

# Hitachi Highly

Rollkolbenverdichter

Rotary Compressors

**Spezifikation**

Installation Manual

## **WHP37600VSKTQ9JK**

**R 410A, R 454B, R 454C, R 290**

**84,8 cm<sup>3</sup>/rev**

**900 - 6600 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)

# Content

1. <b>WHP37600VSKTQ9JK</b> Specifications	1~4
1. Scope of application	
2. Compressor Specifications	
3. Motor parameters	
4. General characteristics	
5. List of parts and drawings	
2. DC Inverter Compressor Usage Benchmark	5~15
3. Acceptance basis and rules	16
1. Acceptance basis	
2. acceptance rules	
4. drawing	17~27
5. Noise and vibration test method	30
6. Modification experience	appendix

	<p>SUBJECT</p> <p>Model WHP37600VSKTQ9JK SPECIFICATION</p>	PAGE: 1/30
--	------------------------------------------------------------	------------

1. SCOPE

This specification is applied to rotary compressors produced by SHEC .

2. SPECIFICATION OF THE MODEL

Item	Spec			
2.1 Model Type	WHP37600VSKTQ9JK			
2.2 Power source input to inverter	Rated voltage		380V	
	Rated frequency		50Hz	
	Phase		3phase	
2.3 Application	T1 Air Conditioner or Heat pump water heater compressor T1			
2.4 Refrigerant	R410A/R454B/R454C/R290			
2.5 Displacement	84.8ml/rev (double-cylinder			
2.6 Allowable frequency range	900～6600min <sup>-1</sup>			
2.7 Oil	* or equivalent 2000±20ml			
2.8 Allowable amount of refrigerant charge	Below 5300g(R410A/R454B/R454C) or 3200g(R290)			
2.9 Compressor cooling	Forced air			
2.10 Hermetic Terminal	Wire ear type			
2.11 pace volume of inner case	3200cm <sup>3</sup>			
2.12 Compressor weight	29.5 kg incl. Oil			
2.13 Motor Type	Direct current brushless motor E class			
Insulation class				
	R410A	R454B	R454C	R290
2.14 Rated Heating Capacity (W)	36810	34950	23630	21590
2.15 Compressor Rated Input (W)	9000	8400	5240	4820
2.16 COP	4.09	4.16	4.51	4.48
2.17 Current ( A )	26.2	24.7	15.5	14.6
2.18 Noise (dB (A) )	73			

	<p>SUBJECT</p> <p>Model WHP37600VSKTQ9JK SPECIFICATION</p>	PAGE: 2/30
--	------------------------------------------------------------	------------

2.19 Vibration (m/s <sup>2</sup> )	5
2.20 Capacity measuring conditions and noise & vibration measuring condition	<p>Rotational speed 3600min<sup>-1</sup></p> <p>Evaporating temp. 7.2 °C</p> <p>Condensing temp. 54.4°C</p> <p>Liquid temp. 46.1°C</p> <p>Ambient temp. 35.0°C</p> <p>Return gas temp. 35.0°C</p> <p>Wind speed 2m/s</p>

\*.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. MOTOR PARAMETER

Item	Spec	explanation
3.1 Rotor Pole (Pole)	6	---
3.2 Rated Frequency Range (Hz)	45-330	Electrical Frequency, Relating to VDCmax of Inverter
3.3 Demagnetizing Curren (A)	85.00A	Peak Current, at 120°C, -5% Demagnetizing Rate
3.4 Inductance Ld (mH)	Sheet 2	---
3.5 Inductance Lq (mH)	Sheet 2	---
3.6 Stator coil resistance (20) (Ω)	0.278 (20°C)	line-to-line

	<p>SUBJECT</p> <p>Model WHP37600VSKTQ9JK SPECIFICATION</p>	PAGE: 3/30
--	------------------------------------------------------------	------------

Item	Spec	explanation
3.7 Voltage Constant ( Vrms/krpm) ( Vrms/krpm)	60.61V/krpm	line-to-line
3.8 Torque Constant (N • m/Arms)	0.95	Torque/Current
3.9 Inertia (Kg • m2)	0.003222	
3.10 FluxΦ a (Wb)	0.1575	φ (Per Phase, Peak)=
3.11 Magnet Material	NdFeB	

surface 2: Measurement frequency 100Hz

current	1	2	3	4	5	6	8	10	12	14	16	18	20	22	24
q axis	4.12	4.07	3.94	3.82	3.71	3.64	3.54	3.47	3.38	3.30	3.21	3.10	3.04	3.01	2.95
d axis	2.62	2.67	2.72	2.74	2.75	2.76	2.76	2.74	2.71	2.68	2.65	2.62	2.57	2.53	2.49

2: Standard condition3600rpm

Operating rms current (A)	14.65	14.71	14.97	15.70	16.74	17.77	18.88	19.97	21.17
Running torque (N. m)	12	13	14	15	16	17	18	19	20

#### 4. CHARACTERISTICS

4.1 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 300mg MAX

4.4. Residual impurities 90mg MAX

5 PARTS AND DRAWING LIST

PARTS NAME		QTY/SET	DRAWING NO.	REMARKS
Compressor		1	4CYCE0083	Dimensioned sketch
Mounting Parts	Rubber grommet	4	4CYC01288	*  *
	Bolt	--	4CYC00700	
	Nut	--	M8	
Electrical Parts	Terminal cover	1	4CYC01310	
	Gasket	1	4CYC01415	
	Fix-spring	1	4CYC01129	
	Bolt	3	4CYC01246	
			4CYC01294	Lead routing
			1	Pressure guarantee Chart Oil level datum
			2	Notes for rotational
			3	speed change Performance curse  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. 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.

## 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 $\phi$ 100V, 200V, 3 $\phi$ 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 ,6,7and the overload condition should not be continuous.

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.)

## 4 Operating temperatures and pressures

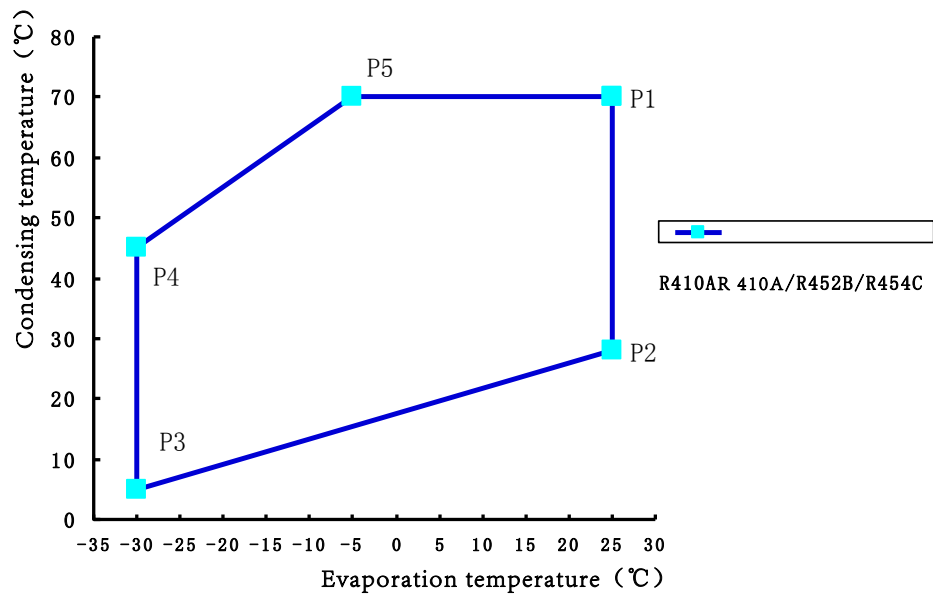
The operating temperatures and pressures of a compressor should be within the range shown in the table 1.

Table 1

Item	Operating Envelope			
	see graph 1(a)	see graph 1(a)	see graph 1(b)	see graph 1(c)
Refrigerant	R410A	R454B	R454C	R290
Discharge pressure MPa	4.76 MAX (condensing temperature: 70℃)	4.40 MAX (condensing temperature: 70℃)	3.47 MAX (condensing temperature : 75℃)	3.13MAX (condensing temperature: 80℃)
Suction Pressure MPa	0.272~1.652	0.251~1.543	0.2~1.19	0.139~0.95
	(Evaporation Temperature: -35℃~25℃). Compressor suction side can handle the same maximum pressure as discharge side without damage when compressor is not running.			
Compressor case bottom temp	99℃ or below and 6 ℃ higher than condensing temperature, (the time compressor case bottom temp 6 ℃ below the condensing temperature should be less than 5 minutes each time) , Requirement for high pressure ratio condition can be seen on page 28.			
Motor winding temp	R. Voltage $\pm 10\%$ : lower than 130℃ MAX			
Accumulator temp	Higher than outlet pipe of evaporator			
Ambient temp	Meet for the condition of above mentioned motor winding temp.			

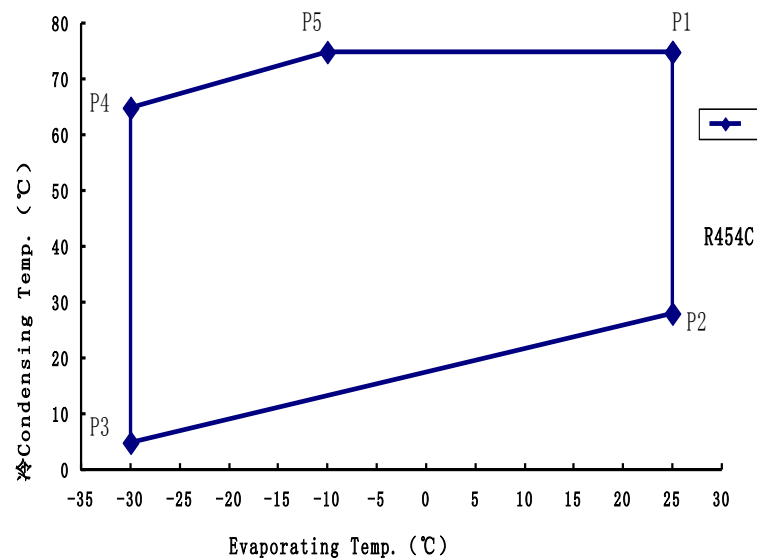
Notes: Overload condition should not be continuous.





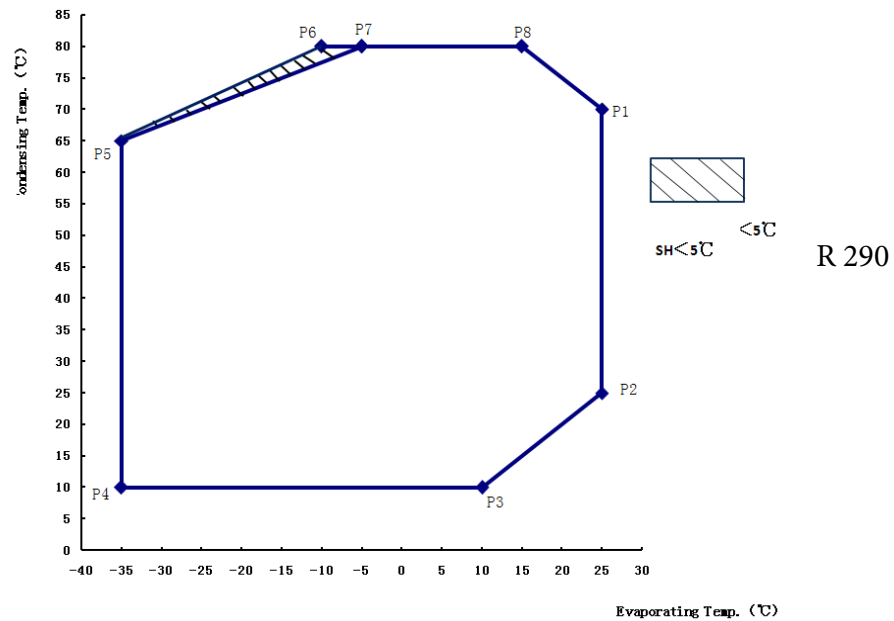
Graph 1(a)

	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)

	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



Graph 1(c)

	P1	P2	P3	P4	P5	P6	P7	P8
Condensing temperature	70°C	25°C	10°C	10°C	65°C	80°C	80°C	80°C
Evaporation Temperature	25°C	25°C	10°C	-35°C	-35°C	-10°C	-5°C	15°C

#### 5 Pressure difference between suction and discharge

In all allowable rotational speed range, the difference of pressure should be more than 0.39MPa{4kgf/cm<sup>2</sup>}. But if there is no problem of noise when assembled in air conditioner, it can also be below this value.

#### 6 Discharge pipe temperature

Discharge pipe temperature is measured at a distance 300mm from the surface of compressor and should be less than 110°C. But When the compressor is running from 900 to 1800min<sup>-1</sup>, it should be below 100°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.

#### 7 Air leakage test pressure

The pressure should be less than 4.32MPa{42kgf/cm<sup>2</sup>G}.

#### 8 Oil back and oil level

The oil should be returned continuously to the compressor and the structure of the refrigeration 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.

#### 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 3 minutes. But oil level should be met to item 8. Suction and discharge pressure should balance completely before restarting.

#### 12 Rate of rotational speed change

The rate of compressor rotational speed (acceleration) should be less than  $133\text{min}^{-1}/\text{s}$ , But if The variable range is below  $120\text{min}^{-1}$ , rate can also be less than  $600\text{min}^{-1}$  when rotational Speed is reduced to avoid temporary over- current. The change of compressor rotational speed is referred to chart 3.

#### 13 Air and moisture in refrigerating system

The degree of vacuum in refrigerating system should be less than 50Pa ( $375 \times 10^{-3}\text{mmHg}$ ) at room temperature just before charging refrigerant. The quantity of water should be less than 0.2ml.

## 14 Impurities in refrigerating system

- (1) The weight of residue on the inside surface of the heat exchanger and tube should be less than  $0.2\text{g/m}^2$ . 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. 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.

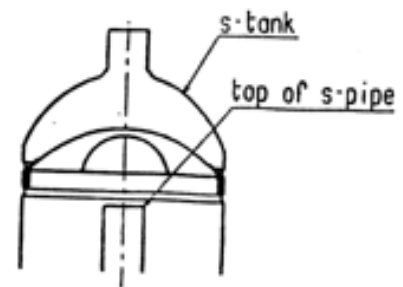
## 15 Compressor vacuum operation

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.

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

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.

#### 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  $5^\circ$  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  $0.8 \text{ mm}$  ( $1/32''$ ) when the compressor is operating at allowable rotational speed range and voltage range of rated  $\pm 10\%$ .

Displacement in excess of  $0.8 \text{ mm}$  ( $1/32''$ ) 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  $12.7 \text{ mm}$  ( $1/2''$ )

Moving tubes to non-moving parts; minimum clearance  $9.5 \text{ mm}$  ( $3/8''$ )

## 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, 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 adequate clearance between the OD23-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  $-10^{\circ}\text{C}$ . 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 R290, 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) (mm)	Thickness (mm)
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

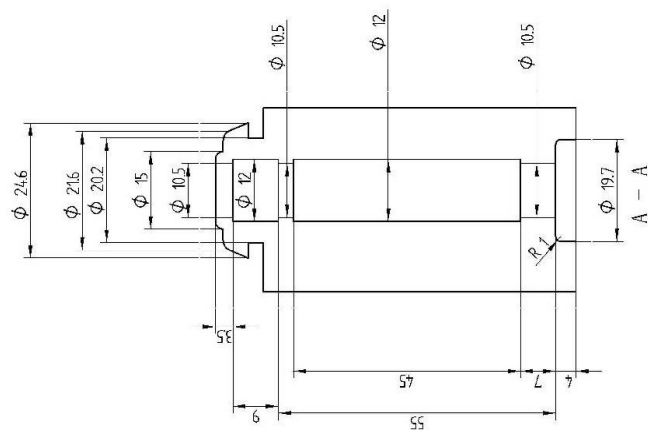
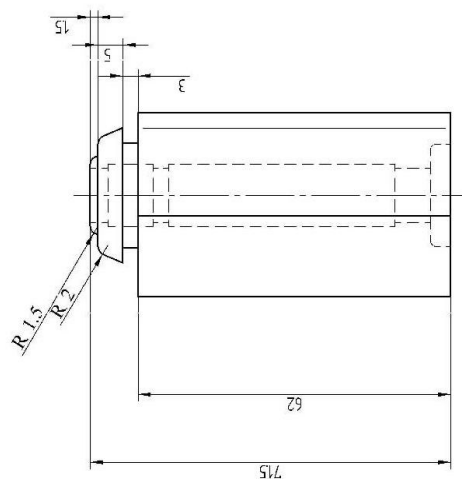
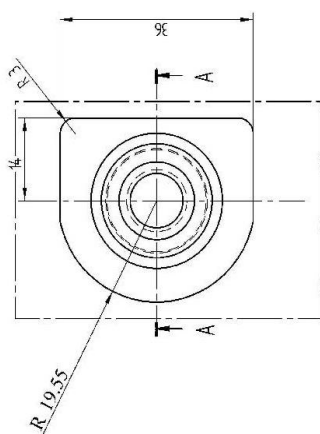
The Performance test will be carried out in accordance with this “compressor Specification”.

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.



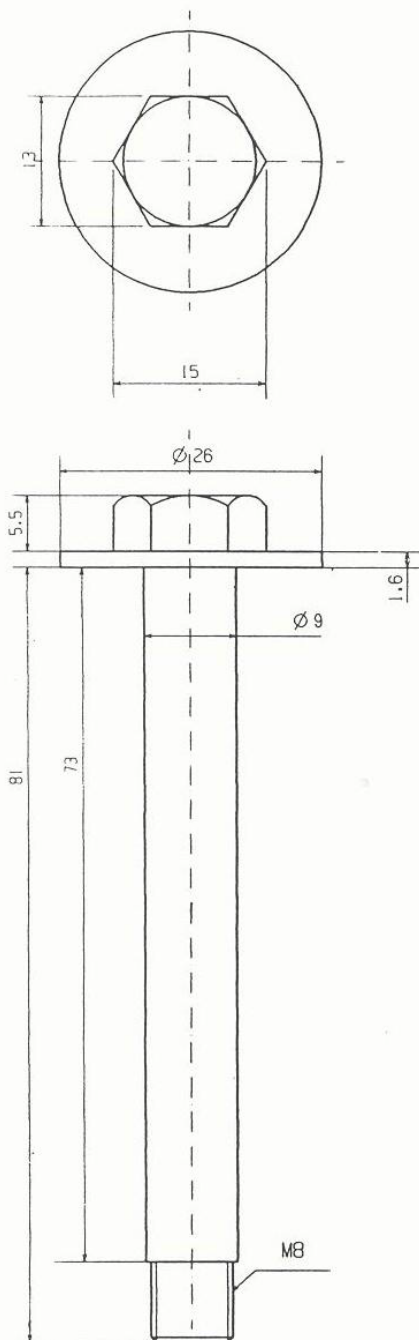


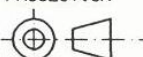
DIMENSION: mm

RE MARKS	DIM. 1 DIM. 2 DIM. 3 DIM. 4 DIM. 5 DIM. 6 DIM. 7 DIM. 8 DIM. 9 DIM. 10 DIM. 11 DIM. 12 DIM. 13 DIM. 14 DIM. 15 DIM. 16 DIM. 17 DIM. 18 DIM. 19 DIM. 20 DIM. 21 DIM. 22 DIM. 23 DIM. 24 DIM. 25 DIM. 26 DIM. 27 DIM. 28 DIM. 29 DIM. 30 DIM. 31 DIM. 32 DIM. 33 DIM. 34 DIM. 35 DIM. 36 DIM. 37 DIM. 38 DIM. 39 DIM. 40 DIM. 41 DIM. 42 DIM. 43 DIM. 44 DIM. 45 DIM. 46 DIM. 47 DIM. 48 DIM. 49 DIM. 50 DIM. 51 DIM. 52 DIM. 53 DIM. 54 DIM. 55 DIM. 56 DIM. 57 DIM. 58 DIM. 59 DIM. 60 DIM. 61 DIM. 62 DIM. 63 DIM. 64 DIM. 65 DIM. 66 DIM. 67 DIM. 68 DIM. 69 DIM. 70 DIM. 71 DIM. 72 DIM. 73 DIM. 74 DIM. 75 DIM. 76 DIM. 77 DIM. 78 DIM. 79 DIM. 80 DIM. 81 DIM. 82 DIM. 83 DIM. 84 DIM. 85 DIM. 86 DIM. 87 DIM. 88 DIM. 89 DIM. 90 DIM. 91 DIM. 92 DIM. 93 DIM. 94 DIM. 95 DIM. 96 DIM. 97 DIM. 98 DIM. 99 DIM. 100 DIM. 101 DIM. 102 DIM. 103 DIM. 104 DIM. 105 DIM. 106 DIM. 107 DIM. 108 DIM. 109 DIM. 110 DIM. 111 DIM. 112 DIM. 113 DIM. 114 DIM. 115 DIM. 116 DIM. 117 DIM. 118 DIM. 119 DIM. 120 DIM. 121 DIM. 122 DIM. 123 DIM. 124 DIM. 125 DIM. 126 DIM. 127 DIM. 128 DIM. 129 DIM. 130 DIM. 131 DIM. 132 DIM. 133 DIM. 134 DIM. 135 DIM. 136 DIM. 137 DIM. 138 DIM. 139 DIM. 140 DIM. 141 DIM. 142 DIM. 143 DIM. 144 DIM. 145 DIM. 146 DIM. 147 DIM. 148 DIM. 149 DIM. 150 DIM. 151 DIM. 152 DIM. 153 DIM. 154 DIM. 155 DIM. 156 DIM. 157 DIM. 158 DIM. 159 DIM. 160 DIM. 161 DIM. 162 DIM. 163 DIM. 164 DIM. 165 DIM. 166 DIM. 167 DIM. 168 DIM. 169 DIM. 170 DIM. 171 DIM. 172 DIM. 173 DIM. 174 DIM. 175 DIM. 176 DIM. 177 DIM. 178 DIM. 179 DIM. 180 DIM. 181 DIM. 182 DIM. 183 DIM. 184 DIM. 185 DIM. 186 DIM. 187 DIM. 188 DIM. 189 DIM. 190 DIM. 191 DIM. 192 DIM. 193 DIM. 194 DIM. 195 DIM. 196 DIM. 197 DIM. 198 DIM. 199 DIM. 200 DIM. 201 DIM. 202 DIM. 203 DIM. 204 DIM. 205 DIM. 206 DIM. 207 DIM. 208 DIM. 209 DIM. 210 DIM. 211 DIM. 212 DIM. 213 DIM. 214 DIM. 215 DIM. 216 DIM. 217 DIM. 218 DIM. 219 DIM. 220 DIM. 221 DIM. 222 DIM. 223 DIM. 224 DIM. 225 DIM. 226 DIM. 227 DIM. 228 DIM. 229 DIM. 230 DIM. 231 DIM. 232 DIM. 233 DIM. 234 DIM. 235 DIM. 236 DIM. 237 DIM. 238 DIM. 239 DIM. 240 DIM. 241 DIM. 242 DIM. 243 DIM. 244 DIM. 245 DIM. 246 DIM. 247 DIM. 248 DIM. 249 DIM. 250 DIM. 251 DIM. 252 DIM. 253 DIM. 254 DIM. 255 DIM. 256 DIM. 257 DIM. 258 DIM. 259 DIM. 260 DIM. 261 DIM. 262 DIM. 263 DIM. 264 DIM. 265 DIM. 266 DIM. 267 DIM. 268 DIM. 269 DIM. 270 DIM. 271 DIM. 272 DIM. 273 DIM. 274 DIM. 275 DIM. 276 DIM. 277 DIM. 278 DIM. 279 DIM. 280 DIM. 281 DIM. 282 DIM. 283 DIM. 284 DIM. 285 DIM. 286 DIM. 287 DIM. 288 DIM. 289 DIM. 290 DIM. 291 DIM. 292 DIM. 293 DIM. 294 DIM. 295 DIM. 296 DIM. 297 DIM. 298 DIM. 299 DIM. 300 DIM. 301 DIM. 302 DIM. 303 DIM. 304 DIM. 305 DIM. 306 DIM. 307 DIM. 308 DIM. 309 DIM. 310 DIM. 311 DIM. 312 DIM. 313 DIM. 314 DIM. 315 DIM. 316 DIM. 317 DIM. 318 DIM. 319 DIM. 320 DIM. 321 DIM. 322 DIM. 323 DIM. 324 DIM. 325 DIM. 326 DIM. 327 DIM. 328 DIM. 329 DIM. 330 DIM. 331 DIM. 332 DIM. 333 DIM. 334 DIM. 335 DIM. 336 DIM. 337 DIM. 338 DIM. 339 DIM. 340 DIM. 341 DIM. 342 DIM. 343 DIM. 344 DIM. 345 DIM. 346 DIM. 347 DIM. 348 DIM. 349 DIM. 350 DIM. 351 DIM. 352 DIM. 353 DIM. 354 DIM. 355 DIM. 356 DIM. 357 DIM. 358 DIM. 359 DIM. 360 DIM. 361 DIM. 362 DIM. 363 DIM. 364 DIM. 365 DIM. 366 DIM. 367 DIM. 368 DIM. 369 DIM. 370 DIM. 371 DIM. 372 DIM. 373 DIM. 374 DIM. 375 DIM. 376 DIM. 377 DIM. 378 DIM. 379 DIM. 380 DIM. 381 DIM. 382 DIM. 383 DIM. 384 DIM. 385 DIM. 386 DIM. 387 DIM. 388 DIM. 389 DIM. 390 DIM. 391 DIM. 392 DIM. 393 DIM. 394 DIM. 395 DIM. 396 DIM. 397 DIM. 398 DIM. 399 DIM. 400 DIM. 401 DIM. 402 DIM. 403 DIM. 404 DIM. 405 DIM. 406 DIM. 407 DIM. 408 DIM. 409 DIM. 410 DIM. 411 DIM. 412 DIM. 413 DIM. 414 DIM. 415 DIM. 416 DIM. 417 DIM. 418 DIM.
----------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

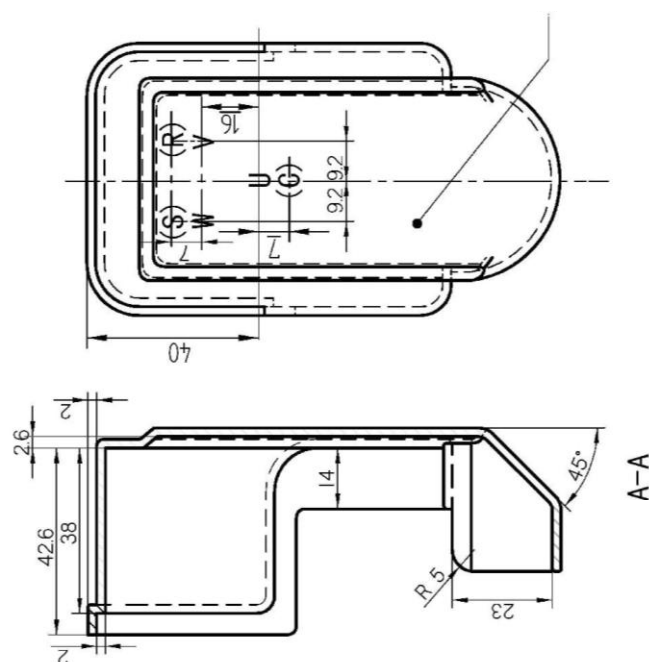
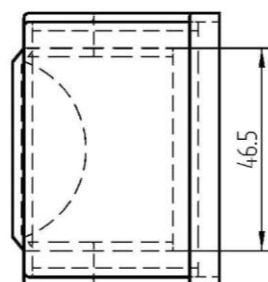
4CYC00700

A




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

4CYC01310

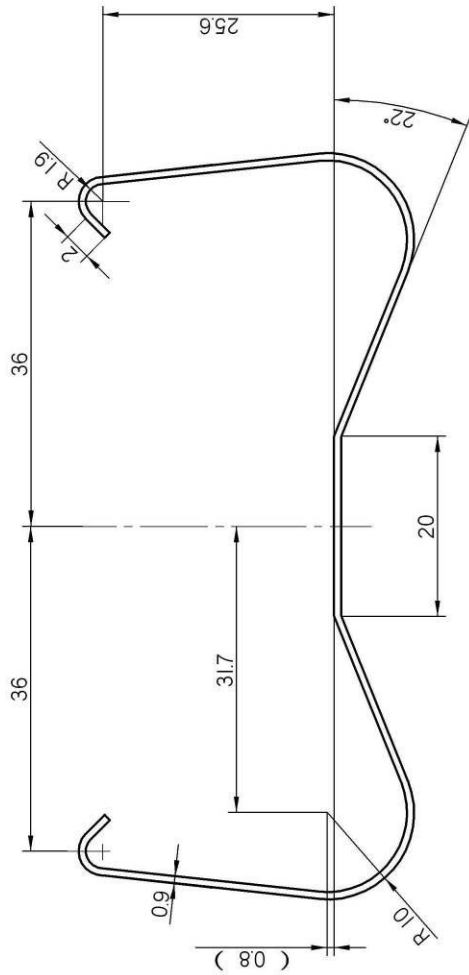


DIMENSION: MM

	REF. MARKS			PROJECTION 	SCALE N.T.S.	
REC'D	DW'N	18. 04. 13	TITLE DIMENSIONED	Shanghai	DW'N NO.	
	CIRCD.	18. 04. 13	SKE'TCH	Highly, Ltd.		
	CHKD.	18. 04. 13				
	APPU.	18. 04. 13				

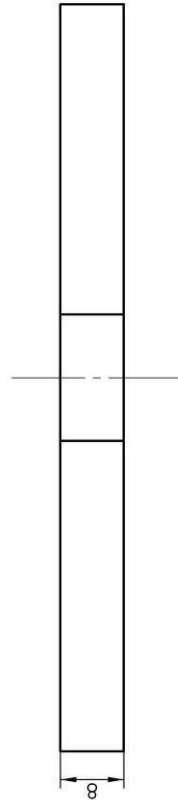
4CYC01129


A

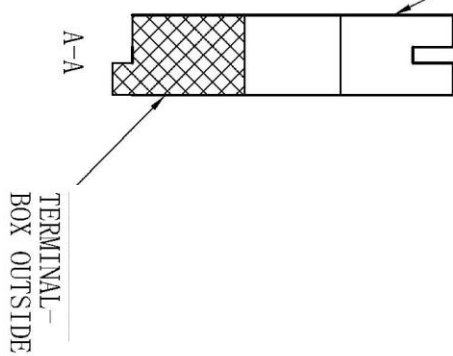
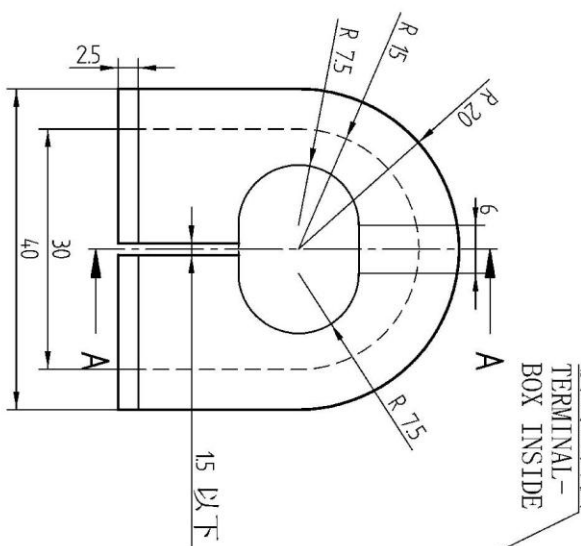


MATERIAL: J4

DIMENSION: MM

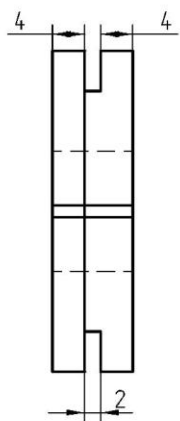



REC'D	RE. MARKS				PROJECTION 	SCALE NTS	DWN. NO. 4CYC01129
	DWN.	陈成	14. 12. 24	TITLE		Shanghai Hitachi, Ltd.	
	CHKD.	陈成	14. 12. 24	FIX-SPRING			
	CHKD.	陈成	14. 12. 24				
		APPR.	陈成	14. 12. 24			



MATERIAL: EPDM

DIMENSION: MM



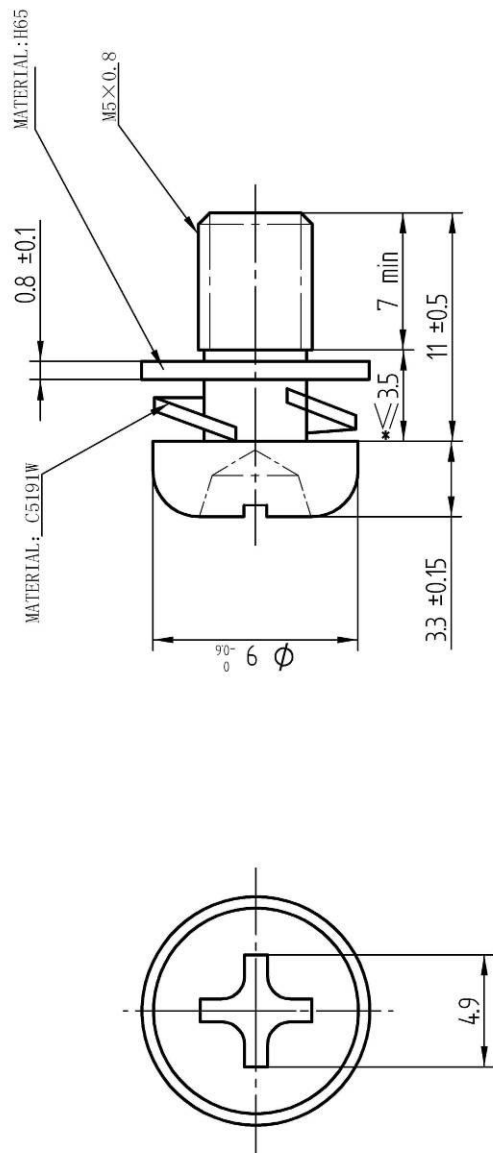
	RE.			PROJECTION	SCALE	
	MARKS				NTS	
			TITLE			DRAW. NO.
REC'D	DWN.	DATE	20.06.11	GASKET	SHEC	
	CIND	数量	20.06.11			
	CIND	所数	20.06.11			
APPL.						

4CYC01415




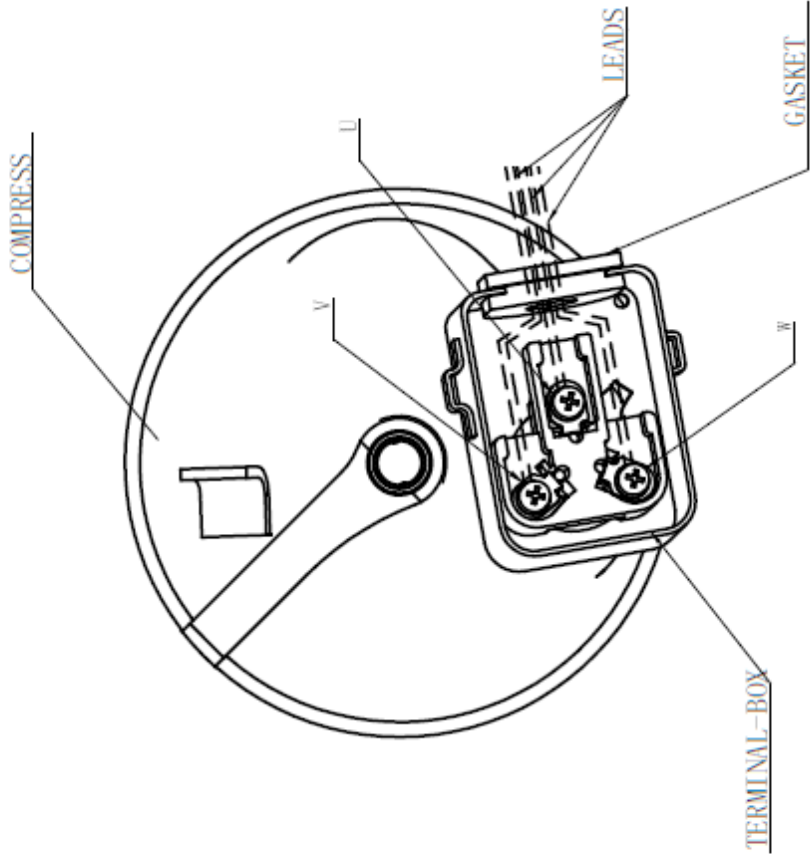
A

4CYC01246

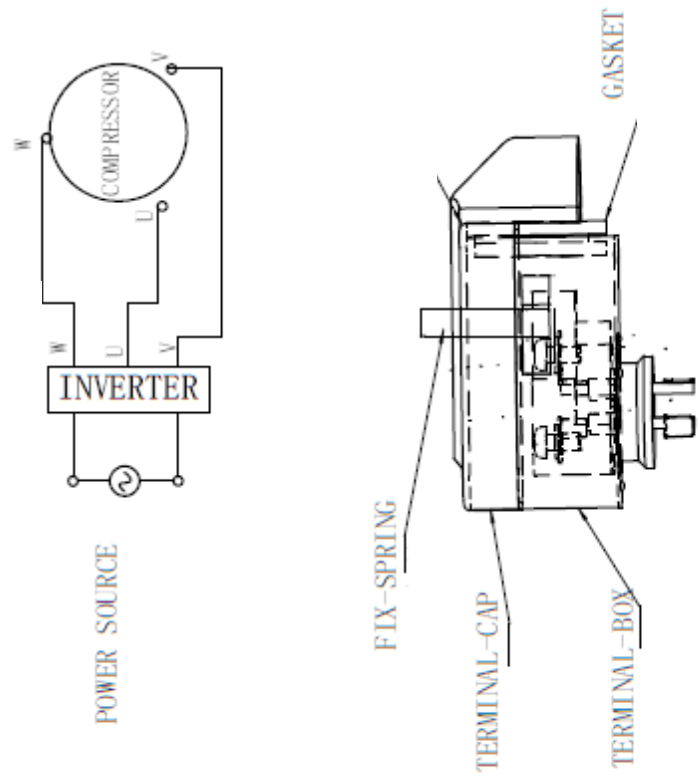


DIMENSION: mm

RECD	RE. MARKS			PROJECTION 	SCALE NTS	DWN. NO. 4CYC01246
DWN.	16. 11. 26	TITLE BOLT	Shanghai Hitachi, Ltd.			
CHKD	16. 11. 26					
CHKD	16. 11. 26					
APPU	16. 11. 26					



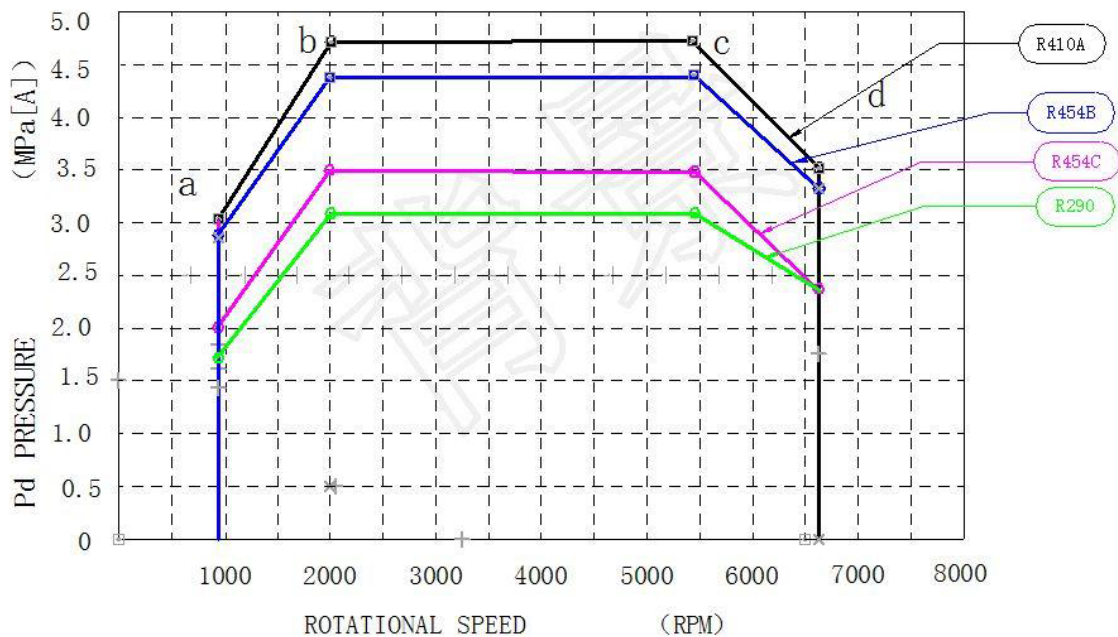
WIRING DIAGRAM



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

REGD	REV.	REV. NO.	REV. DATE	TITLE	PROJECTION	SCALE	DWG NO.
	CHKD.						
	CHKD.						
	APPR.						
				LEAD ROUTING WIRING DIAGRAM	SHEC		4CYC01294

R410A/R454B/R454C/R290  
WHP SERIES R410A/R454B/R454C/R290  
INVERTER COMPRESSOR GUARANTEE PRESSURE RANGE



1

Compressor running speed range: Min 900min<sup>-1</sup>~Max 6600min<sup>-1</sup>

Rotational speed	Pd limit			
	R410A	R454B	R454C	R290
900	3.07	2.90	2.02	1.71
2000	4.76	4.4	3.47	3.13
5400	4.76	4.4	3.47	3.13
6600	3.51	3.32	2.31	2.34

# 1. Instructions:

## PCR

The pressure ratio(PCR) should satisfy the following conditions:

- 1) 900~2000rpm:  $1.5 \leq Pcr \leq 8.0$
- 2) 2000~6600rpm:  $2.0 \leq Pcr \leq 8.0$

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

	Condition 1	Condition 2	Condition 3	Condition 4	Condition 5	Condition 6
Range of the conditions	$P_s \geq P_{smax}$	$0.137 \leq P_s \leq 0.168 \text{ MPa [A]}$	Pressure ratio $\geq 8$	pressure ratio $\leq 1.5$	Pressure difference $\leq 0.39 \text{ MPa}$	The oil temperature $SH \leq 6^\circ\text{C}$
Operations requirement	1) Frequency $\leq 70 \text{ Hz}$ 2) $P_s \leq 1.3 \text{ MPa (A)}$ 3) $P_d \leq P_{dmax}$	1) Rotational speed $N \leq 6600 \text{ rpm}$ 2) 压力比 Pressure ratio $\leq 10$ 3) Lasting time: $\leq 360 \text{ hr}$ 4) The oil level should be in the fixed range 5) $T_d$ The discharge temperature should be in the fixed range 6) $SH \geq 6^\circ\text{C}$ $\geq 0.5 \text{ cP}$ The oil temperature $SH \geq 6^\circ\text{C}$ or oil viscosity $\geq 0.5 \text{ cP}$	1) In the heating mode 2) $P_d$ The discharge pressure should be in the fixed range 3) $P_s$ The suction pressure should be in the fixed range (include ranges under limited conditions) 4) $T_d$ The discharge temperature should be in the fixed range	The working compressor has no abnormal noise	The working compressor has no abnormal noise	The oil viscosity $\geq 0.5 \text{ cP}$

### 3.

In the transitional stage to the final operating condition, the suction pressure and pressure ratio should satisfy the following conditions. (lasting time  $\leq 5 \text{ min}$  each time):

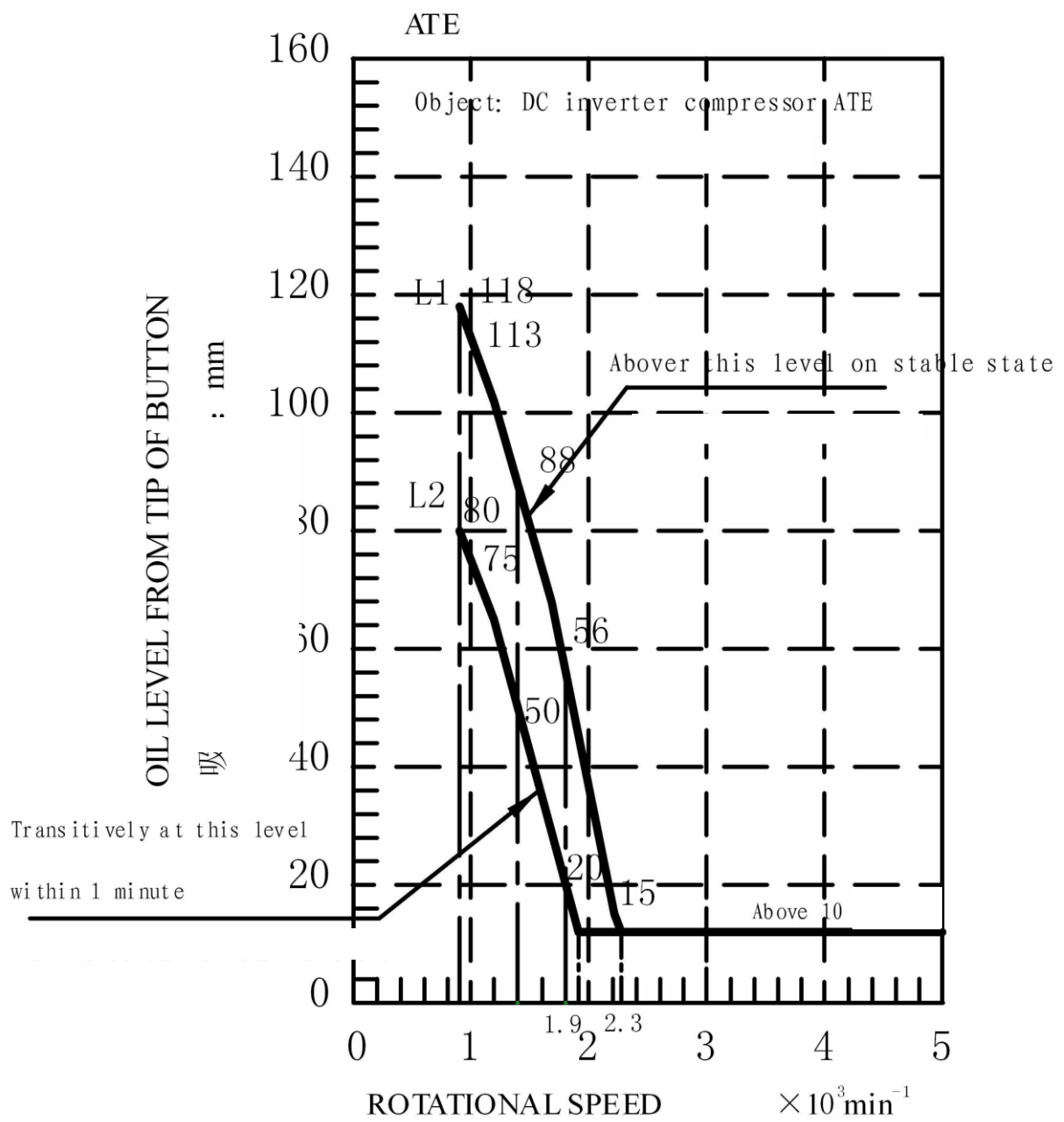
#### a)

The suction pressure can be lower than  $0.168 \text{ MPa}$ , but should not below  $0.137 \text{ MPa}$ .

#### b)

Pressure ratio value ten was allowable when the discharge temperature  $< 100^\circ\text{C}$  and oil viscosity  $\geq 0.5 \text{ cP}$ .

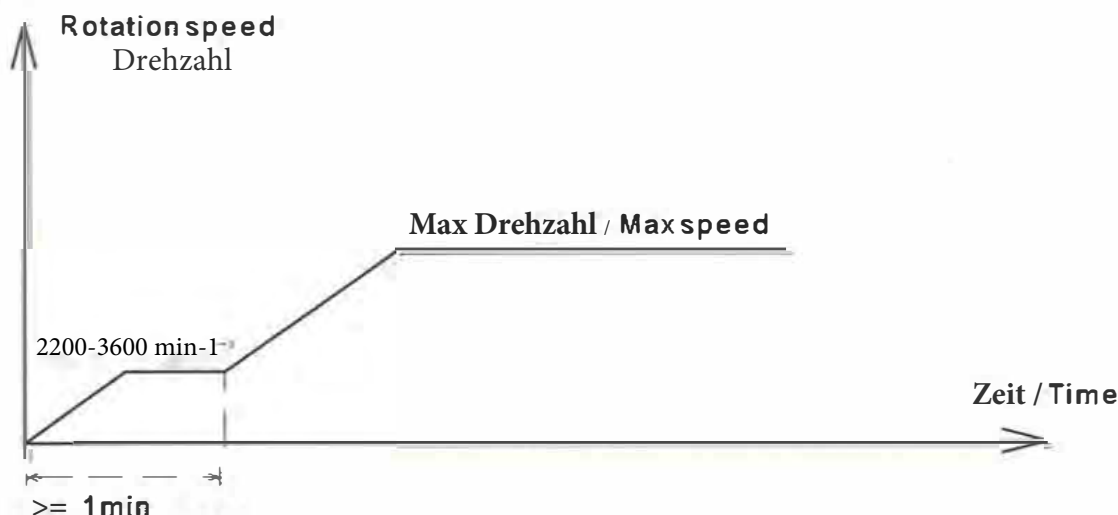
The transitional stage : the system start-up, defrosting or other operating control (on/off or transformation of operating conditions), the stage when pressure or temperature changing rapidly.



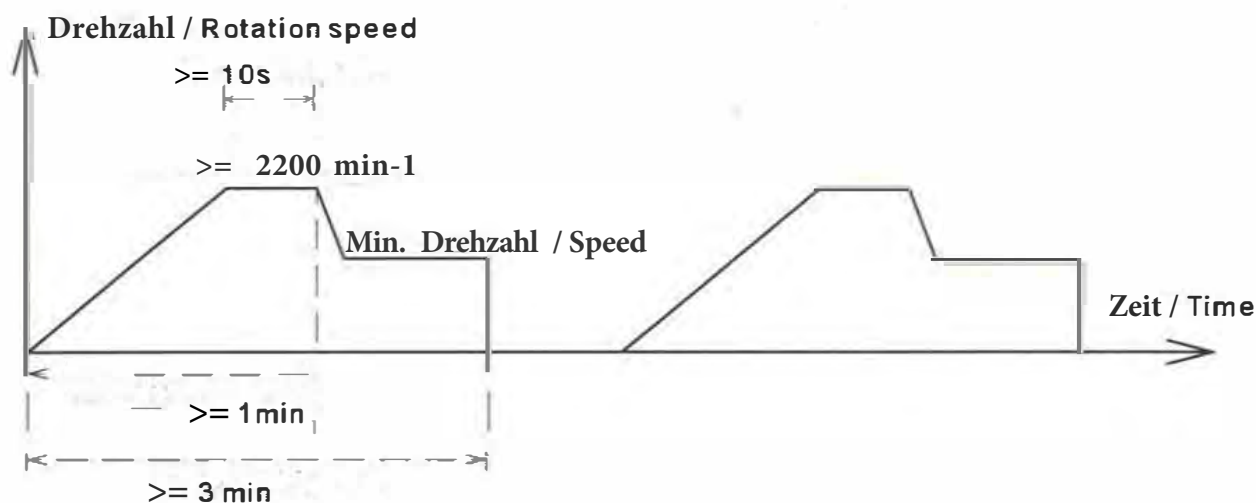
# Anwendungshinweise für DC Inverter Kompressoren zur Drehzahlregelung Instruction for DC inverter compressor rotation speed control

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

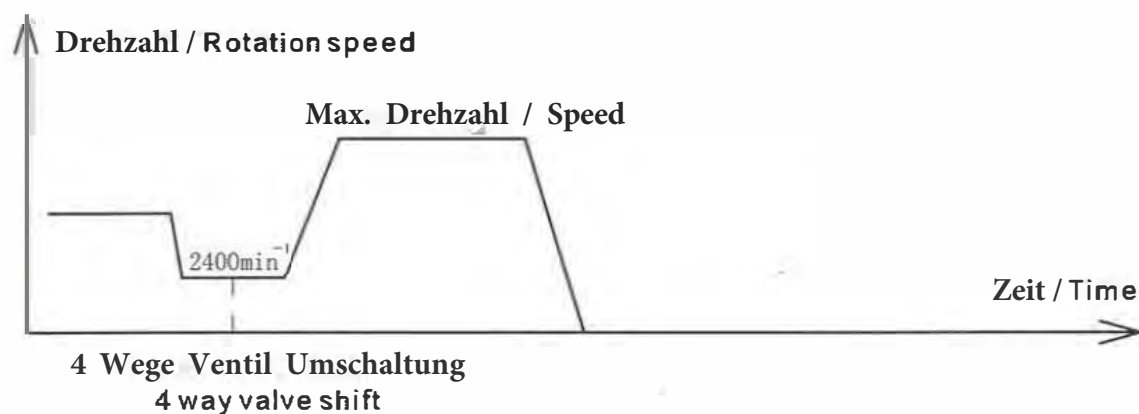
## (1) Vom Start zur gewünschten Drehzahl / From starting to normal running



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

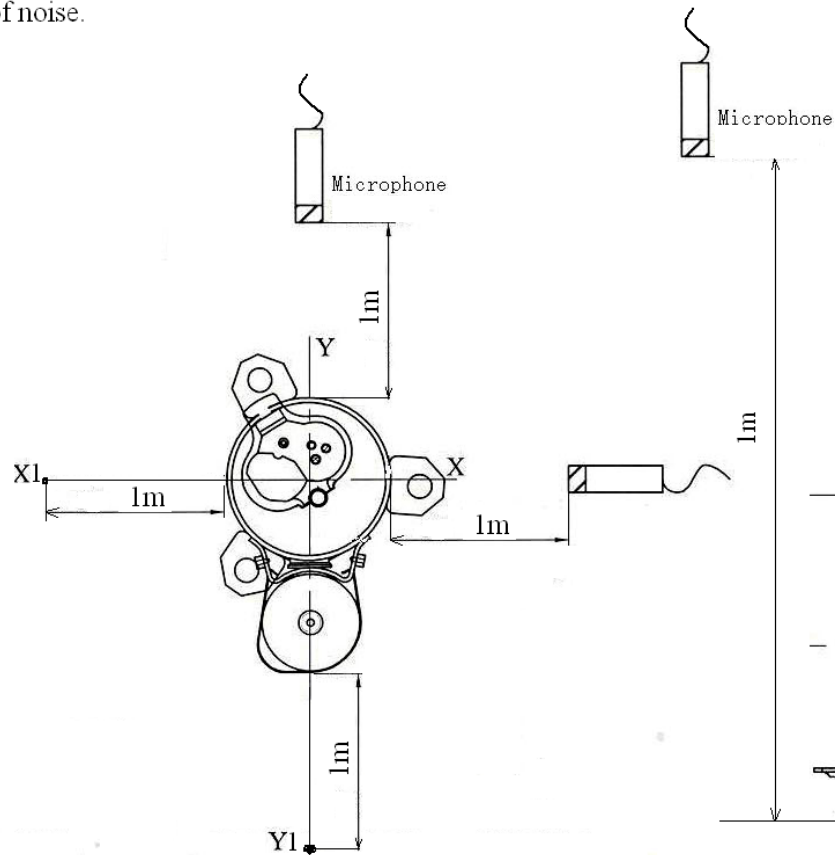


## (3) Abtauung / Defrost mode {unter Verwendung eines 4 Wege Ventiles / by using 4 way valve}

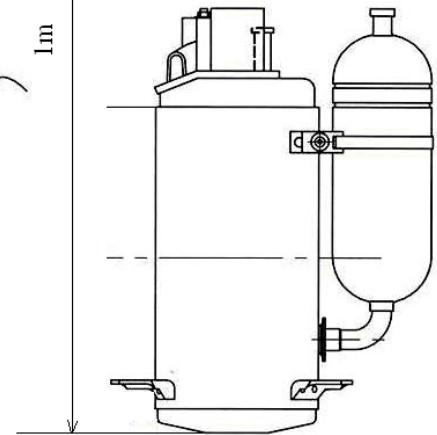


## APPENDIX

1. Noise measuring method: Measure from X, Y, X1 and Y1's direction and take the bigger value of noise.



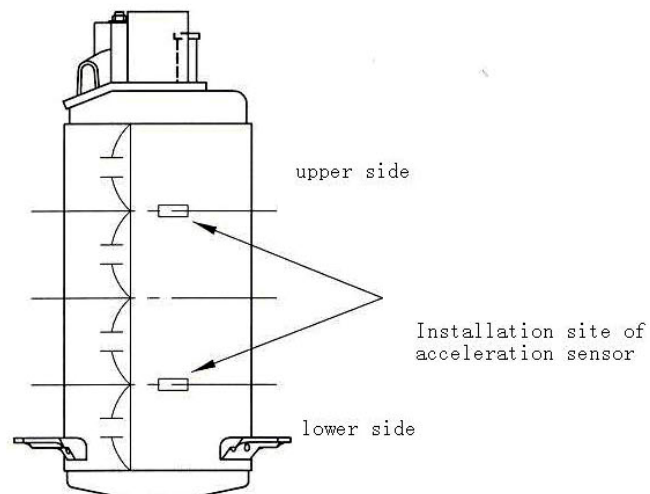
(Picture 1)



(图2)

(picture 2)

2. Vibration measuring method: Measure vibration in the upper and lower side, and take the bigger value.



View from the Y direction of picture 1

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				