

# **Hitachi Highly**

**Rollkolbenverdichter**

**Rotary Compressors**

**Spezifikation**

**Installation Manual**

## **WHP03300PRKQA3JT6**

**R 290**

**14,0 cm<sup>3</sup>/rev**

**1000 - 7200 min<sup>-1</sup>**

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](mailto:info@ries-gmbh.de), Website: [www.ries-gmbh.de](http://www.ries-gmbh.de)

# Table of contents

1. WHP03300PRKQA3JT6 Specifications	1~4
1. Application range	
2. Compressor Specifications	
3. Motor parameters	
4. general characteristics	
5. List of parts and drawings	
2. Use standard of DC inverter compressor	5~15
3. Acceptance basis and rules	16
1. Acceptance basis	
2. acceptance rules	
4. Drawing	17~26
5. appendix	27~29
6. Specification modification	
Experience	Attached page

## SUBJECT

Model WHP03300PRKQA3JT6 SPECIFICATION

PAGE: 1/29

## 1. SCOPE

This specification is applied to rotary compressors produced by SHEC.

## 2. SPECIFICATION OF THE MODEL

Item	Spec
2.1 Model Type	WHP03300PRKQA3JT6
2.2 Power source input to inverter	Rated voltage 220V Rated frequency 50Hz Phase 1phase
2.3 Output	666W
2.4 Application	Heat pump water heater
2.5 Refrigerant	R290
2.6 Displacement	14.0ml/rev (single-cylinder)
2.7 Allowable frequency range	1000~7200min <sup>-1</sup>
2.8 Oil	Synthetic oil 150±20ml
2.9 Allowable amount of refrigerant charge	Below 150g
2.10 Compressor cooling	Forced air
2.11 Hermetic Terminal	1/4" quick connect type
2.12 Space volume of inner case	950cm <sup>3</sup>
2.13 Compressor weight	6.99kg incl. Oil
2.14 Motor Type Insulation class	Direct current brushless motor B class
2.15 Rated Capacity (see *) ( W )	3389
2.16 Compressor Rated Input (see *) ( W )	709
2.17 COP	4.78

	<p>SUBJECT</p> <p>Model WHP03300PRKQA3JT6 SPECIFICATION</p>	PAGE: 2/29
--	---	------------

Item	Spec
2.18 Current ( A )	2.53 (compressor input)
2.19 Noise (dB (A) ) (see appendix)	77
2.20 Vibration (m/s <sup>2</sup> ) (see appendix)	15
2.21 Capacity measuring conditions and noise & vibration measuring condition	Rotational speed 3600min <sup>-1</sup> Evaporating temp. 7.2℃ Condensing temp. 54.4℃ Liquid temp. 46.1℃ Ambient temp. 35.0℃ Return gas temp. 35℃ Wind speed 2m/s

\*. 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 97% of the rated capacity and allowable input should be less than 103% of rated motor input. Don't need to set the ambient temperature and wind speed when measuring the noise and vibration.

### 3. THE PARAMETER OF MOTOR

Item	Spec	explanation
3.1 Rotor Pole (Pole)	6	6 electrodes 9 slots concentrated winding
3.2 Rated Frequency Range (Hz)	16.7-120	Mechanical Frequency, Relating to VDCmax of Inverter
3.3 Demagnetizing Current (A)	21.84	Peak Current, at 130℃, -5% Demagnetizing Rate
3.4 Inductance Ld (mH)	1	—

-	SUBJECT Model WHP03300PRKQA6JT6 SPECIFICATION	PAGE: 3/29
---	--	------------

Item	Spec	explanation
3.5 Inductance Lq (mH)	Sheet 1	---
3.6 Winding Resistance (Ω) (20℃)	1.867	Line-to-Line
3.7 Voltage Constant (Vrms/krpm)	49.20	Line-to-Line
3.8 Torque Constant (N•m/Arms)	0.78	Torque/Current
3.9 Inertia (Kg•m2)	0.000311	---
3.10 Flux Φa (Wb)	0.1279	$\varphi$ (Per Phase, Peak)= $\frac{\sqrt{2} \times E0}{2\pi \sqrt{3}}$
3.11 Magnet Material	NdFeB	

Tabelle 1: 100Hz

RMS)	1.0	2.0	3.0	4.0	5.0	6.0	7.0
Lq (mH)	15.45	14.94	14.30	13.60	12.88	12.21	11.61
Ld (mH)	10.95	10.98	10.82	10.51	10.17	9.81	9.46

4. CHARACTERISTICS

4.1 Appearance

The surface of the compressor is painted to black, without obvious flaw ,impact scar, paint peel off, rust and so on.

4.2. Indication

Compressor model type, manufacturing data are clearly indicated on the surface of compressor.

4.3. Residual moisture                      120mg    MAX

4.4. Residual impurities                    60mg      MAX

5 PARTS AND DRAWING LIST

PARTS NAME		QTY/SET	DRAWING NO.	REMARKS
Compressor		1	—	Dimensioned sketch
Mounting Parts	Rubber grommet	3	4CYC00851	
	Bolt	—	4CYC00940	*
	Nut	—	(M8)	*
Electrical Parts	Terminal cover	1	4CYC01114	
	Gasket	1	4CYC01113	
	Nut	1	3CYC00004	
	Sleeve	1	4CYC01042	
	Rubber washer	1	4CYC00174	
	Thermostat	1	4CYC01403	
			4CYC01268	Lead routing
			1	Pressure guarantee Chart
			2	Oil level datum
			3	Notes for rotational speed change
				Performance curse
				Appendix

\*: Out of supply, for reference.

	DC INVERTER COMPRESSOR CRITERIA	PAGE: 5/29
<p>COMPRESSOR CRITERIA</p> <p>1 Strictly observe the specification</p> <p>The compressor should be used in specifications written in this “compressor specification” and not be used in specifications outside it. Moreover, accessories should be specified parts used in specified way, service must use specified parts too. The main circuit must link up with fuse or breaker.</p> <p>2 Source voltage</p> <p>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 1φ100V, 200V, 3φ200V). This is because that if applied alternating current the direct current motor will demagnetize.</p> <p>3 Operating voltage range</p> <p>The compressor should be operated in the range of rated voltage <math>\pm 10\%</math> , under standard condition and overload condition of rated frequency (applied voltage to inverter).</p> <p>It must be satisfied with item 5, 6, 7 and the overload condition should not be continuous.</p> <p>But the standard condition and overload condition mentioned here refer to condition that specified in GB/T 7725. (The standard condition refers to the rating cooling condition and the overload condition refers to the maximum operating condition.)</p> <p>4 Operating temperatures and pressures</p> <p>The operating temperatures and pressures of a compressor should be within the range shown in the table 2.</p>		

Table 2

Item	Standard load condition	Overload Condition	Blocked fan Condition
Discharge pressure  MPa {kgf/cm <sup>2</sup> G}	3.13 MAX  In the range mentioned in chart 1		Next Page Nächste Seite
Suction Pressure  MPa {kgf/cm <sup>2</sup> G}	0.137~0.95MPa . (Evaporation Temperature: -35℃~25℃) It can also be 0.137~0.95MPa when in transition , but should not be used when it is less than 0.101MPa {0kgf/cm <sup>2</sup> G}		
Compressor c ase bottom temp	99℃ or below and 6 ° higher than condensing temperature		
Motor winding temp.	Rated voltage: +/-10% lower than 127℃ MAX		
Accumulator temp	Higher than outlet pipe of evaporator		
Ambient temp.	Meet for the condition of above mentioned motor winding temp.		

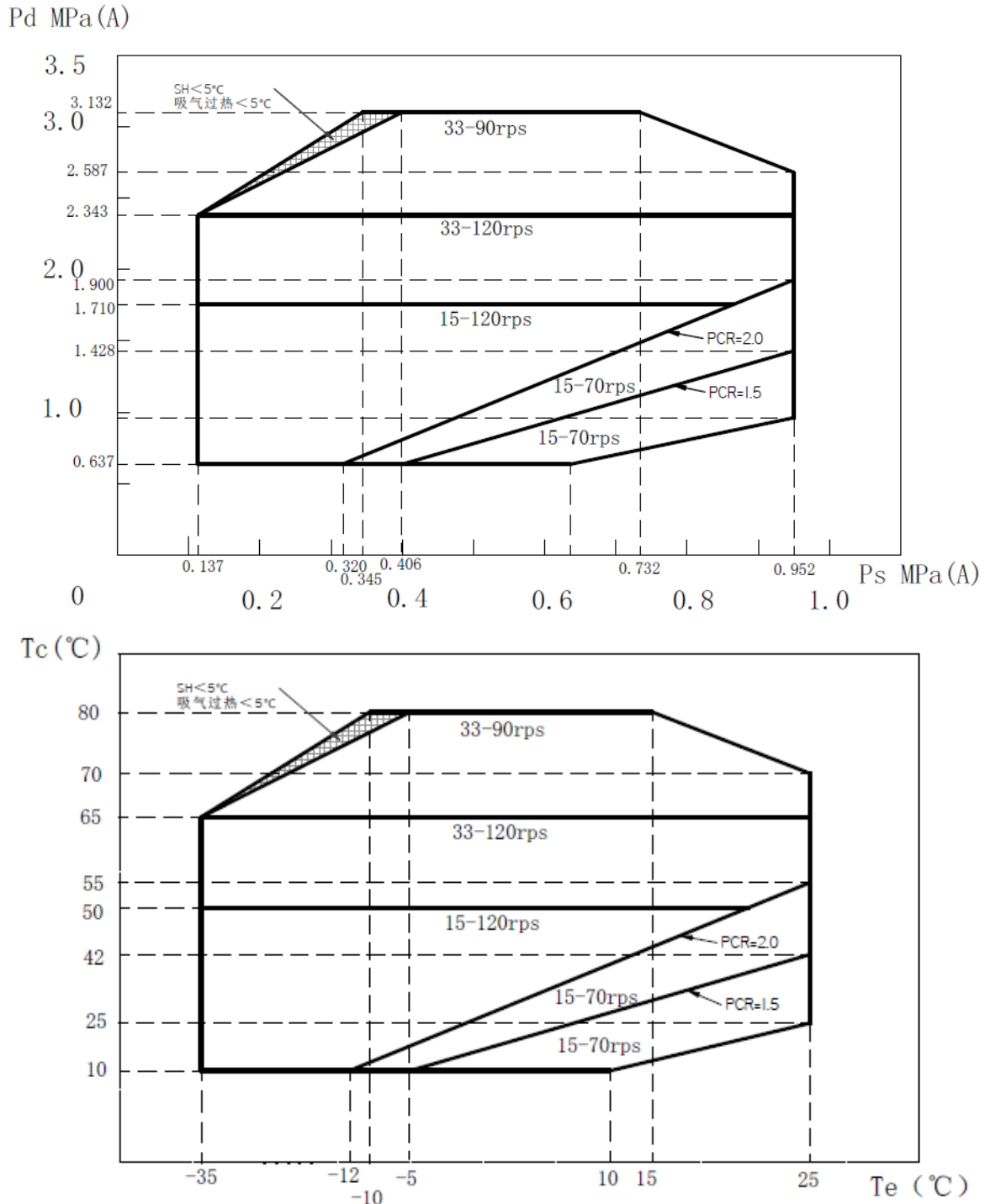
Notes: Overload condition should not be continuous.

5 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.



Graph 1 Operating Envelope



\* Relevant requirement for condition out of the envelop can be seen on page 27.

##### 5 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.

6. Die Druckgastemperatur sollte  $110^\circ\text{C}$  . gemessen in einer Distanz von 300mm von der Oberfläche des Verdichters , nicht überschreiten.

#### 8 Air leakage test pressure

The pressure should be less than 4.32MPa (abs) {43kgf/cm<sup>2</sup> G}.

4.32Mpa (abs) {43kgf/cm<sup>2</sup> G} 9 Oil back and oil level

9. 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.

#### 10 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.

#### 11 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.

	DC INVERTER COMPRESSOR CRITERIA	PAGE: 9/29
12	<p>Start-stop frequency</p> <p>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. But oil level should be met to item 9. Suction and discharge pressure should balance completely before restarting.</p>	
13	<p>Rate of rotational speed change</p> <p>The rate of compressor rotational speed (acceleration) should be less than <math>133\text{min}^{-1}/\text{s}</math>, But if The variable range is below <math>120\text{min}^{-1}</math>, rate can also be less than <math>600\text{min}^{-1}</math> when rotational Speed is reduced to avoid temporary over- current. The change of compressor rotational speed is referred to chart 3.</p>	
14	<p>Air and moisture in refrigerating system</p> <p>The degree of vacuum in refrigerating system should be less than 133Pa (<math>998 \times 10^{-3}\text{mmHg}</math>) at room temperature just before charging refrigerant. The quantity of water should be less than 0.2ml.</p>	
15	<p>Impurities in refrigerating system</p> <p>(1) The weight of residue on the inside surface of the heat exchanger and tube should be less than <math>0.01\text{g}/\text{m}^2</math>. 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.</p> <p>(2) Prevent the impurities from entering into the enclosed unit system used R290. When the impurities entered into the enclosed system, it will damage the moving mechanism parts and result in the capillary depositing.</p> <p>(3) Eliminate all system contaminants such as trichlorethylene, alkalies, soaps, oil, acids &amp; washing fluid used at machining heat exchanger and tubes.</p>	
	DC INVERTER COMPRESSOR CRITERIA	

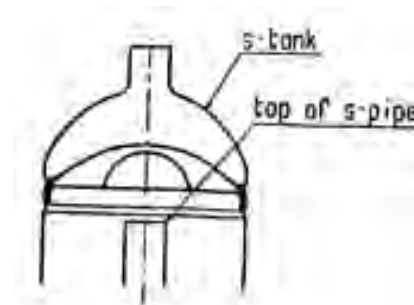
#### 16 Compressor vacuum operation

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

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

#### 18 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 stank 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.

- 19 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  $-20^\circ\text{C}$ .

Dry nitrogen should be charged in compressor before assembly of system. Welding should be finished within one minute after charge of nitrogen. Dry nitrogen needs to be charged again and weld if over one minute. Always purge the compressor with dry nitrogen during assembly of system.

The motor winding temperature should be less than  $149^\circ\text{C}$  and hermetic terminal body temperature should be less than  $177^\circ\text{C}$  in process of manufacturing.

#### 20 Apply for vehicle

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

#### 21 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.

#### 22 Pipe vibration

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

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

#### 23 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.

## 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 R32, 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. Do not recharge with the remaining refrigerant in the system when leakage happened. Because the percent component of the refrigerant in the unit system had possibly been changed.
- (10) Temperatures within systems during stable compressor operation should not be less than  $-35^{\circ}\text{C}$  to prevent wax precipitation from the oil.
- (11) 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.
- (12) The units of refrigerating system should be connected to earth.
- (13) There should be 0.5~3mm 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 pins 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  $-10^{\circ}\text{C}$ . Confirm the start-up of compressor if the temperature of compressor surface is below  $-10^{\circ}\text{C}$ . Heat up compressor to reach the temperature higher than  $-10^{\circ}\text{C}$  with heater if the ambient temperature is below  $-10^{\circ}\text{C}$ .
- (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 direct contact 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 R32, 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 of air-conditioner.
- (26) The start-up current and torsion of compressor  
Adjust the start-up torsion of the compressor to above 0.55Nm by inverter. Confirm and measure the start-up current if change the parts and design.
- (27) The thickness of the refrigerating system using tube  
the tube thickness as followed

External diameter(mm)	Thickness
6.35	0.5
6.35~11.0	0.5
11.0~13.0	0.6
13.0~15.0	0.6
15.0~19.0	0.8

#### 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
--	---

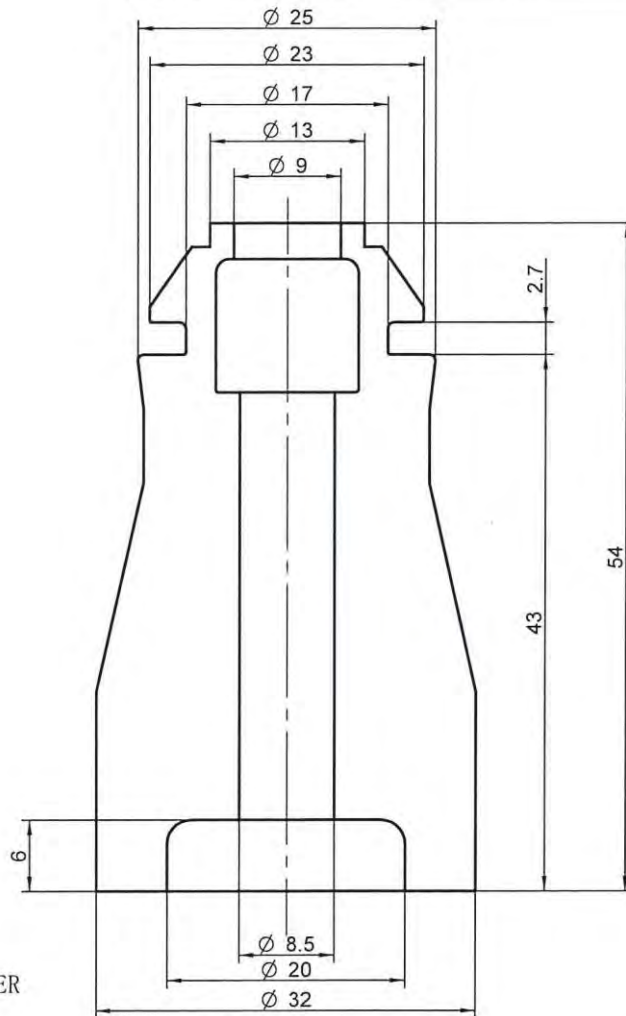


- DIMENSION:** mm

Technical drawing of a door profile. The drawing shows a cross-section of the door with a height dimension of 31.1 indicated by a vertical arrow on the left side.

4CYC00851

E



NOTE:

1. MATERIAL: NATURAL RUBBER

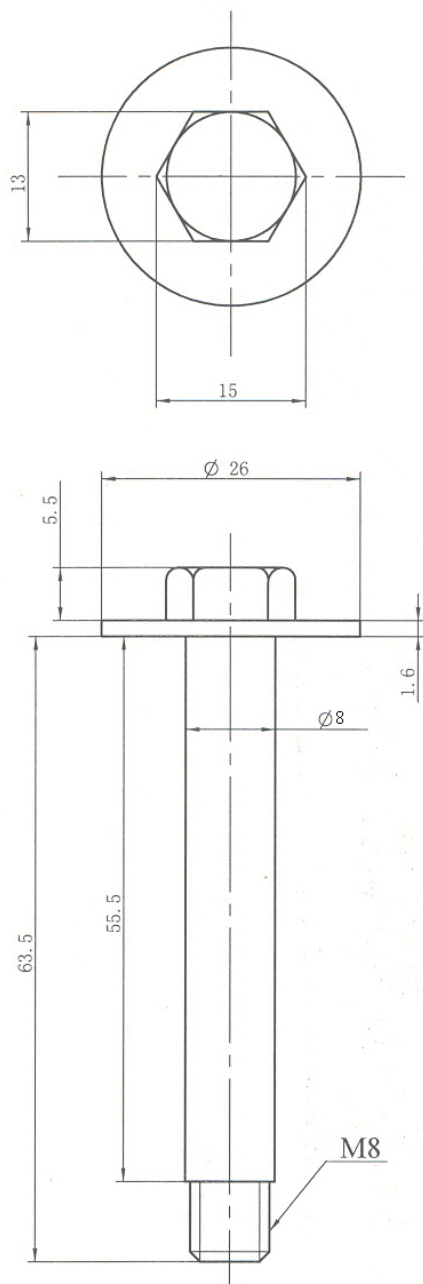
2. HARDNESS: Hs=40<sup>+5</sup><sub>-3</sub>

DIMENSION: mm

	RE-MARKS		PROJECTION ⊙	SCALE NTS	
REGD.	DWN.	张朋 2018.5.29	SHEC		DWN. NO.  4CYC00851
	CHKD.	杨维钦 2018.5.29			
	CHKD.	曹海韵 2018.5.29			
	APPD.	毛开智 2018.5.29			
		TITLE RUBBER GROMMET			

4CYC00940

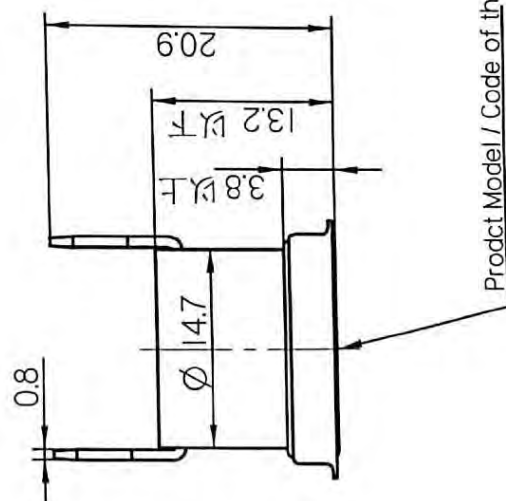
B



	RE-MARKS		PROJECTION	SCALE	
				NTS	
REGD.	DWN.	张纪平 04.9.8	Shanghai Hitachi, Ltd.		DWN. NO.
	CHKD.	王强 04.9.8			4CYC00940
	CHKD.	王强 04.9.8			
	APPD.	王强 04.9.8			
		TITLE			
		BOLT			

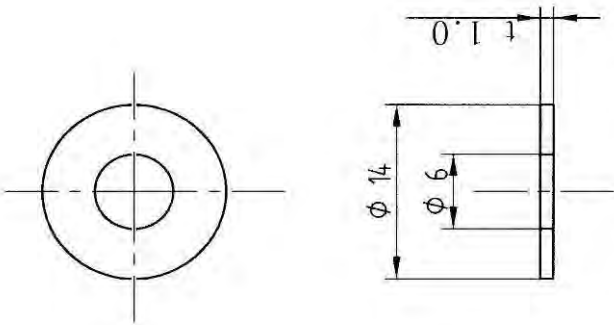


Manufacturer	Product Model	Operating Temp(OFF)	Operating Temp(ON)	Testing Voltage	Testing Current
Tongbao	KSD301-11.5/10BC22S20-S2	115±3℃	95±5℃	AC250V	10A



	Product Model / Code of the operating temp
--	--

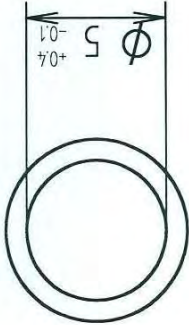
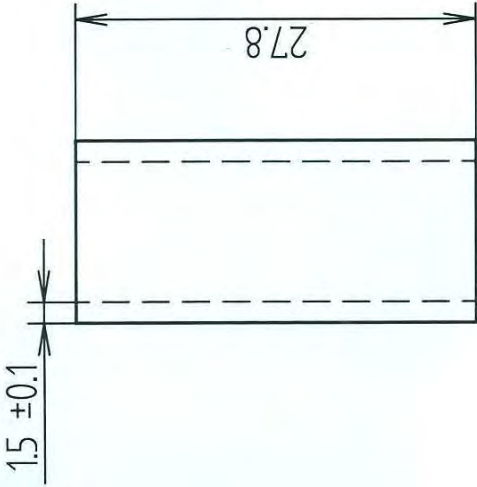
REGD	DPN. 20.1.19 CHRD. 20.1.19 CHRD. 20.1.19 APFD. 20.1.19	RE. MARKS THERMOSTAT SHEC 4CYC01403	PROJECTION SCALE NTS DOWN HD
------	---	--	---------------------------------------



MATERIAL: EPDM

DIMENSION: mm

REVISIONS		PROJECTION		SCALE	
REV	DATE	BY	CHKD	1st Angle	NTS
1	01/20	Wang	Wang	Shanghai Hitachi, Ltd	
DRAWN	DATE	BY	CHKD		
1	01/20	Wang	Wang		
2	01/20	Wang	Wang		
TITLES		DWG. NO.		4CYC00174	
RUBBER WASHER					



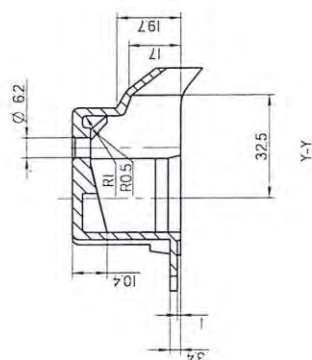
NOTE:  
1. COLOR: WHITE  
2. MATERIAL: SILICONE RUBBER

DIMENSION: mm

REGD	RE. MARKS				PROJECTION 	SCALE NTS	DWN. BY  4CYC01042
	DWN.	李卓	12.2.1	TITLE  SLEEVE			
	CHKD.	李卓	12.2.1				
	CHKD.						
	APPD.	李卓	12.2.1	Shanghai Hitachi Ltd.			




4CYC01114



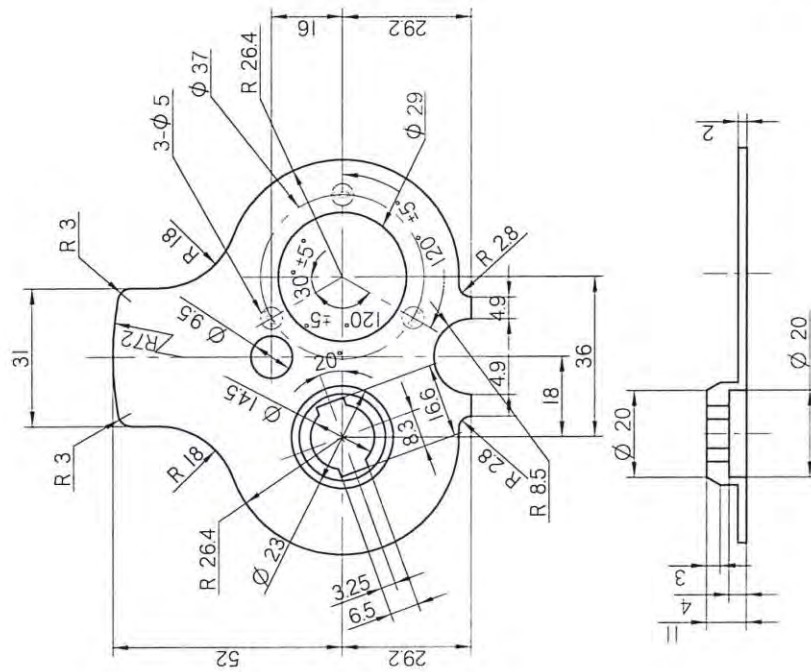
MATIERIAL: VALOX 420 SE0 BK1066

DIMENTION: mm

REGD	REF. MARKS			PROJECTION 	SCALE NTS	DIM. IN 4CYC01114
	DWN.	18.4.21	TITLE			
	CHRD.	18.6.21	DIMENSIONED			
	CHRD.	18.6.21	SKEICH			
	APPR.	10.6.21				

4CYC01113

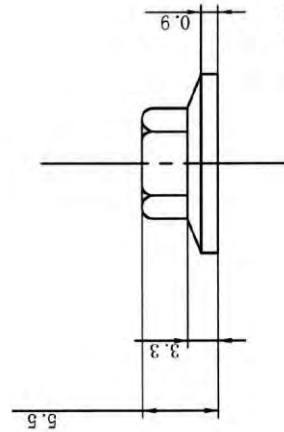
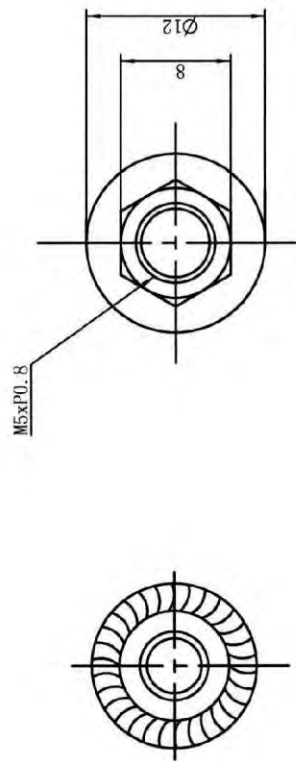
B



REGD	DRN.	CHKD	CHKD	APPL.	TITLE	PROJECTION	SCALE	DWG NO.
	18.6.21	18.6.21	18.6.21	18.6.21	DIMENSIONED SKETCH	NTS	NTS	4CYC01113


E

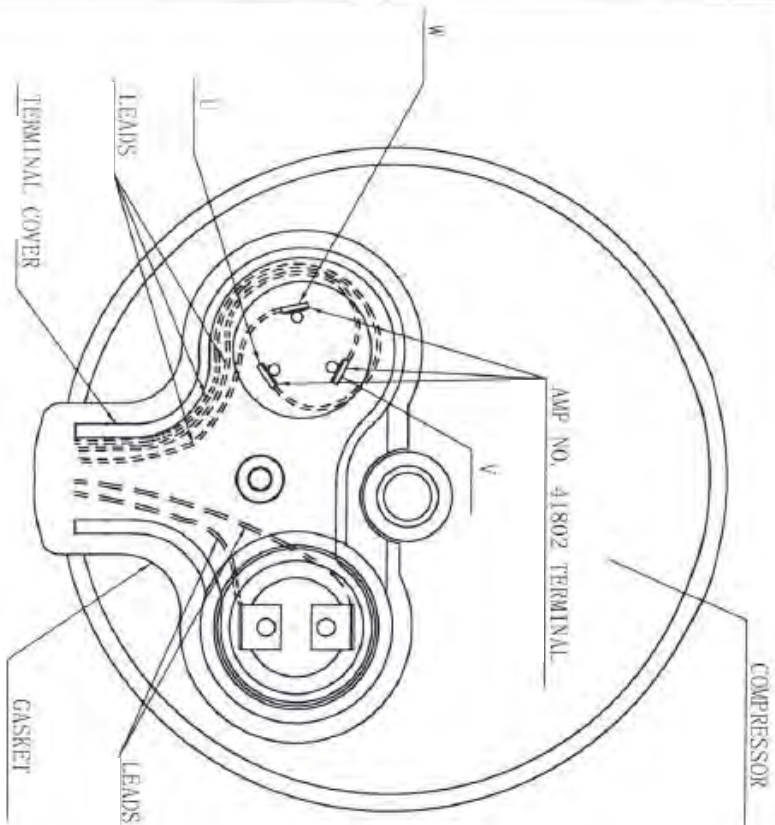
3CYC000004



DIMENTION: mm

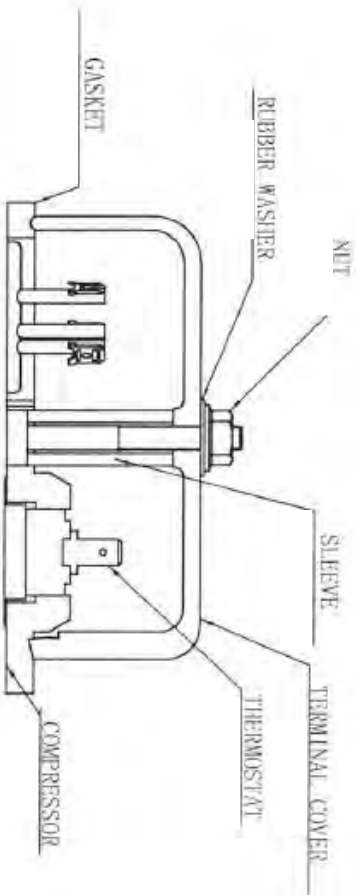
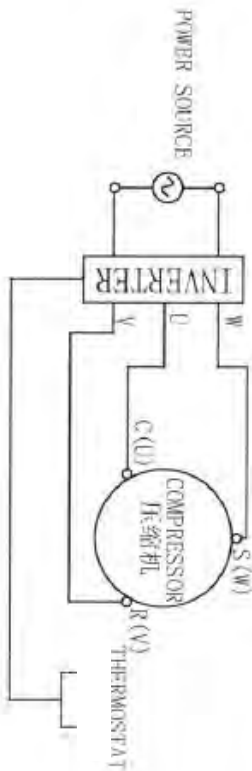
MATERIAL: 08F

	REF. MARKS		PROJECTION	SCALE	
				NTS	
REGD	DWN. 周扬 18.5.21	TITLE	SHEC		DWN. NO. 3CYC000004
	CHKD. 陈之浩 18.5.21	NUT			
	CHKD.				
	APPD. 周扬 18.5.21				



NOTES:

1. PLEASE PREPARE LEADS BY YOURSELF.
2. THE LETTER L, V OR W STANDS FOR EACH TERMINAL.
3. TABS FOR HERMETIC TERMINAL ARE AMP #250.
4. THERMOSTAT TO BE SET ON THE TOP OF COMPRESSOR AS SHOWN.



REC'D	DATE	BY	PROJECT	SCALE
100%	10/10	10/10	10/10	10/10
100%	10/10	10/10	10/10	10/10
100%	10/10	10/10	10/10	10/10
TITLE			SHEET	
LEAD ROUTING			4CYC01268	
WIRING DIAGRAM				

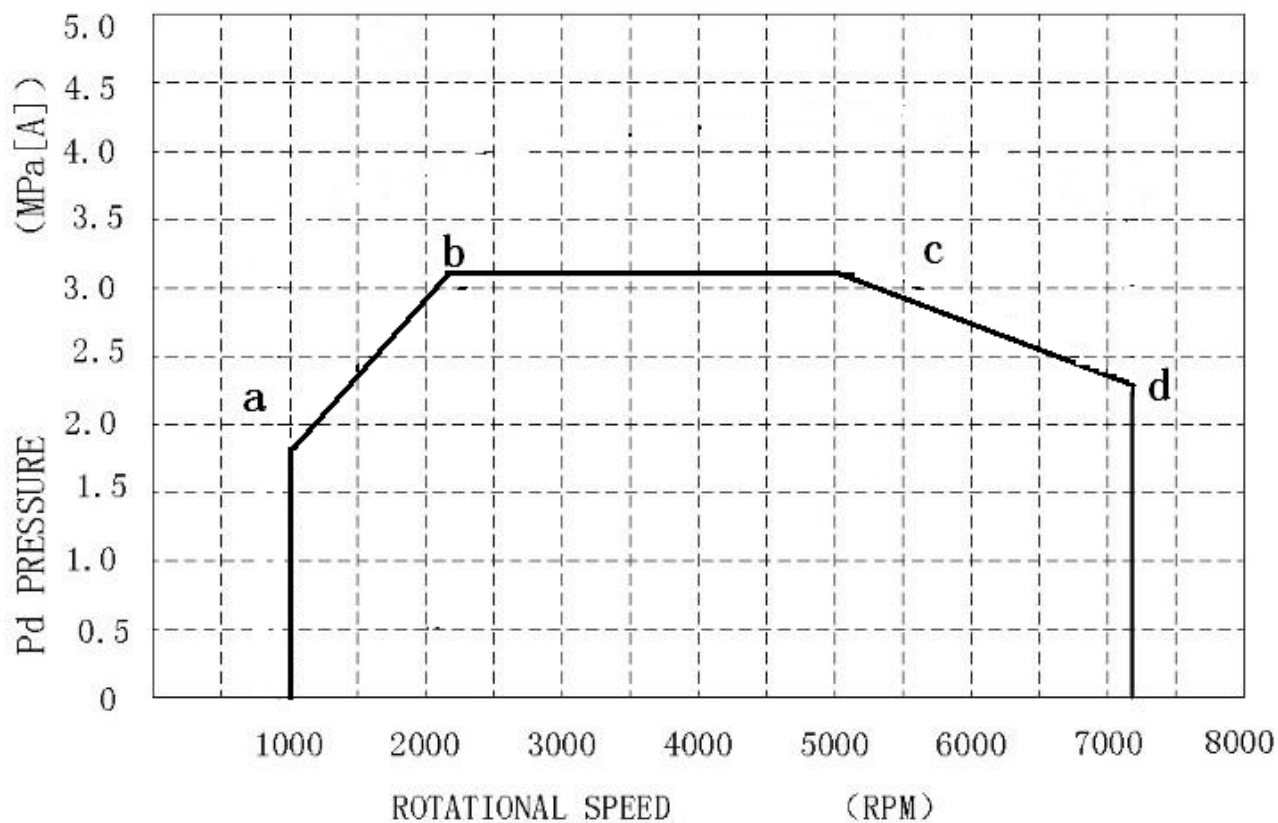
## Instructions:

1. If the suction pressure, pressure ratio out of the used envelop under normal operating condition, the following tips should be considered to make the compressor operating reliability

	Condition 1	Condition 2	Condition3	Condition 4
Range of the conditions	$P_s \geq P_{smax}$	The discharge pressure ( $P_d$ ) is out of the used envelop	Pressure ratio $\leq 1.5$	Compressor case bottom temp SH $\leq 6^\circ\text{C}$
Operations requirement	1) Frequecy $\leq 70\text{rps} = 4200\text{min}^{-1}$ 2) $P_s \leq 1.3\text{MPa(A)}$ 3) $P_d \leq P_{dmax}$	1) Lasting time: $\leq 1600\text{hr}$ 2) $0.137 \leq P_s \leq 0.345\text{Mpa[A]}$ 2) $P_d \leq 3.13\text{Mpa[A]}$ 3) $T_d \leq 120^\circ\text{C}$ 4) The oil viscosity $\geq 0.5\text{cP}$ and above the minimum viscosity value according the curve in graph 2	1. The working compressor has no abnormal noise  2. Frequecy $\leq 70\text{rps} = 4200\text{min}^{-1}$	1. During the transitional stage. 2. The oil viscosity $\geq 0.5\text{cP}$ and above the minimum viscosity value according the curve in graph 2. Or discharge superheating temperature is higher than $15^\circ\text{C}$ ( for more than 10 minutes)

The transitional stage : the system start-up, defrosting or other operating control (on/off or transformation of operating conditions), the stage when pressure or temperature changing rapidly.

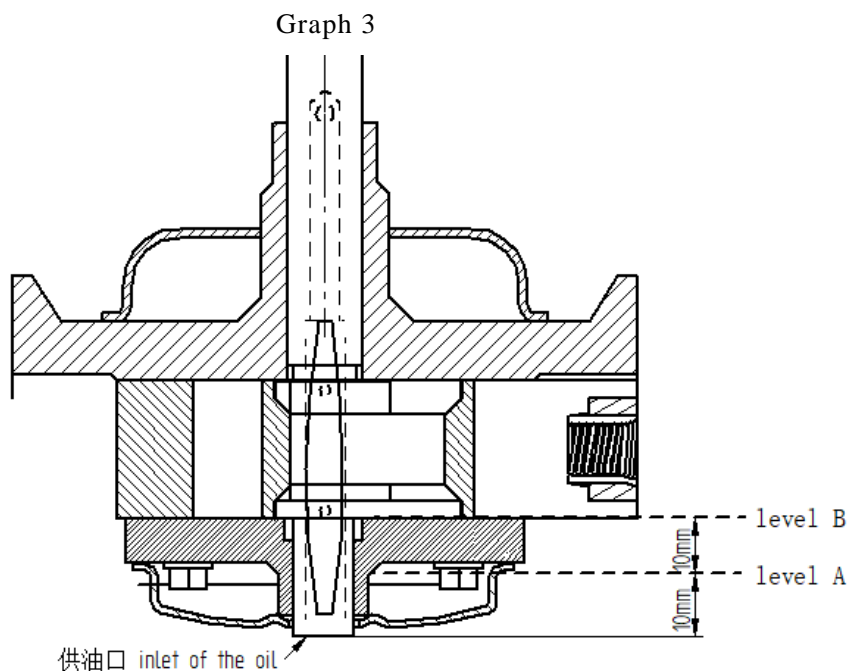
# WHP SERIES INVERTER COMPRESSOR GUARANTEE PRESSURE RANGE



Rotational speed	Pd limit
min-1	MPa
1000	1.71
2100	3.13
5000	3.13
7200	2.34

## 1 COMPRESSOR OIL LEVEL Kompressor Ölstand

In order to ensure the reliability of the compressor, the minimum oil level required for each operating frequency is shown in the following chart:



Operating frequency	Operating Below 30rps = 1800 min-1	30rps-Maximum speed Stable operation 30rps- = 1800 min-1	Transitional operation
The oil level height	Above level a	Above level b	Above level c

※Transition operation phase refers to the phase of rapid changes in system pressure and temperature caused by the operation control (on/off or working condition switch) of system startup and defrosting or the rapid change of environment.

Recommended specifications of compressor heating belt for low temperature heating

The environment temperature (°C)	0 °C		-10°C		-20°C		-30°C	
Recommended power of the electric heating (W)	30	60	30	60	30	60	30	60
Preheating time (h)	≥1.0	≥0.5	≥1.7	≥0.7	≥2.7	≥0.9	≥4.0	≥1.2

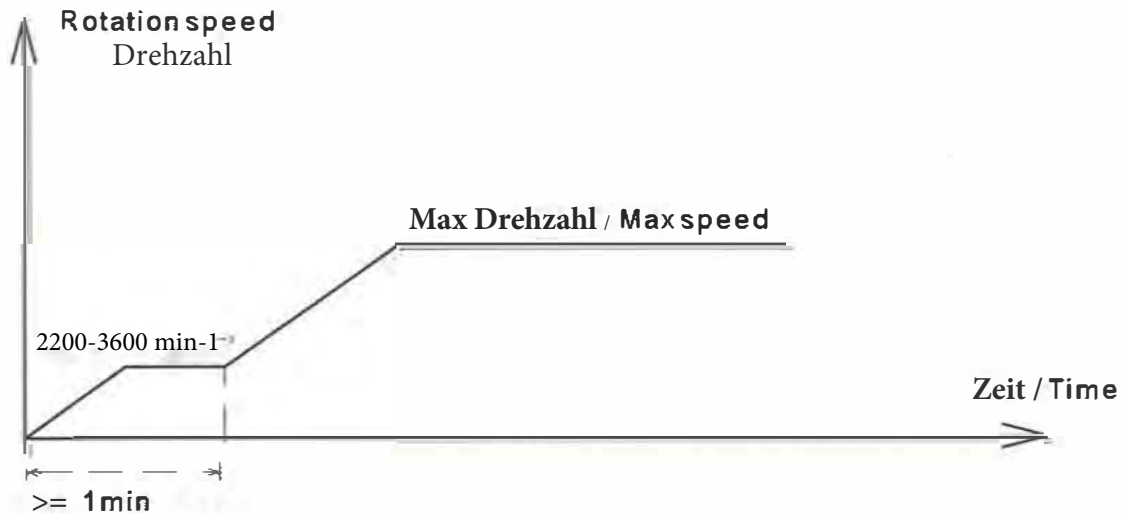
Modell	Nennspannung	Nennleistung	Hersteller	Passend für Verdichter Eine Auswahl von vielen weiteren Anwendungen (Hermetik Hub-, Scroll- oder Rotary)	Durchmesser		Umfang	
	Volt	Watt			Min mm	Max mm	Min Mm	Max mm
CH025	240	25	Hitachi, Rechi, Mitsubishi, Panasonic, Samsung, Copeland, Danfoss	Universal Bandheizung für Rollkolben- und Scrollverdichter. Im Besonderen bei hohen Füllmengen und Außenaufstellung (Winterbetrieb)	90	150	280	470
CH038	240	38			111	171	349	536
CH045-3	400 460	45 34			112	172	352	540

Diese und weitere Modelle auch mit Thermostat kurzfristig lieferbar  
These and other models also available with thermostat.

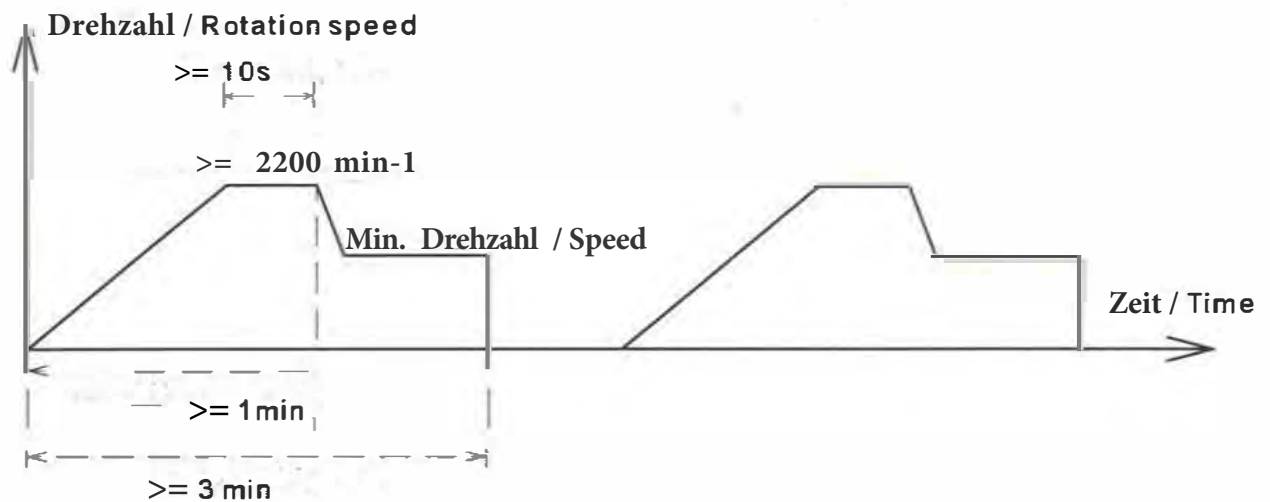


Drehzahländerung / Speed change rate:  $\leq 133 \text{ min}^{-1}/\text{s}$   
Max und Min Drehzahl in den einzelnen Spezifikationen  
Max and min speed is showed in the specification

(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}

