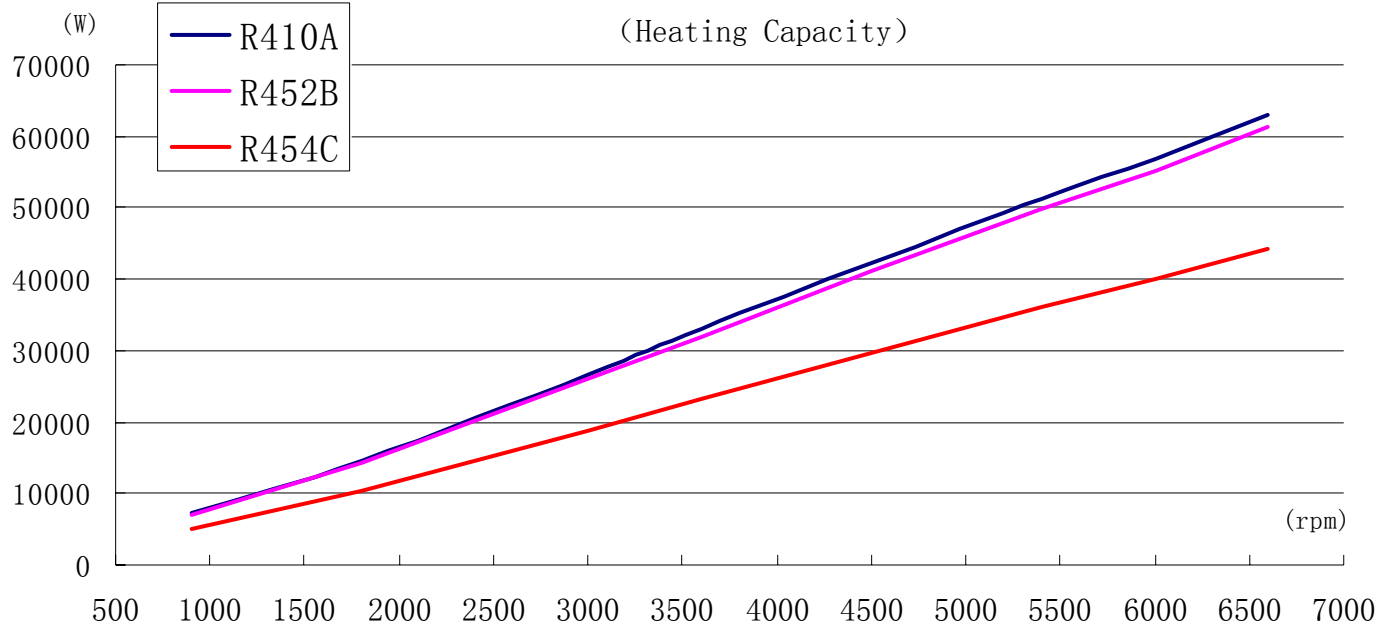
(Evaporating temp.) : 7.2℃;

(Return gas temp.) : 35℃

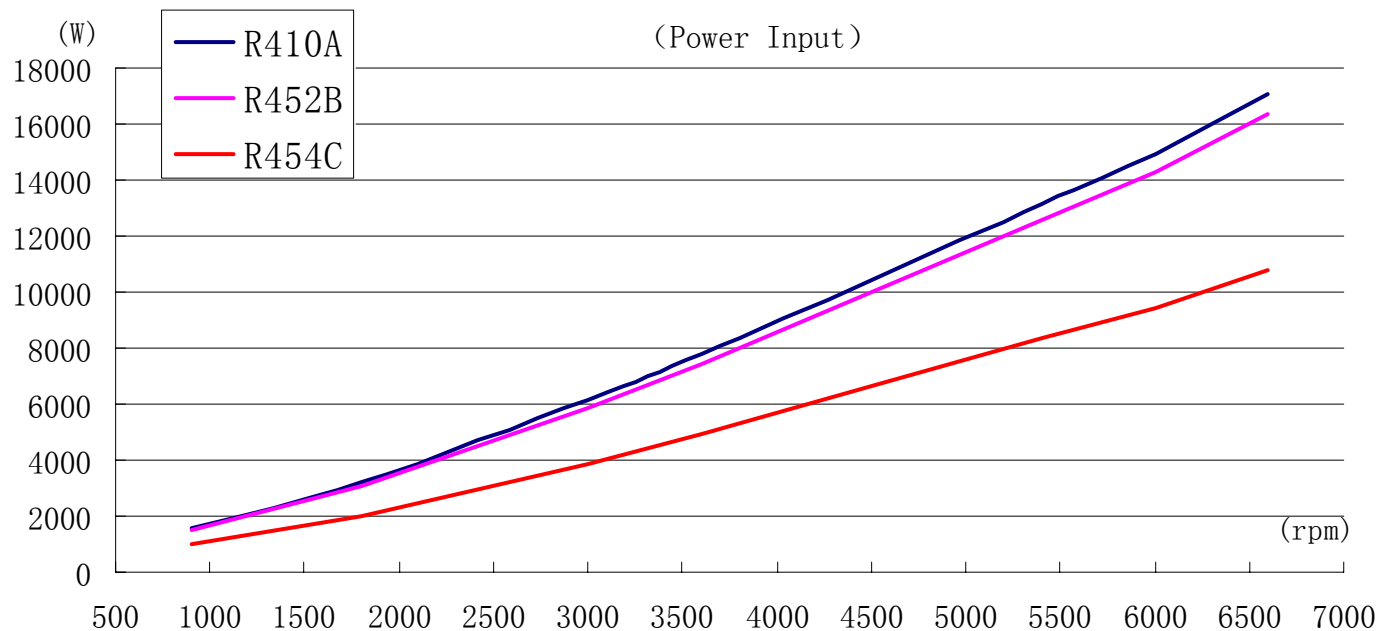
(Condensing temp.) : 54.4℃;

(Ambient temp.) : 35℃

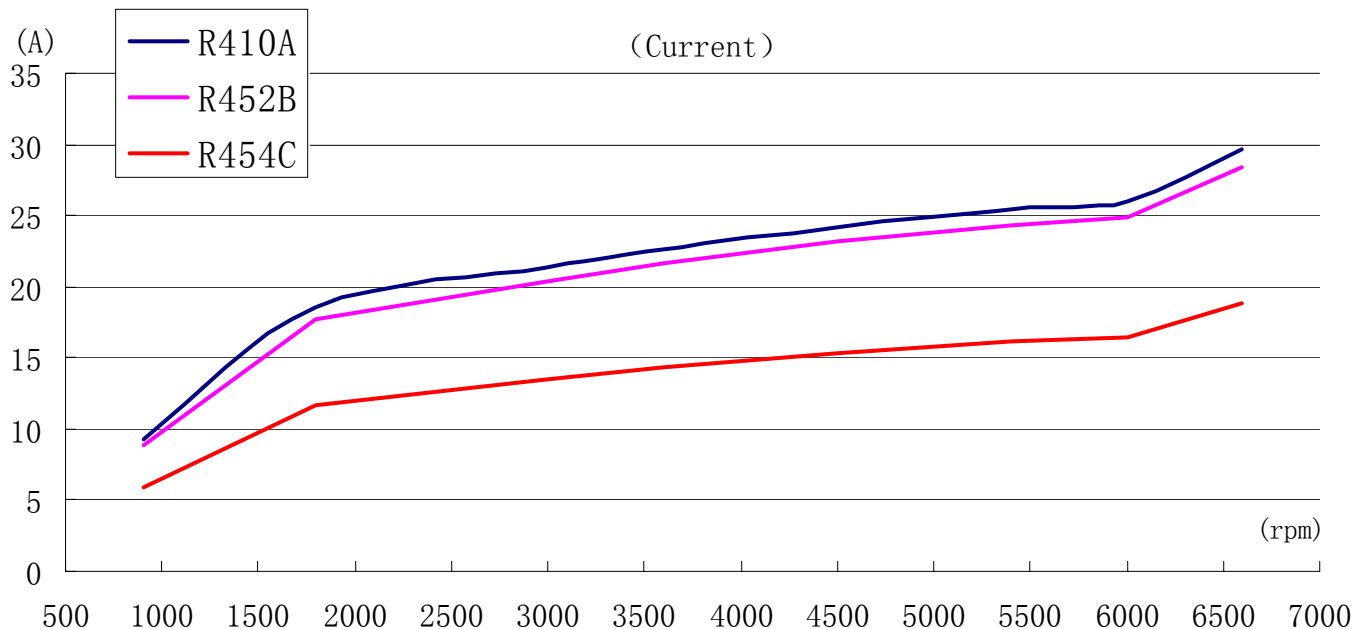
(Heating Capacity)



(Power Input)



(Current)



Specification Revision Record				
No.	Date	Page in Spec	Revision Reason	Conclusion Date
A				
B				
C				
D				
E				
F				
G				
H				
J				
K				
L				
M				
N				
P				
Q				
R				
S				
U				
V				