

TOSHIBA HERMETIC
COMPRESSOR SPECIFICATION

PRELIMINARY

MODEL : **DA422A3F-27M**

COMPRESSOR SALES DEP'T
COMPRESSOR DIV.
TOSHIBA CARRIER CORPORATION

TOSHIBA

1.General specification

Compressor data

Application	Inverter air conditioner
Compressor type	Hermetic rotary compressor
Refrigerant	R-410A
Painting color	Black
Mass (included oil)	22.4 kg
Number of cylinder	2
Displacement	42.3 cm ³ /rev
Diameter of cylinder	φ63.0 mm
Height of cylinder	22.0 mm
Orbital radius	5.31 mm
Oil charged	Ester oil VG74 1400 ml
Suction tube	φ16.1 mm(I.D.)
Discharge tube	φ9.8 mm(I.D.)
Wiring connection terminal	Receptacle #250(flag type)

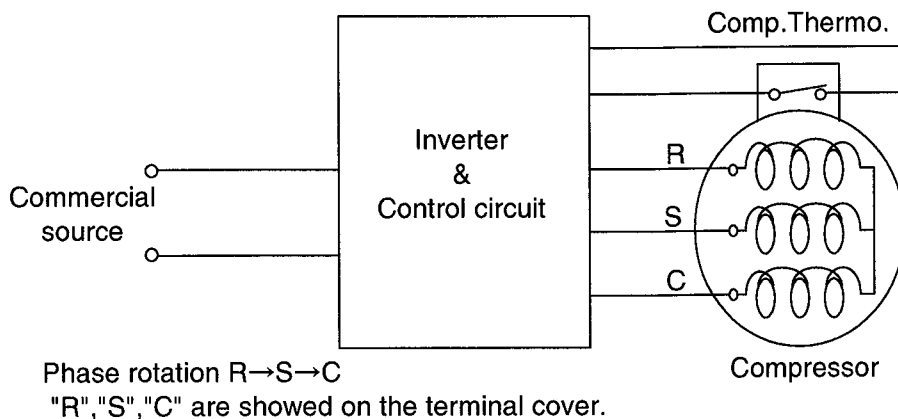
Motor data

Motor type	DC Brushless Motor
Number of pole	4
Starting type	DC Inverter Starting
Revolution range	10~120 s ⁻¹
Nominal output	3750 W
Winding resistance	(20°C) 0.79 Ω
Classification of insulation	E

2.Electrical parts

Parts List	Specification	Drawing No.	Part No.	Quantity
Comp.Thermo.	CS-74-TC5 Opens: 120±4°C Closes: 90±5°C	E200700061	82890951	1

3. Wiring diagram



4. Performance

Capacity	13100W	Rating conditions
Motor input	3300W	Revolution : 60 s ⁻¹
Current	-	Condensing temp. : 42.3 °C
		Evaporating temp. : 2.7 °C
		Return gas temp. : 12.8 °C
		Liquid temp. : 34.3 °C
		Ambient temp. : 35.0 °C
Sound level (Overall)	77dBA (sound power level)	Revolution : 60s ⁻¹ Pd/Ps=2.44/0.76MPa
Vibration	40µm max. (Half amplitude)	Revolution : 30s ⁻¹ Pd/Ps=1.99/0.92MPa

5. General characteristics

Insulation resistance	20MΩ min. (when shipped)	
Withstand voltage	1800V/1sec. (sine wave form)	
Residual moisture	350mg Max.	
Residual impurities	50mg Max.	
Air tight test pressure	High pressure side	4.3 MPa
	Low pressure side	2.3 MPa
Strength test pressure	High pressure side	6.2 MPa
	Low pressure side	3.3 MPa

6.General limitation

item	Normal load	Max. load	at 15s ⁻¹
Discharge pressure	3.28MPa max.	4.15MPa max.	Pd-Ps : 0.2MPa over
Suction pressure	0.53~0.98MPa	0.23~1.15MPa	
compression ratio	7.5 max.	7.5 max.	-
Motor winding temp.	100°C max.	125°C max.	-
Discharge tube temp.	100°C max.	115°C max.	-
System Refrigerant amount		1.50kg. Max.	

* Pd : Discharge pressure Ps : Suction pressure

Please observe the following limitations

1. "Rotary compressor Operating Instructions"
2. "System design limitation of inverter aided rotary compressor"
3. "Limitation of operating pressure"

7.The drawing attached/Supply accessory

Name	Drawing No.	Part No.	Quantity
DA422A3F-27M	D234900310	82807571	1
Terminal Cover	D229680310	82891297	1
Terminal Bushing	E229680110	82891298	1

8.Container

1. Standard container specified in TOSHIBA CARRIER CORPORATION is used.

9.Notes

1. The unit of pressure is given in MPa. Gauge

Rotary Compressor Operating Instructions

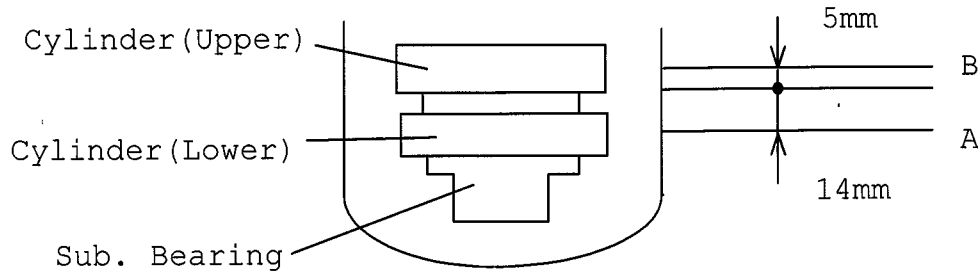
In order to safely and properly use the Toshiba high back pressure type rotary compressor, please observe the following limitations.

1. System design limitations

1. Continuous flood back into the inlets of suction tubes in accumulator should not be generated.
If the flood back volume is great, liquid compression occurs, and reliability is noticeably reduced.
Check the flood back in low temperature, defrosting, cold-starting and other conditions in which problems can easily occur.
2. (Temperature at the bottom of compressor shell) - (Temperature at the center of condenser tube) = ΔT
Taking ΔT as the difference above, keep ΔT as the following.
Continuous operation : at least 5K
Intermittent operation : at least 0K
If the value of ΔT falls below the above conditions, liquid refrigerant penetrates the compressor, and reliability drops noticeably.
3. When starting up and changing cycles, check that no knocking sound, unusual electric current, and unusual movements occur.
4. For intermittent operation, each cycle should be at least five minutes (ON : at least two minutes, OFF : at least two minutes and the time for the balance of pressure) at the frequency over $30s^{-1}$, at least eight minutes (ON : at least five minutes, OFF : at least two minutes and the time for the balance of pressure) at the frequency below $30s^{-1}$.
The differential between high and low pressure at starting up should be less than 0.05MPa.
The great differential causes that the compressor is not able to start.
5. The degree of setting angle of a compressor receives perpendicularly, and is made into less than 5° in all directions. If the angle of inclination is too great, unusual noise and vibration may occur, and there is the danger of breaking some of the tubes.
6. Arrange the tubes of the refrigeration cycle so that the oil can easily return. If oil return decreases, the oil supplied to the compression parts decreases, and reliability drops noticeably.
7. The arrangement of the refrigeration cycle and mode of operation can result in an increase in the amount of lubricating oil emitted from compressor, causing returning lubricating oil to decrease. There are cases where the oil inside the compressor falls below standard values. If the oil level falls below the standard position, the volume of oil supplied decreases, and reliability drops noticeably.
Check using the compressor with attached sight glass that the oil level inside the compressor is as follows.

Continuous operation : Above the B level
 Intermittent operation (hot start) : Above the B level
 Within 5 minutes after soaking-out start (cold start) : Above the A level
 All through defrosting and within 3 minutes after return from defrosting to heating operation : Above the A level

Fig.1



8. Tube to be connected with a compressor should be free of resonance during operation and transport.

Tube stress should not exceed the value listed below.

Vibration mode	Tubing stress(Half amplitude)
Operating	19.6N/mm ² max.
Start-up, stop	29.4N/mm ² max.
In transit	29.4N/mm ² max.

9. When installing a dryer, make sure tube vibration does not reach the dryer, and that it does not raise the flow of refrigerant inside the dryer. Due to vibration in the tubes and refrigerant flow, material in the dryer becomes fine particles, and can result in clogging of the cycle or malfunction of the compressor.

10. When connecting wiring to the compressor, take into consideration temperature rises in the compressor, and select wiring with adequate heat resistance. Furthermore, do not allow wiring to come in direct contact with the compressor unit.

As a lead wire to the compressor, the goods which have the heat-resistance of more than 105°C specified in AWM Style No. 1015 are recommended. Since the compressor becomes very hot, if wires directly touch it, insulation on the wires might degenerate, and a fire result from an electric short.

11. When welding the tubes of the compressor, to prevent oxidation, pass it through nitrogen gas. Furthermore, do not allow flax to penetrate the cycle. There is the danger that the compressor could malfunction if foreign matter gets into the cycle.

12. When charging refrigerant into the cycle, make sure that refrigerant always be filled from the higher-pressure side (outlet of condenser) of cycle. In case of refrigerant R-407C, liquid refrigerant only should be charged in all cases.
No liquid refrigerant is filled to the compressor. When in servicing, charging refrigerant into the cycle from low pressure side while the unit is running, make sure that refrigerant except R-407C is filled gradually in a gaseous state.
If liquid refrigerant is sucked in to the compressor, liquid compression occurs, the discharge valve is damaged, lubrication effectiveness degenerates, and reliability drops noticeably.
13. Do not use the compressor on a vehicle, ship or aircraft.
14. When exceeding the limitation of the system refrigerant amount, both parties (the provider and the purchaser of the compressor) should mutually discuss and decide on compressor specifications (accumulator, oil amount, etc.), and cycle specifications (additional accumulator, oil heater, oil separator, control method, etc.).
15. Do not use refrigerants and lubricants besides those specified.
There is the danger of explosion or fires.

2. Process limitations

1. When installing the unit, follow the instructions specified by manufacturer of the unit, and ensure the unit is grounded.
There is the danger of electric shock.
2. Do not allow flame of a burner to come in contact with compressor terminals. Furthermore, protect the terminals from impact.
Sudden heating and impact will cause fine cracks in the supporting glass of the terminals. There is also the danger that gas or oil leaks might cause electric fires.
Do not use the compressor if found any damages and cracks in the supporting glass and pins of terminals.
3. Do not bend or break discharge tube and suction tube. Safety and reliability drops noticeably.
4. Do not modify the compressor.
Safety and reliability drops noticeably.
5. Do not operate the compressor in a vacuum state. Furthermore, do not apply high voltage to a vacuum state compressor.
There is danger that insulation could degenerate, causing electric shock.
6. Do not compress the air including the case of leakage in the refrigeration cycle. If compressors runs with air mixed, inside the compressor is heated and pressurized, which may cause an explosion.
7. Do not turn on the power with the terminal cover removed.
There is the danger of electric shock.
8. Do not remove the terminal cover before turn off the power.
There is the danger of electric shock.

9. Do not touch the compressor with bare hands during operation or immediately after stoppage. The compressor is at a high temperature. There is the danger of burns.
10. Maintain the weighted impact on the compressor at below 590m/s^2 . If the compressor is hit with a large impact, there is the danger that parts inside the compressor will slip out of position, or the compressor base will fluctuate, and the device will cease to function.
11. Do not put a compressor on its side or turn over. There is danger that lubricating oil will leak out.
12. After removing rubber plugs from compressor tubes, promptly use the compressor and do not leave in the atmosphere for 10 minutes over. If air gets into the compressor, the lubricating oil could oxidize, or moisture could accumulate, accelerating degeneration of the inside of the cycle or compressor.
13. When removing the rubber plugs from the compressor, remove it from the discharge tube firstly. When doing so, the sound of nitrogen gas escaping from inside the compressor can be faintly heard.
If the plug is removed from the suction tube firstly, oil will escape.
14. Wires connected to the compressor, follow the compressor specification manual, and instructions published by manufacturers of devices and equipment, to connect them correctly.
Incorrect wiring can result in malfunction, reverse operation, or burning out of motor, reliability and safety drops, and there is the danger of fire.
Further, do not use an incorrectly wired compressor. There is the danger of burning out the motor, damaging the compression parts by operating in reverse.
15. After making sure that the lead wires are not entangled with the terminal bushing, replace the terminal cover.
If the terminal cover is replaced with connecting wires entangled with bushing, there is the danger that wiring insulation could degenerate, resulting in defective insulation, which causes electric shock.
16. Do not expose the compressor to corrosive gases such as sulfuric gas, chlorine gas, or sulfurous gas. Furthermore, do not use such materials as for sound proofing or heat insulation, that have a potential of producing corrosive gases at high temperature. If terminal contacts of electric parts corrode, there is danger of fire.
17. Do not contrive any device to drain water from the unit.
There is the danger of electric shock due to deterioration of the insulation, or decay of the compressor shell.
18. Take proper moisture-proof or dust-proof measures for compressor terminal box if water drops, dust or particles might get into the terminal box.
Terminal corrosion and an increase in electric current leaks can cause fires.

19. For the vertical style compressor, always remove air from the refrigeration cycle or purge coolant from both high and low pressure sides.

For work performed on only the high pressure side or only on the low pressure side, there is the danger that coolant or oil will spurt from unexpected places, causing fires and burns.

20. Wear safety goggles when servicing the unit.

When removing the tubes by heating it with a burner, there is the danger of burns or eye injury if the refrigerant and/or oil remaining in the tubes is emitted.

21. Leak check pressure value in case a compressor exchanges.
Follow an air-conditioner service manual.

22. When you dispose of compressor, drain refrigerant and oil in advance.

3. Limitations in storage

1. Do not expose the compressor to wind and rain. If at all possible, it should be stored indoors, in an environment where the temperature is maintained between $-10^{\circ}\text{C} \sim 65^{\circ}\text{C}$.

SYSTEM DESIGN LIMITATION OF INVERTER AIDED ROTARY COMPRESSOR

MODEL : DA422A3F-27M

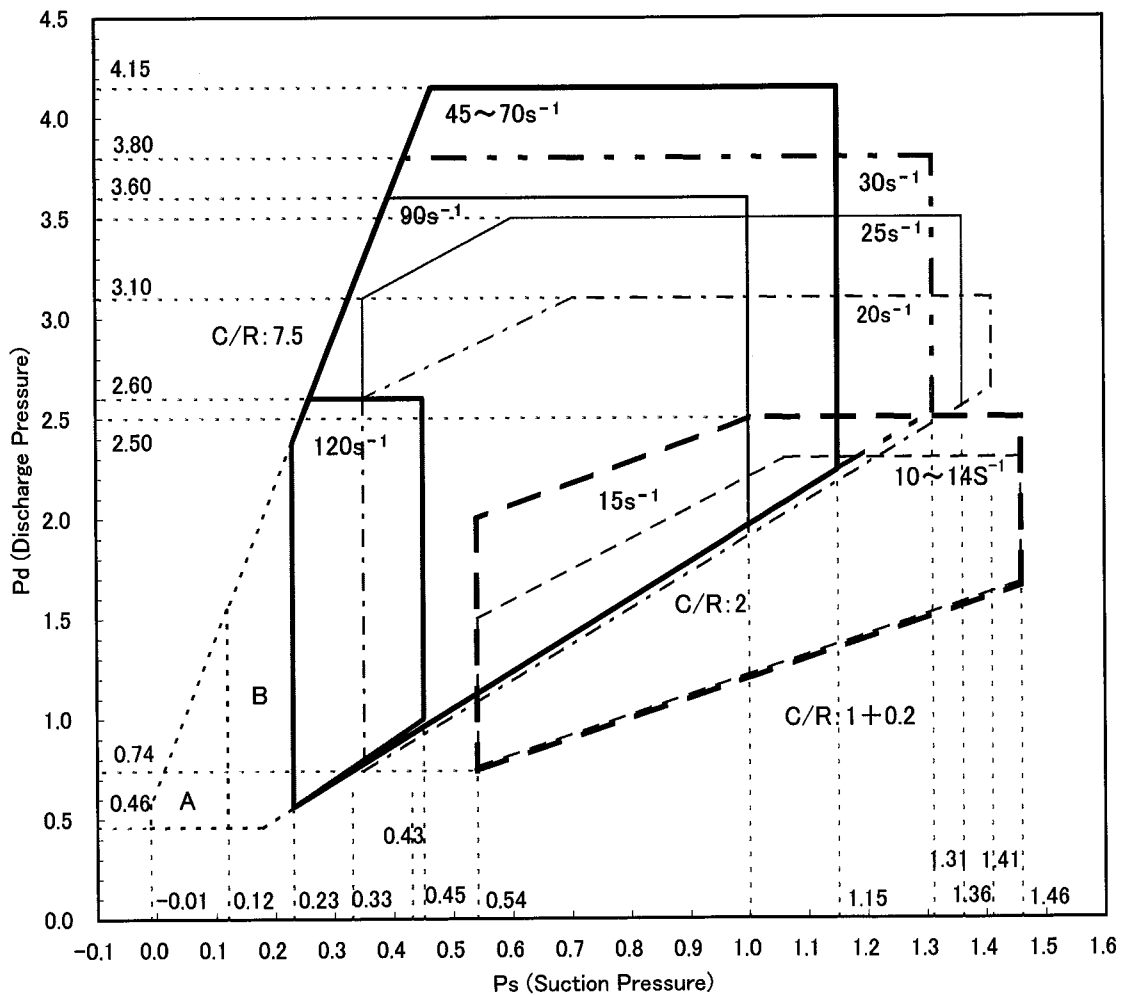
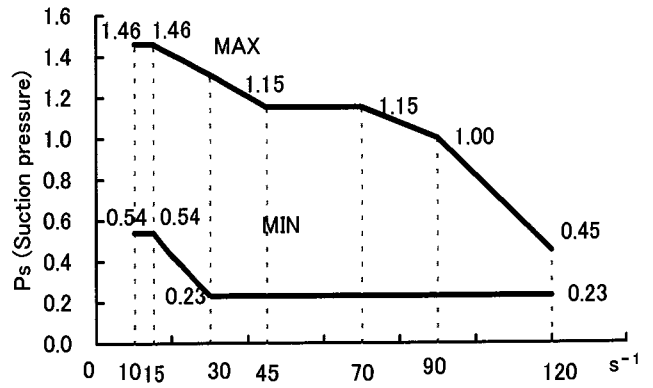
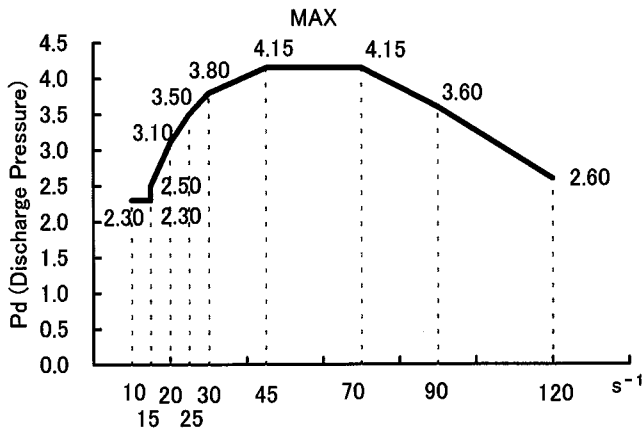
The manufacturer of Inverter air-conditioner must comply with the following limitations.

1. A compressor performance is sometimes lower, because of it's rotor magnetic force decreases:
 - a) In case AC voltage is impressed to the compressor.
 - b) In case a drive transistor is shorted in a high-rotation area (about 60s^{-1} or higher).
 - c) In case a motor step out occurs in a high-rotation area (about 60s^{-1} or higher).
 - d) In case the motor winding temperature is 130°C over and compressor current is 55A at starting and running.
(The current value was measured in one rotation of a motor rotor.)
2. When the compressor is heated to keep the refrigerant oil warm, keep the motor winding temperature below 55°C
3. Range of actual compressor motor revolution should be $15\sim 120\text{s}^{-1}$ ($15\sim 120\text{rps}$) at the conditions except starting.
4. When the outdoor temperature is below 0°C , the compressor should be operated at the revolution over about 26s^{-1}
5. When cold-starting, defrosting and operating intermittently, maintain revolution near 60s^{-1} and 90s^{-1} at least one minute.
6. Optimum revolution for defrosting is less than 90s^{-1}
7. Keep variations of speed in revolution to less than $1\text{s}^{-1}/\text{sec.}$, but in revolution 28s^{-1} and less, variations of down speed is slower than $0.143\text{s}^{-1}/\text{sec.}$
It prevents breaking-down of the compressor.
8. For intermittent operation in revolution 15s^{-1} , the on time is more than 10 min..

LIMITATION OF OPERATING PRESSURE

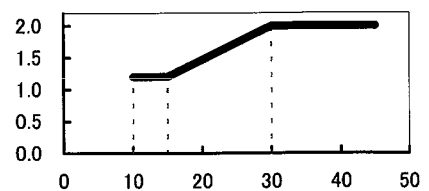
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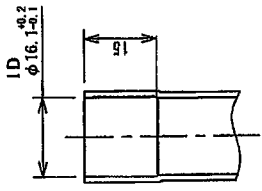
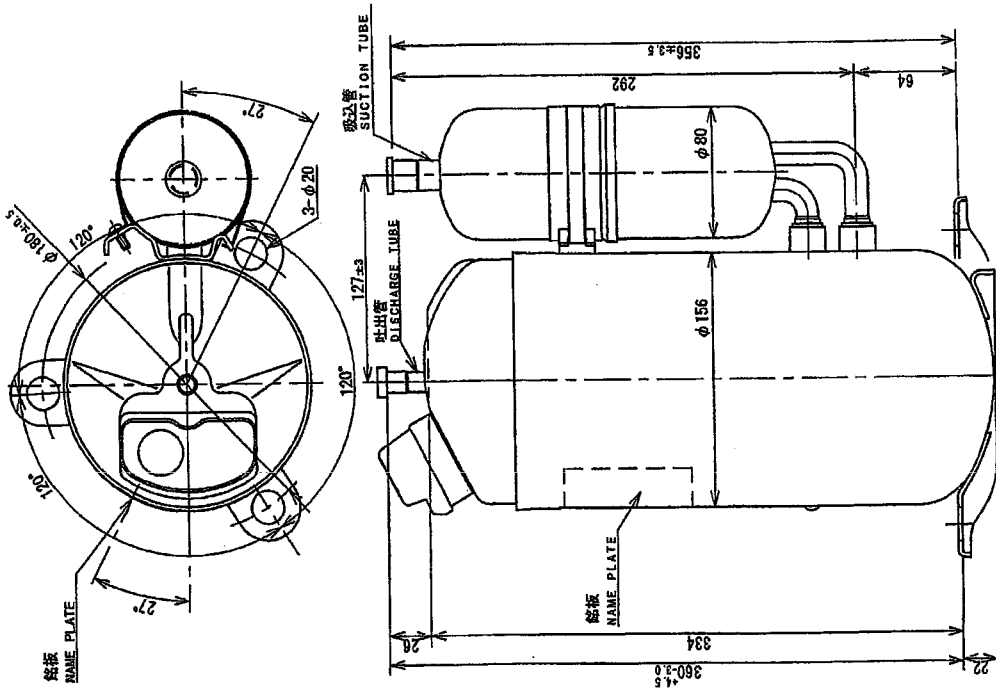
MPa (gauge)



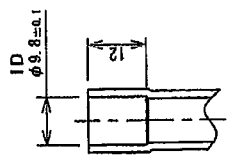
Notes

1. Zone A : Within 5 min. after starting in soaking-out
2. Zone B : During defrosting and within 3 min. after re-starting.
3. Limitation at 15s⁻¹ :
On time at intermittent operation should exceed 10 min..

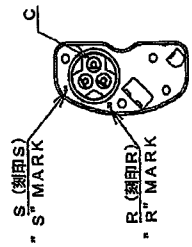




吸込管詳細
SUCTION TUBE



吐出管詳細
DISCHARGE TUBE



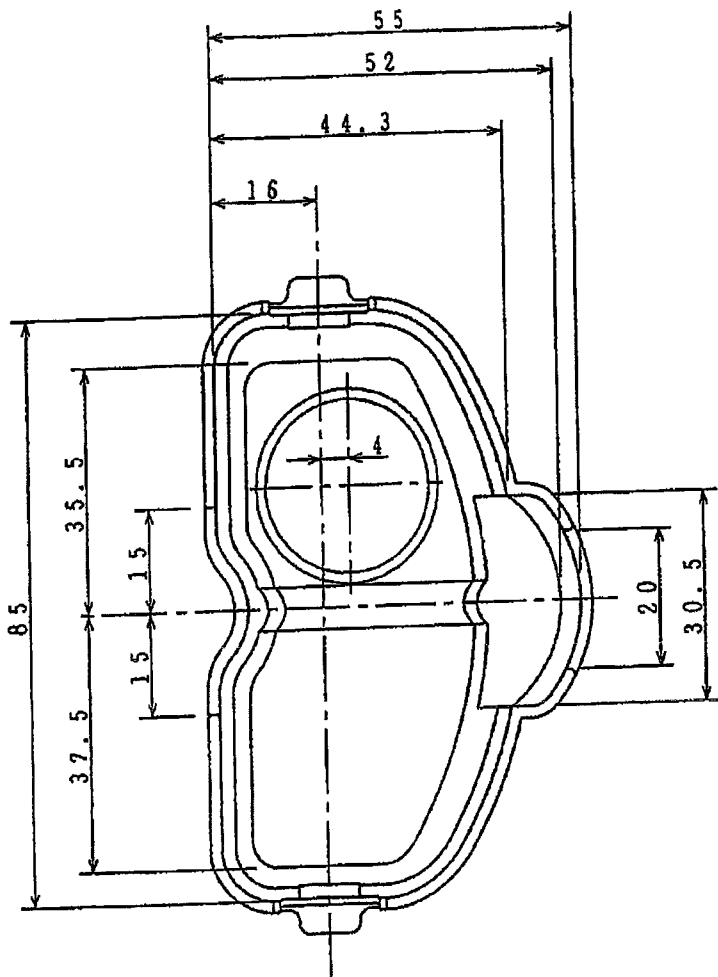
電源接続部詳細
TERMINAL IDENTIFICATION

名称TITLE
コンプレッサ外形図
DRAW EXTER
図面番号DRAWING NO.
D234900310

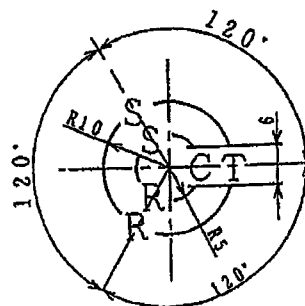
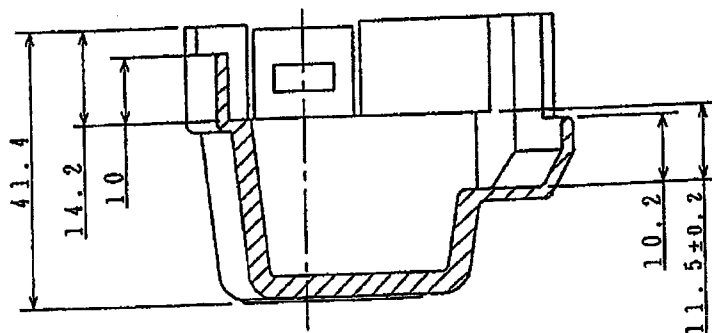
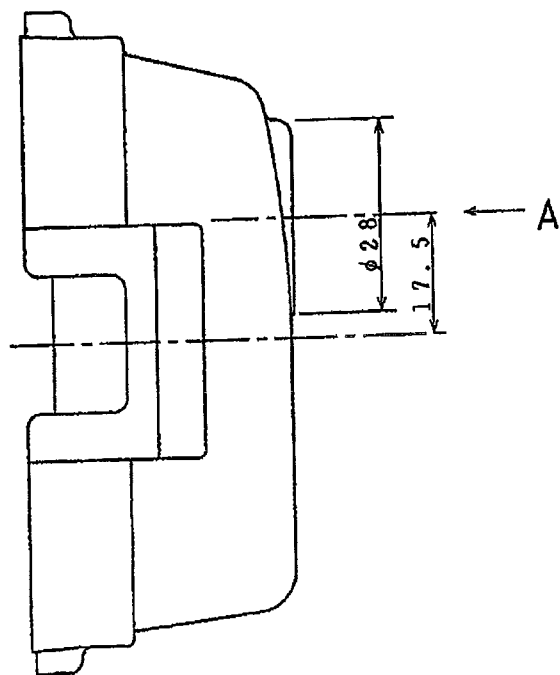
TERMINAL BOX COMPONENTS

TERMINAL COVER D229680310

MILLIMETERS



NOTES
 MATERIAL: POLYCARBONATE
 COLOR : BLACK



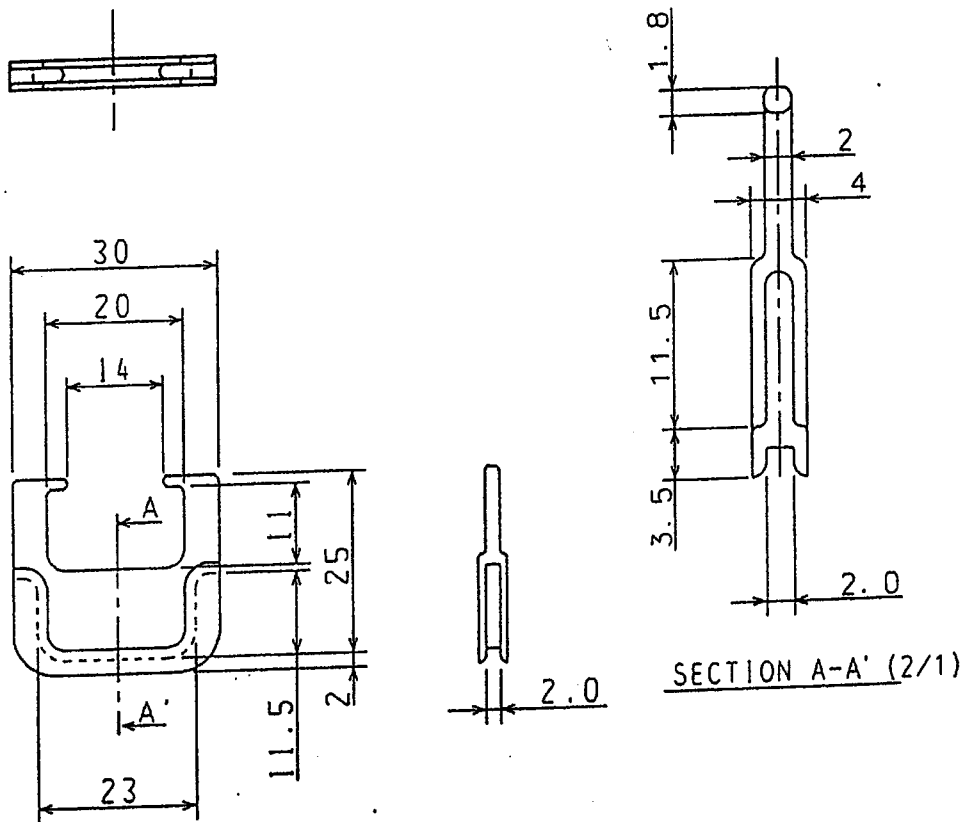
C, S, R and R, S, T MARK
 (View from A)

TERMINAL BOX COMPONENTS

TERMINAL BUSHING

E229680110

MILLIMETERS



NOTES
MATERIAL: POLYCARBONATE
COLOR : BLACK