

DMCT & INVERTER CHECKER

RAC-B-A04

SERVICE TOOLS

DMCT & INVERTER CHECKER

DMCT



INVERTER CHECKER

DMCT&CCCT RMA006A012A



function with transfer box and transfer cable for testing and diagnosing DC motor and PWB incorporated

INVERTER CHECKER RMA006A013A



Confirm output inverter drive of inverter PWB and judgment before changing compressor and PWB

COMMUNICATION TOOL RMA006A014A

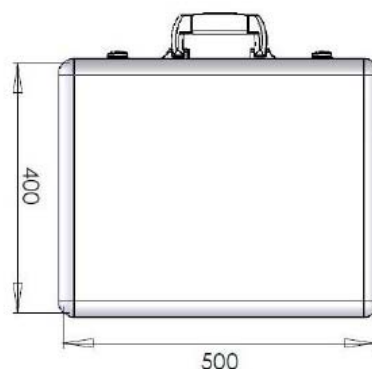
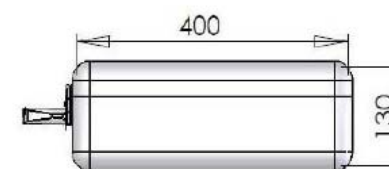
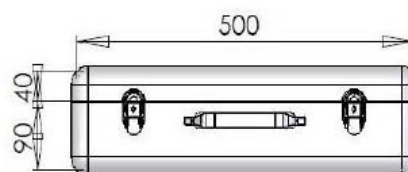


The error display and help inform at the sites check the running communication data of indoor and outdoor units, then it can assist in troubleshooting irregular stop with error codes for analysis



SERVICE TOOL ASSY

RMA006A011A



SIZE = 500?400?130 mm
WEIGHT = 6.5 kg (Included
service tool)

Price _____ \$US

Part No: RMA006A011A

Description: SERVICE TOOL ASSY

Name: RAC Service Tool Kit



- 1.0.0 TOOL CASE
- 2.0.0 DMCT- CCCT CHECKER TOOL
 - 2.1.1 TRANSFER BOX-TYPE A (DMCT)
 - 2.1.2 CABLE FOR DC MOTOR TYPE B (DMCT)
 - 2.1.3 TRANSFER BOX-TYPE C (DMCT)
 - 2.1.4 TRANSFER BOX-TYPE D (DMCT)
 - 2.2.1 CABLE FOR TYPE A (CCCT)
 - 2.2.2 CABLE FOR TYPE B (CCCT)
 - 2.2.3 CABLE FOR TYPE C (CCCT)
 - 2.2.4 CABLE FOR TYPE D (CCCT)
- 3.0.0 INVERTER CHECKER (ICT)
- 4.0.0 COMMUNICATION TOOL (COMT)

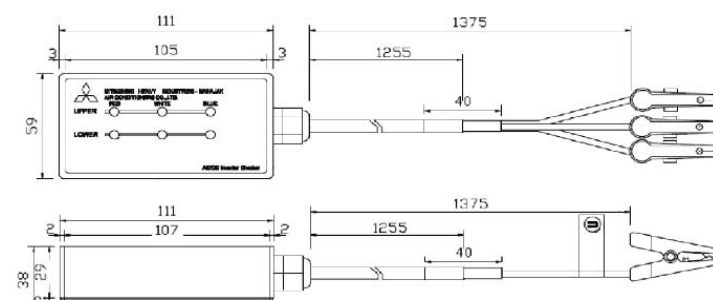
1. RAC Service tool

Service tool	Function	Part
DC motor checker (DMCT)	Operate the DC fan motor Noise test of DC motor	FMo FMi
Control circuit checker (CCCT)	Confirm PCB output to DC motor Confirm response from	PWB (Main)
Communication checker (COMT)	View error display Check operation data	PWB, Actuators
Inverter checker (ICT)	Check output from PCB/Transistor to compressor	PCB(INV)

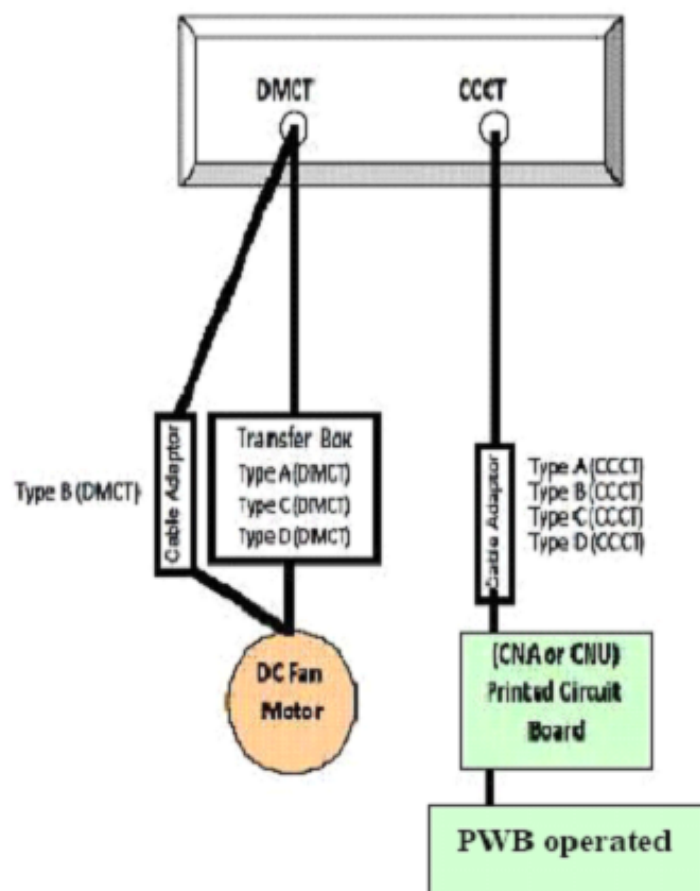
DMCT,CCCT



INVERTER CHECKER



CONNECTION CABLE



Connect to DC motor



Connect to PWB

CCCT

- The indoor unit PCB supplies voltage output to vary the speed of the DC motor, these outputs are displayed on the checker tool by rotating the variable switch
- When testing the voltage output from the PCB, there is no need to supply power to the checker tool, the air-conditioner power supply is used to display reading from the checker tool.
- The LED display will confirm the various outputs to the DC fan motor and the response input from the DC fan motor.

DMCT

- The checker tool with AC power applied can drive the DC fan motor directly without use of the PCB.
- The speed of the fan motor can be controlled by rotating the variable switch.
- The LED display will confirm the input and output signals of the DC motor to be correct.

***Note:** The motor should be tested with a multi meter prior to connection to avoid blowing the fuse on the checker tool.*

TRANSFER BOX & CABLE FOR DMCT

The transfer boxes (*Lead only for type B*) are used to connect the various types of DC fan motor plugs to the checker tool connector DMCT. You will need to check the compatibility table to determine the interface for each DC Motor, please do this carefully.

CONNECTION CABLE FOR CCCT

The CCCT connection cables are used to connect the various types of PCB connections to the checker tool connector CCCT and confirm the output from the PCB is OK.

Check Procedure for DC Motor check (DMCT)

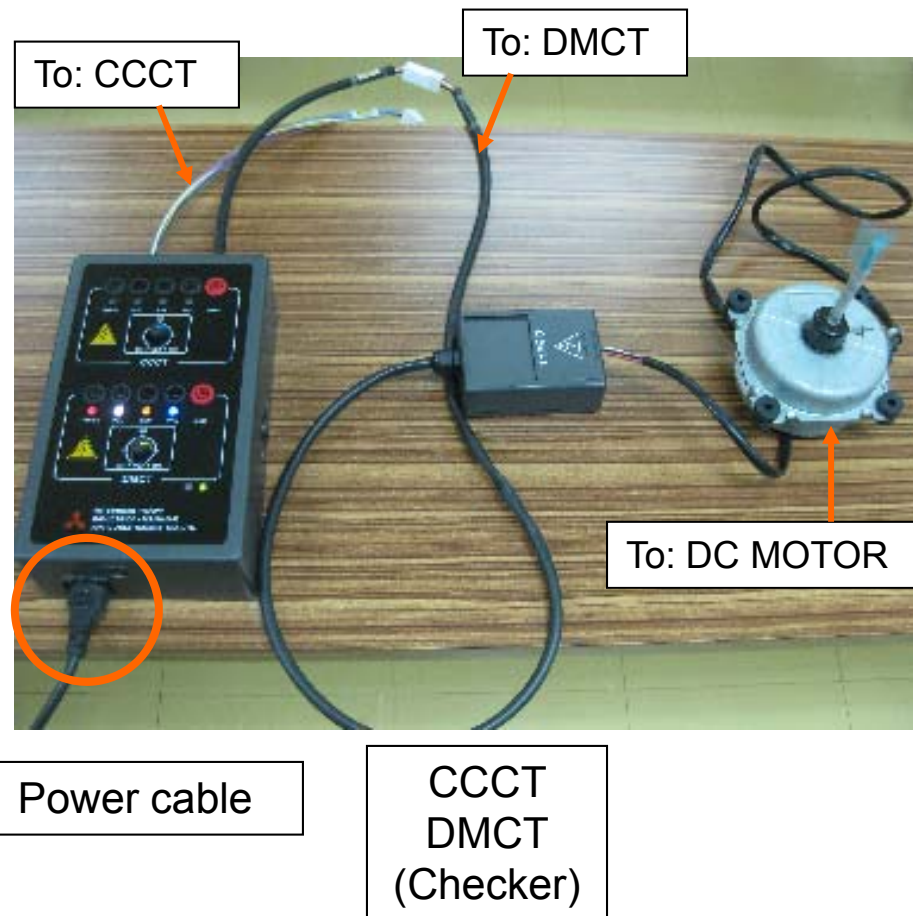
1. Check the DC motor rotation by hand – OK?
2. Check the Model No and Part No in the following tables – Select the Type A, B, C or D
3. Check the resistance of the DC motor as per page 8 – OK?
4. If resistance is OK connect the DC motor using the correct type of transfer box or cable
5. Apply power to the checker tool – set the speed controller to the minimum setting
6. Check Voltage - V_m to Gnd= 330VDC V_{cc} to Gnd= 15VDC approx. If no DC voltage is found, check if the fuses on the checker tool are OK? When the speed controller is turned clockwise, observe if V_{sp} (Orange LED) and V_{fg} (Blue LED) are flashing on and off? If so the motor will now turn if normal.
7. Observe that the DC motor operates correctly – OK?
8. If no operation turn off power and check fuse - OK?
9. Conclude if DC motor is OK?
10. Disconnect the motor from the checker tool



1. RAC Service tool

1-1 How to use DC motor checker (DMCT)

(1) Connection



(1) Choice a connector type

Wiring (pin position)is different
(Depend on FM model)

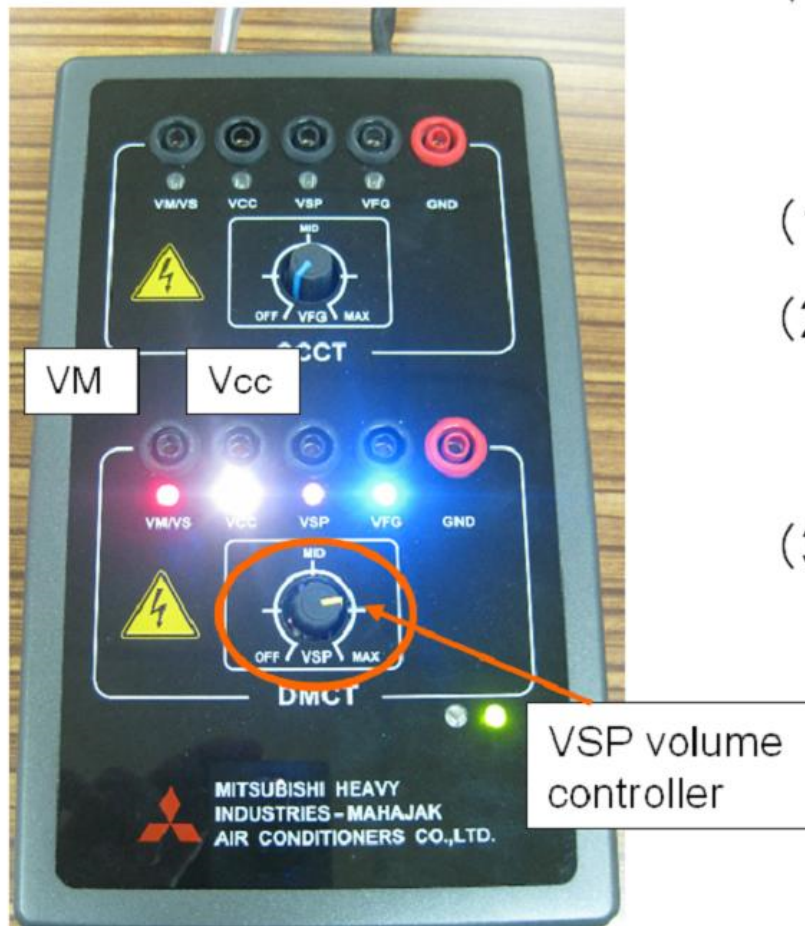
(2) Connect FM to DMCT

(3) Connect power cable

1. RAC Service tool

1-1 How to use DC motor checker (DMCT)

(2) How to check



- (0) Before turn on the power supply
- Check motor rotation by hand
 - Check wiring resistance

(1) Turn on the power supply

(2) Check voltage

- Vm – GND : 330VDC
- Vcc – GND : 15VDC

(3) Turn the Vsp controller clockwise

- Check FM rotating condition
- Stable speed or fluctuated?
Is there any noise?

⇒ IF FM rotate normal, FM is OK

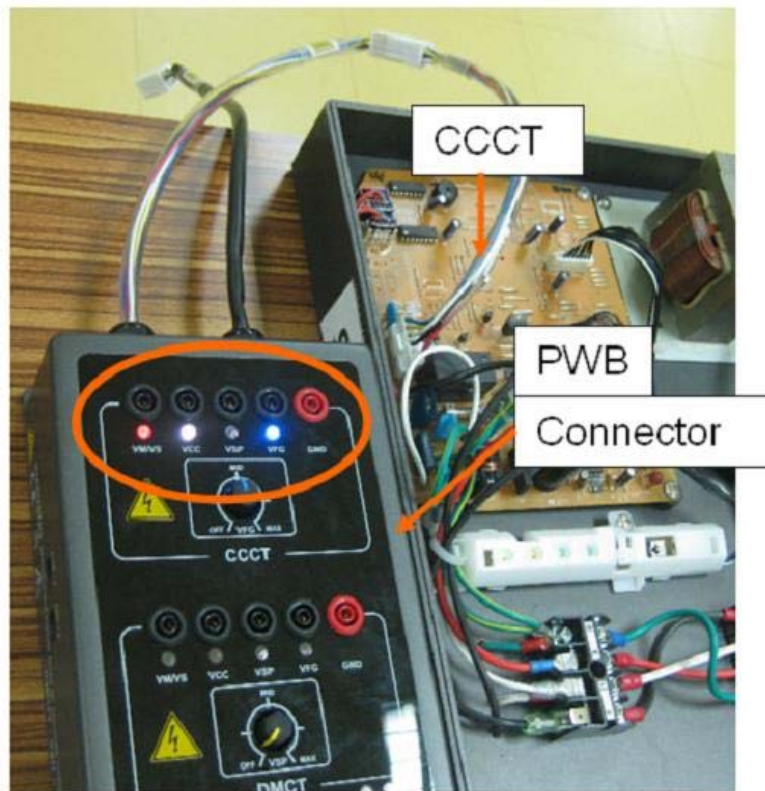
Check Procedure for PCB (CCCT)

1. Turn the power off to the air conditioner and checker (Checker is power by PCB)
2. Check the appearance of the PCB – fuse, varistor and other components are not damaged – OK?
3. Select the PWB transfer cable from the model table – Type A, B, C or D
4. Connect the transfer cable between the PCB and checker tool, set the speed controller to minimum setting
5. Turn power on to the air conditioner and send a command from the remote controller to start the outdoor fan motor
6. Check Voltage - Vm to Gnd= 330VDC. Vcc to Gnd= 15VDC approx. If no DC voltage is found, check if the fuses on the checker tool are OK? If PWB output is OK increase the speed controller, Vsp (Orange LED) & Vfg (Blue LED) will flash on and off, indicating PWB pulse input Vsp (Orange LED) to CCCT has been received and a signal has been sent back to PWB by CCCT pulse output - Vfg (Blue LED). Note: Dependant on remote control settings Vsp (Orange LED) may light up solid or go out, as compressor may be at max Hz and PWB output Vsp (Orange LED) to CCCT is now at high speed. VFG (Blue LED) will only flash on & off at any stage of this test when the speed controller is turned in the clockwise direction.
7. Conclude if PCB is OK?

How to use CCCT?

1-2 How to use Control circuit checker (CCCT)

(1) Connection



No need a Power cable

(1) Choice a connector type

Wiring (pin position) is different

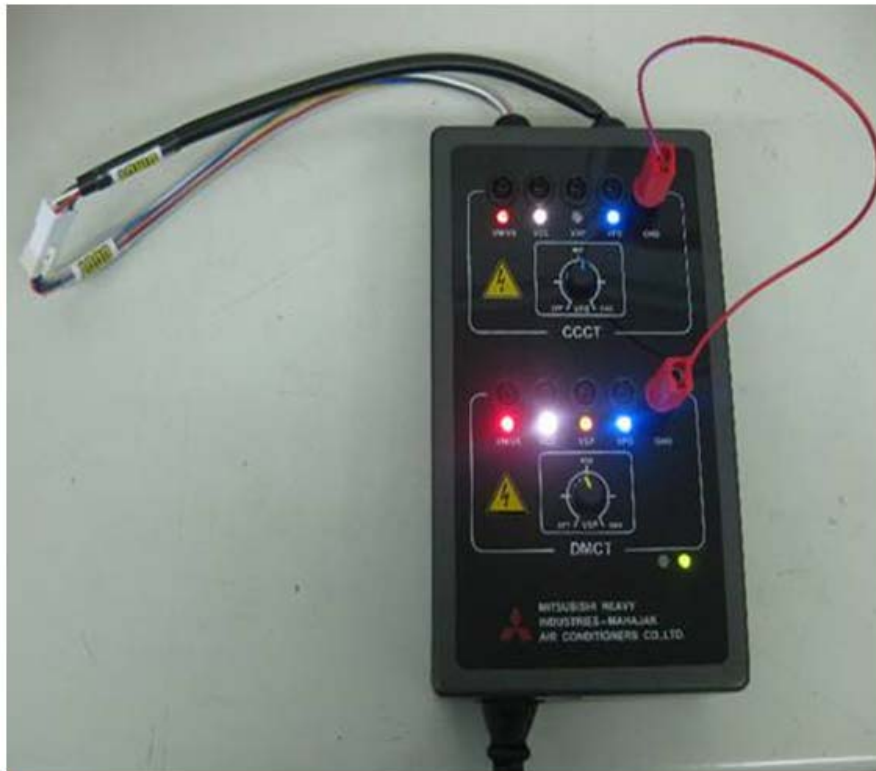
(Depend on FM model)

(2) Connect the wiring between CCCT and PWB

How to use CCCT?

1-2 How to use Control circuit checker (CCCT)

(2) How to check



Self check DMCT-CCCT join and check all LED

(0) Before turn on the power supply

- Check fuse and varistor on PWB

(1) Turn on a unit via remote controller

(2) Check voltage

- $V_m - GND : 330VDC$
- $V_{cc} - GND : 15VDC$

(3) Check V_{sp} and V_{fg}

- Flashing (On and Off)?
Flashing condition will be depend on FM control

⇒ If yes, PWB is normal.

This new version CE mark

DC MOTOR NOTES

- Never disconnect or reconnect a DC motor while the power is on to the air conditioner.
- Never disconnect or reconnect a DC motor while the fan shaft is turning.
- Always rotate the shaft of a DC motor by hand to ensure it rotates smoothly, if tight DC motor is usually faulty.

Please view the following tables to select the Model No and Connector Type for testing DC motors & PCB.

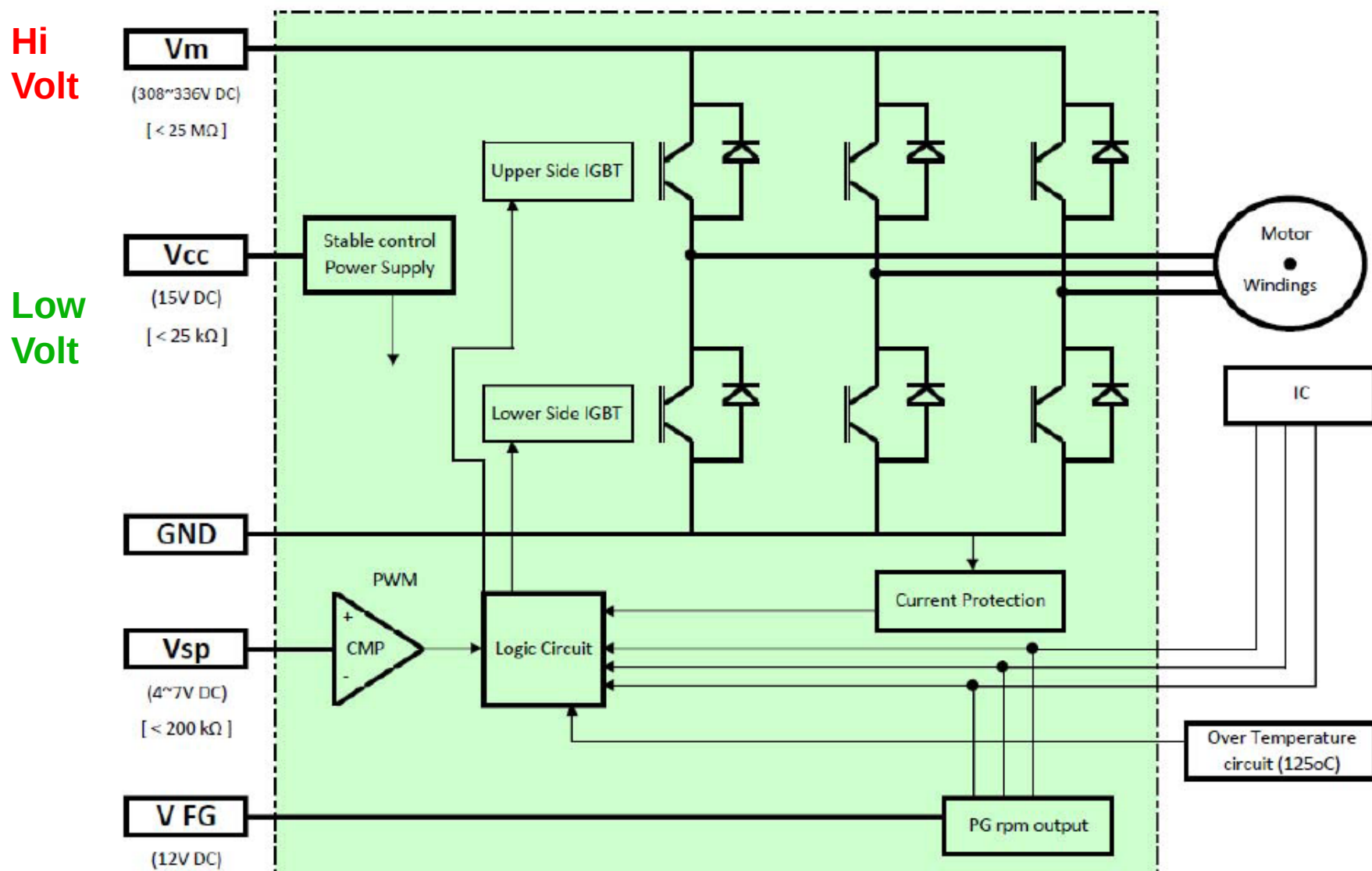
Indoor DC fan motor (CNU)							
Model	Part No.	Type of connector	RPM (@ Vsp 6.5V)	Vm	Vcc	Vsp	V FG
SRK20ZG-S	SSA512T081	A	2479	200 ~ 375	13.5~16.5	0 ~ 7.3	12
SRK20ZJ-S	SSA512T081B	A	2479	200 ~ 375	13.5~16.5	0 ~ 7.3	12
SRK20ZIX-S	SSA512T092	A	2307	200 ~ 410	13.5~16.5	0 ~ 7.3	12
SRK20ZJX-S	SSA512T092	A	2307	200 ~ 410	13.5~16.5	0 ~ 7.3	12
SRK25ZD-S	SSA512T064B	A	2079	240 ~ 375	13.5~16.5	0 ~ 7.3	12
SRK25ZGA-S	SSA512T081	A	2479	200 ~ 375	13.5~16.5	0 ~ 7.3	12
SRK25ZJ-S	SSA512T081B	A	2479	200 ~ 375	13.5~16.5	0 ~ 7.3	12
SRK25ZDXA-S	SSA512T046F	A	2340	50~370	13.5~16.5	0~6.5	12
SRK25ZGX-S	SSA512T046F	A	2340	50~370	13.5~16.5	0~6.5	12
SRK25ZIX-S	SSA512T092	A	2307	200 ~ 410	13.5~16.5	0 ~ 7.3	12

Indoor motor type A

Outdoor DC fan motor (CNA)							
Model	Part No.	Type of connector	RPM (@ Vsp 6.5V)	Vm	Vcc	Vsp	V FG
SRC20ZG-S	SSA512T075	D	1867~2284	120 ~ 375	14 ~ 16	0 ~ 7.3	12
SRC20ZJ-S	SSA512T094	D	1690	50 ~ 370	13.5 ~ 16.5	0 ~ 6.5	12
SRC20ZIX-S	SSA512T094	D	1690	50 ~ 370	13.5 ~ 16.5	0 ~ 6.5	12
SRC20ZJX-S	SSA512T094	D	1690	50 ~ 370	13.5 ~ 16.5	0 ~ 6.5	12
SRC25ZDA-S	SSA512T038D	D	1917~2343	120~375	14~16	0~7.3	12
SRC25ZG-S	SSA512T075	D	1867~2284	120 ~ 375	14 ~ 16	0 ~ 7.3	12
SRC25ZJ-S	SSA512T094	D	1690	50 ~ 370	13.5 ~ 16.5	0 ~ 6.5	12
SRC25ZDXA-S	SSA512T038D	D	1917~2343	120~375	14 ~ 16	0~7.3	12
SRC25ZGX-S	SSA512T075	D	1867~2284	120 ~ 375	14 ~ 16	0 ~ 7.3	12

Outdoor motor type D

DC MOTOR CIRCUIT DIAGRAM



DC motor

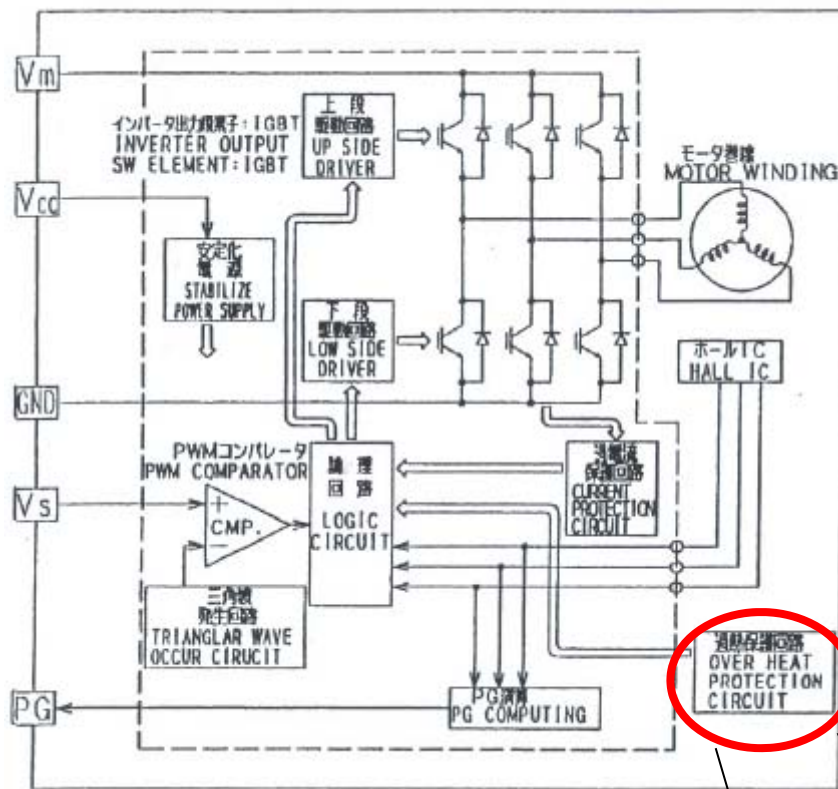


Fig. Wiring of DC motor

Vm ; motor power voltage input

Vcc ; Control power voltage input

GND ; gnd

Vs ; Speed control voltage input

FG ; Revolution pulse output

Over heat protection starts at $125 \pm 15^\circ\text{C}$ over.

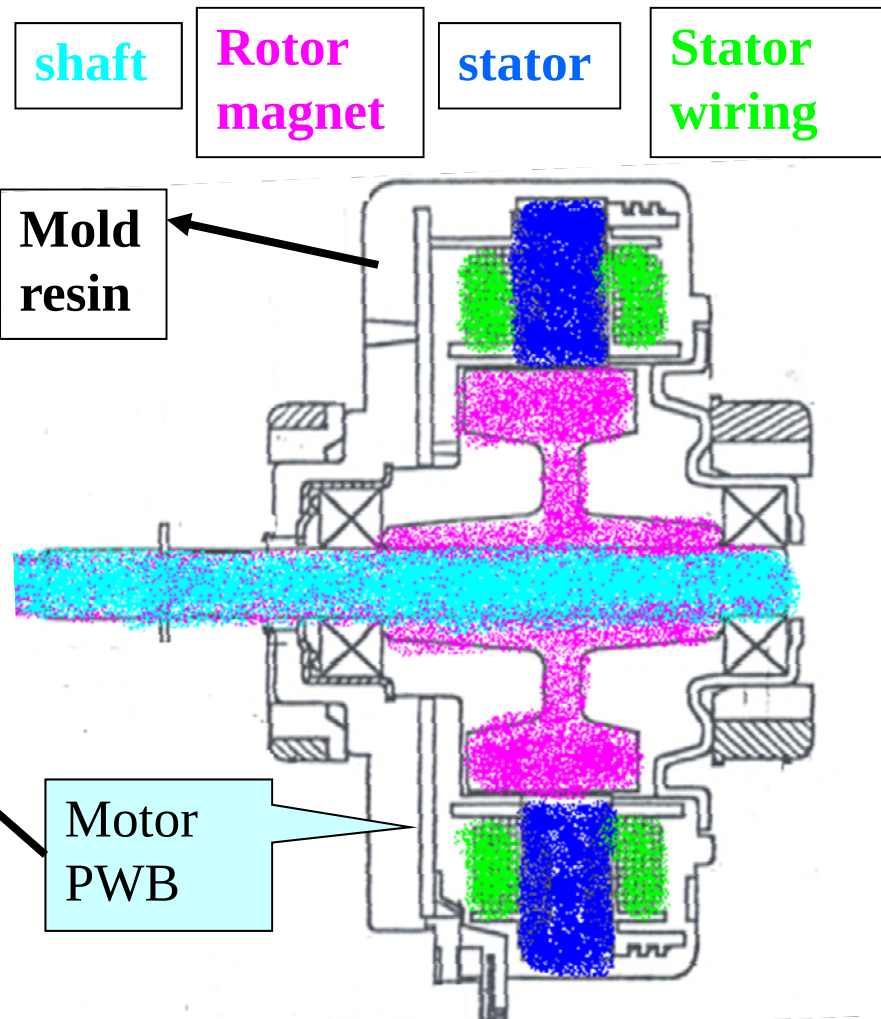


Fig. DC Fan motor construction

1. Indoor DC Fan motor (type A)

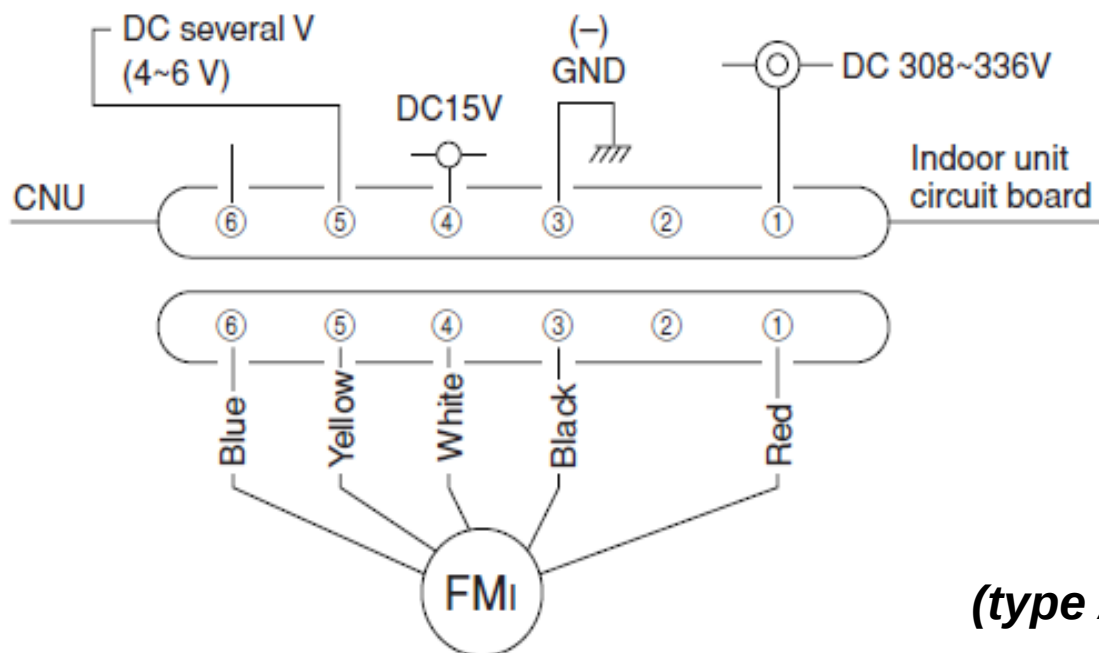


Fig. Wiring from PWB

- ① Power voltage input (Vm /red)
- ② NC
- ③ GND (Gnd /black)
- ④ Control signal (Vcc /white)
- ⑤ Speed control signal (Vsp /yellow)
- ⑥ Revolution output_(Vfg /blue)

(type A)

Notes (1) Remove the fan motor and measure it without power connected to it.

(2) If the measured value is below the value when the motor is normal, it means that the fan motor is faulty.

Indoor DC Motor Part no.

SSA512T072A

SSA512T081, B

SSA512T092

DC Fan motor resistance check

Measuring point	Resistance when normal
④ - ③ (Vcc - Gnd)	25 kΩ or higher
⑤ - ③ (Vsp - Gnd)	100 kΩ or higher
① - ③ (Vm - Gnd)	1 MΩ or higher

2. Outdoor DC Fan motor (type D)

ZG model

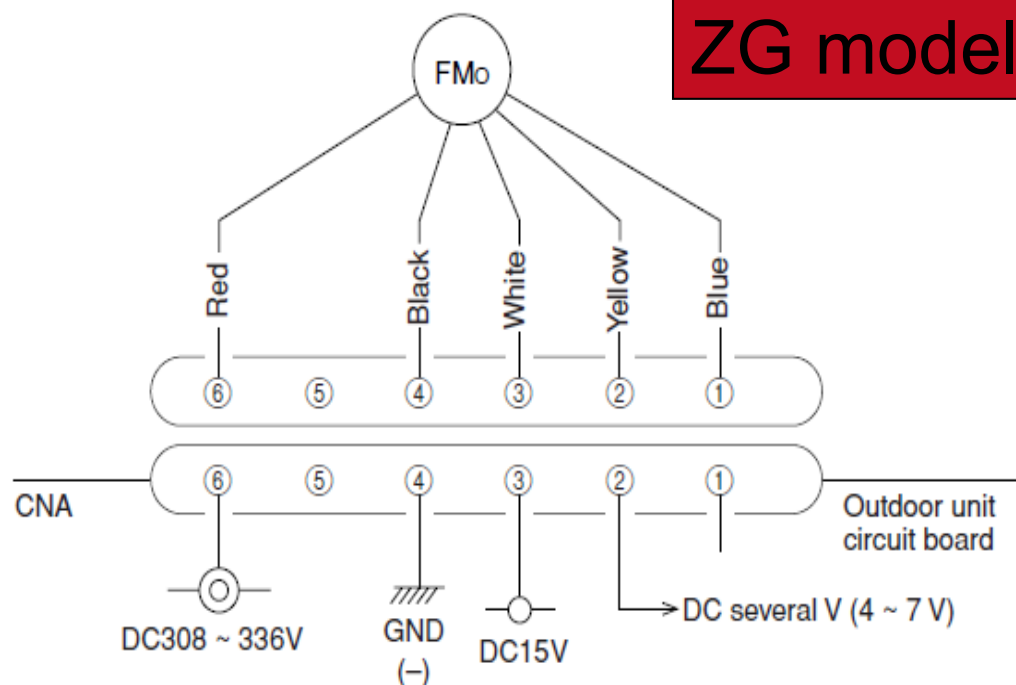


Fig. Wiring from PWB

- ① Revolution output (Vfg /blue)
- ② Speed control signal (Vsp /yellow)
- ③ Control signal (Vcc /white)
- ④ GND (Gnd /black)
- ⑤ NC
- ⑥ Power voltage input (Vm /red)

(type D)

Notes (1) Remove the fan motor and measure it without power connected to it.

(2) If the measured value is below the value when the motor is normal, it means that the fan motor is faulty.

Outdoor DC Motor Part no.

SSA512T075

SSA512T091A

SSA512T094

Measuring point	Resistance when normal
③ - ④ (Vcc - Gnd)	25 kΩ or higher
② - ④ (Vsp - Gnd)	100 kΩ or higher
⑥ - ④ (Vm - Gnd)	1 MΩ or higher

2. Outdoor DC Fan motor (type B)

ZEA model

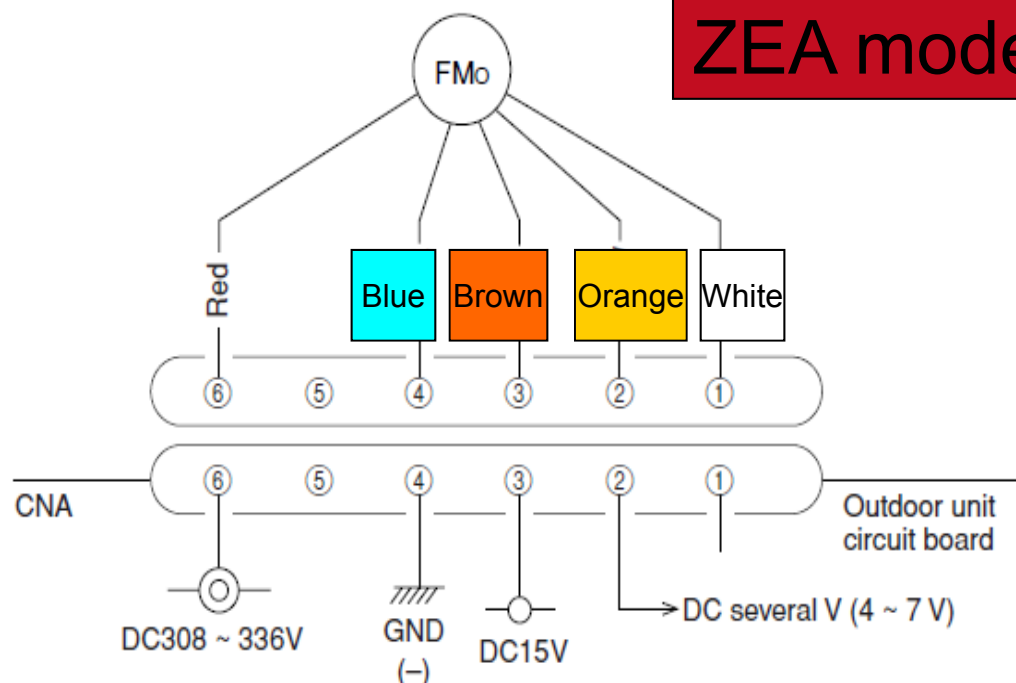


Fig. Wiring from PWB

- ① Revolution output (Vfg /blue)
- ② Speed control signal (Vsp /yellow)
- ③ Control signal (Vcc /white)
- ④ GND (Gnd /black)
- ⑤ NC
- ⑥ Power voltage input (Vm /red)

(type B)

Notes (1) Remove the fan motor and measure it without power connected to it.

(2) If the measured value is below the value when the motor is normal, it means that the fan motor is faulty.

Outdoor DC Motor Part no.
SSA512T076
SSA512T076A

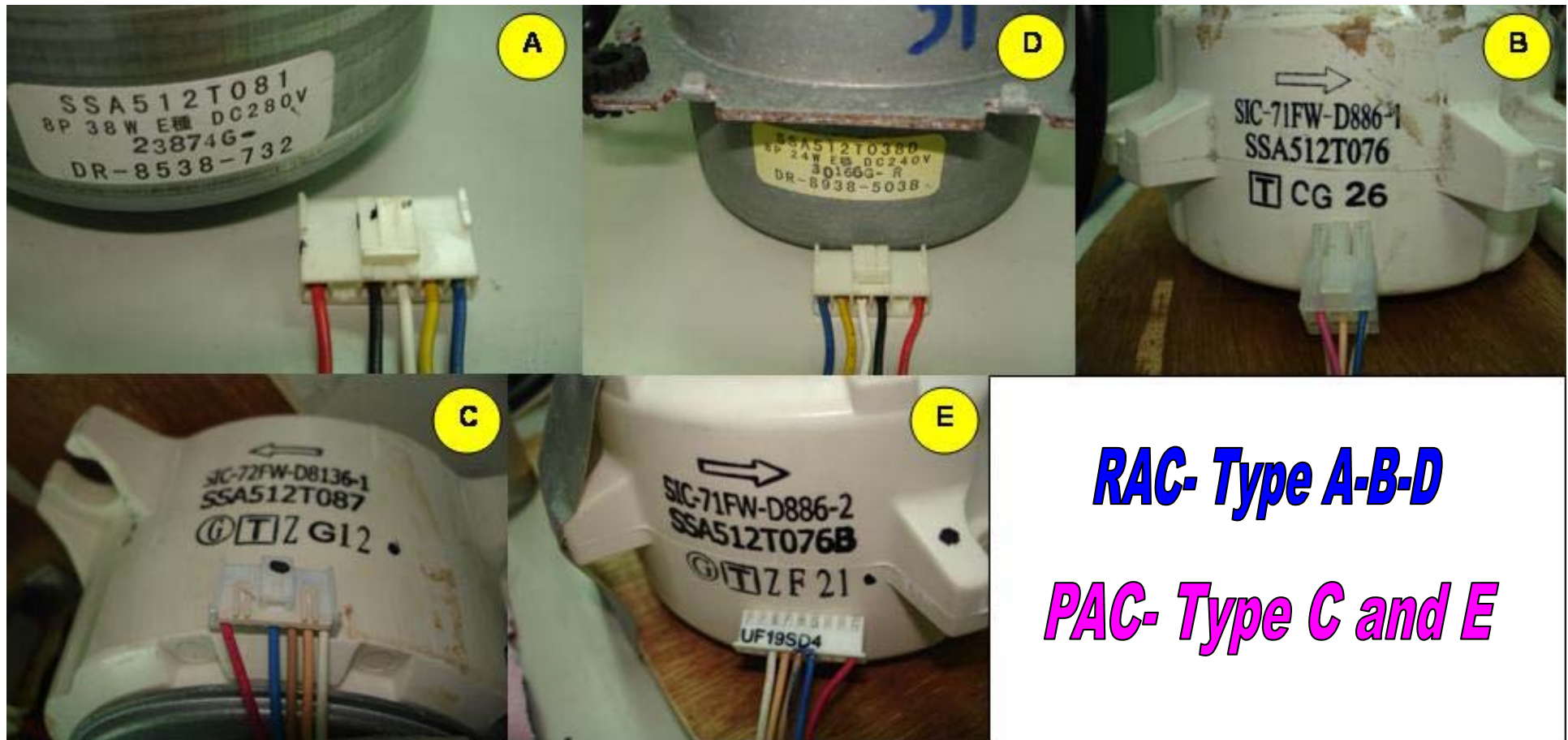
Measuring point	Resistance when normal
③ - ④ (Vcc - Gnd)	25 kΩ or higher
② - ④ (Vsp - Gnd)	100 kΩ or higher
⑥ - ④ (Vm - Gnd)	1 MΩ or higher

TYPE DC MOTOR OF RAC

INDOOR			
NO.	MODEL	DC MOTOR P/NO	TYPE
1	SRK20ZG-S	SSA512T081	A
2	SRK25ZG-S	SSA512T081	A
3	SRK35ZG-S	SSA512T081	A
4	SRK20ZIX-S	SSA512T092	A
5	SRK25ZIX-S	SSA512T092	A
6	SRK35ZIX-S	SSA512T092	A
7	SRK50ZIX-S	SSA512T092	A
8	SRK60ZIX-S	SSA512T092	A
9	SRK50ZHX-S	SSA512T092	A
10	SRK60ZHX-S	SSA512T092	A
11	SRK63ZEA-S	SSA512T072A	A
12	SRK71ZEA-S	SSA512T072A	A
13	SRK80ZEA-S	SSA512T072A	A
14	SRK63ZE-S1	SSA512T072A	A
15	SRK71ZE-S1	SSA512T072A	A
16	SRK80ZEA-S1	SSA512T072A	A
17	SKM20ZG-S	SSA512T081	A
18	SKM22ZG-S	SSA512T081	A
19	SKM25ZG-S	SSA512T081	A
20	SKM35ZG-S	SSA512T081	A
21	SKM50ZG-S	SSA512T081	A

OUTDOOR			
NO.	MODEL	DC MOTOR P/NO	TYPE
1	SRC20ZG-S	SSA512T075	D
2	SRC25ZG-S	SSA512T075	D
3	SRC35ZG-S	SSA512T075	D
4	SRC20ZIX-S	SSA512T094	D
5	SRC25ZIX-S	SSA512T094	D
6	SRC35ZIX-S	SSA512T094	D
7	SRC50ZIX-S	SSA512T091A	D
8	SRC60ZIX-S	SSA512T091A	D
9	SRC50ZHX-S	SSA512T091A	D
10	SRC60ZHX-S	SSA512T091A	D
11	SRC63ZEA-S	SSA512T076C	B
12	SRC71ZEA-S	SSA512T076C	B
13	SRC80ZEA-S	SSA512T076C	B
14	SRC63ZE-S1	SSA512T076C	B
15	SRC71ZE-S1	SSA512T076C	B
16	SRC80ZEA-S1	SSA512T076C	B
17	SCM40ZG-S	SSA512T061B	B
18	SCM45ZG-S	SSA512T061B	B
19	SCM48ZG-S	SSA512T061B	B
20	SCM60ZG-S	SSA512T061B	B
21	SCM80ZG-S	SSA512T076C	B

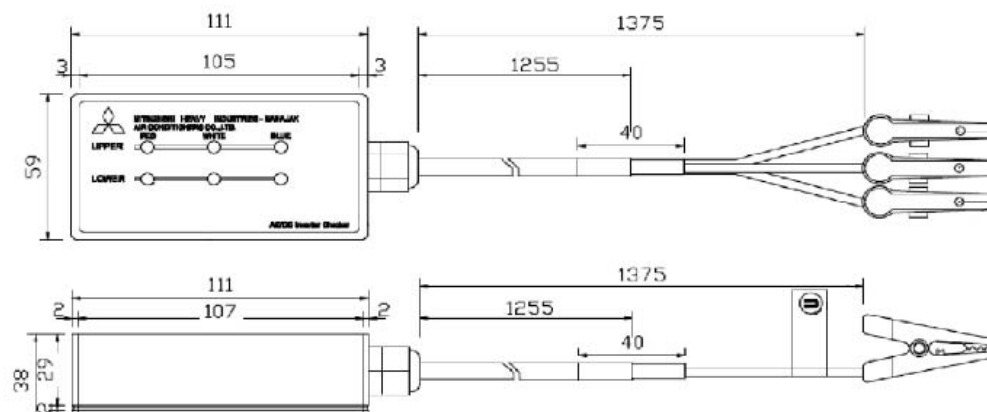
PICTURES TYPE OF DC MOTOR



For PAC- Type of connectors dc motor are development process

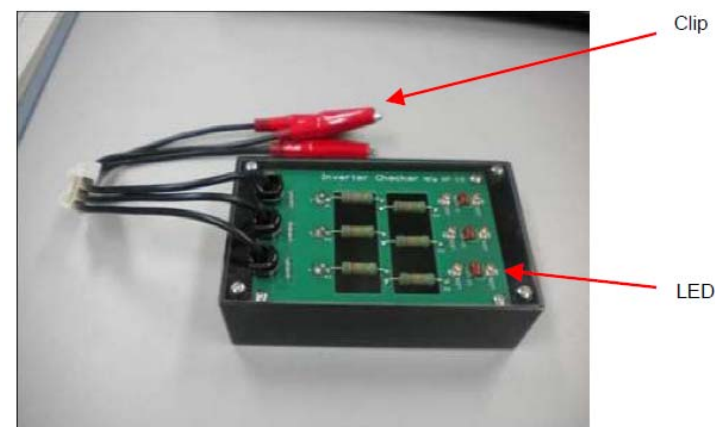
RMA006A013 A **ICT**

INVERTER CHECKER TOOL



The inverter checker tool is used to verify the correct voltage is supplied to the compressor

Confirm output inverter drive of
inverter PWB and judgment before
changing compressor and PWB



CAUTION ! ELECTRIC SHOCK

CAUTION:

HIGH VOLTAGE (Clips and Compressor Terminals)

HIGH TEMPERATURE (Resistors)



HIGH VOLTAGE WARNING:

Clips and compressor terminals are at high voltage.

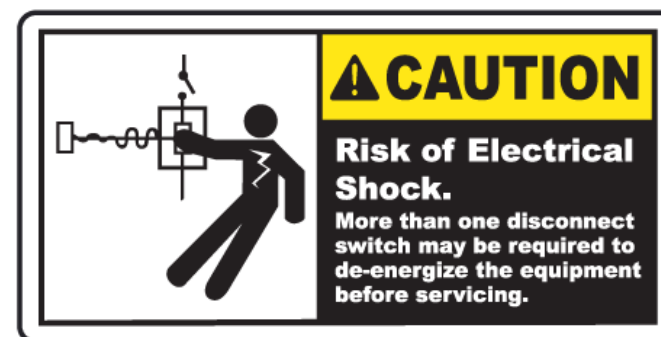
Prior to working with inverter checker, cut off the power supply and wait for more than 5 minutes to complete discharging.

Do not touch inverter checker with wet hands.

Do not connect power Line (L1/L2/L3/N) with inverter checker.

Do not use inverter checker for more than 10 minutes continuously. The tool will be over heated.

Do not modify the inverter checker.



Cautions before identifying fault

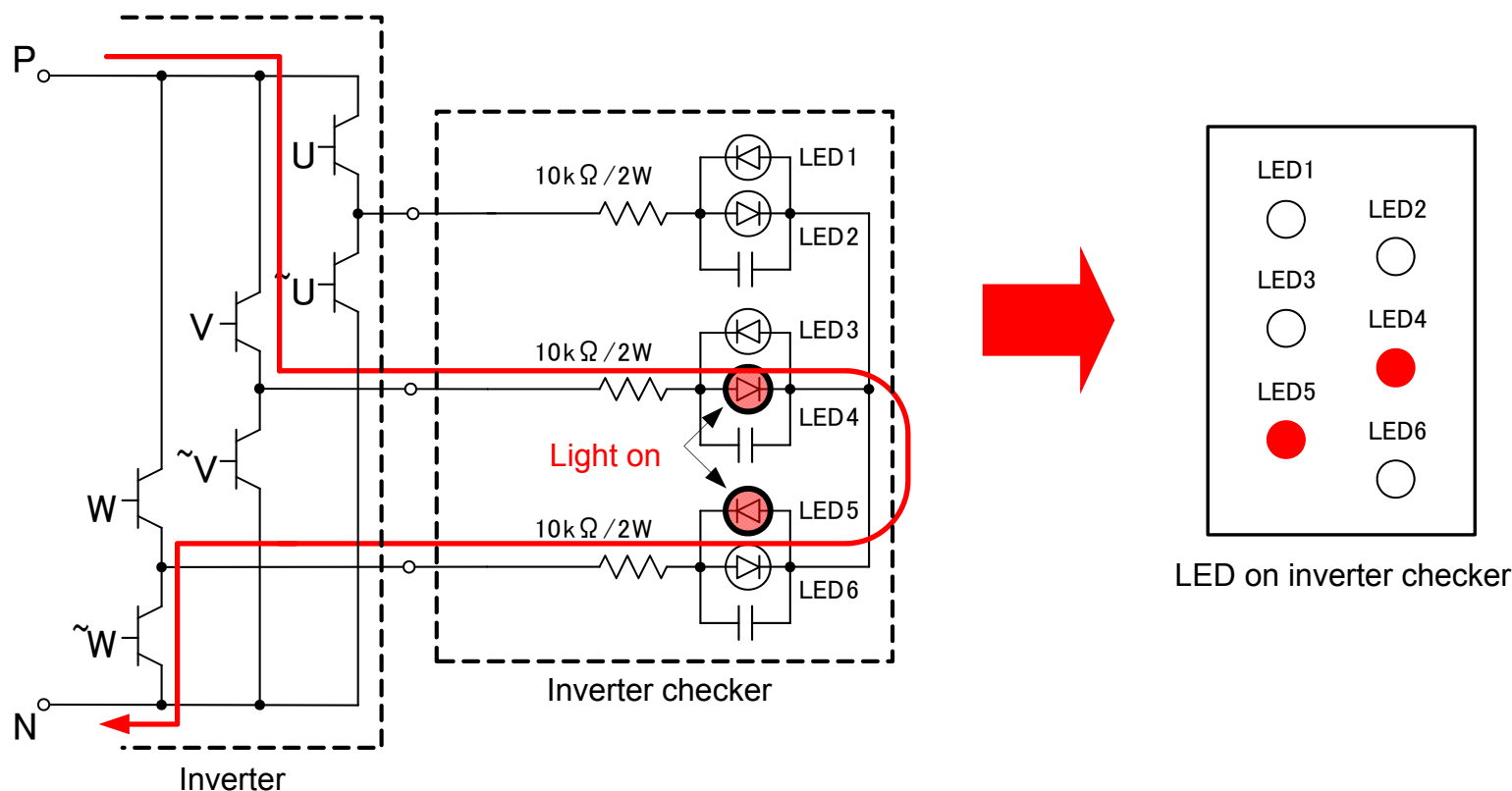
- Never touch the terminals. Terminals have high voltage. Failure to do so may result in electric shock.
- Never touch the terminals with wet hands. Failure to do so may result in electric shock.
- Do not use inverter checker over 10 minutes continuously. Resistors on the inverter checker will get extremely hot.

Inverter Checker

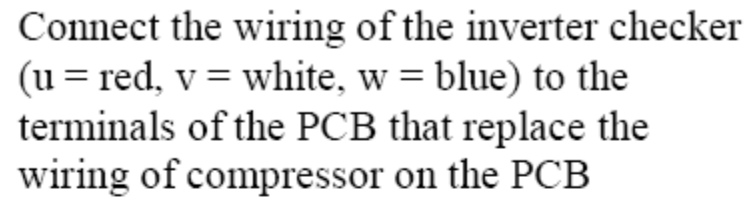
<Principle of operation>

According to switch the mode (6 patterns) of power transistor, LED of inverter checker will light ON in order.

⇒ If inverter has anomaly, LED will be flashing.

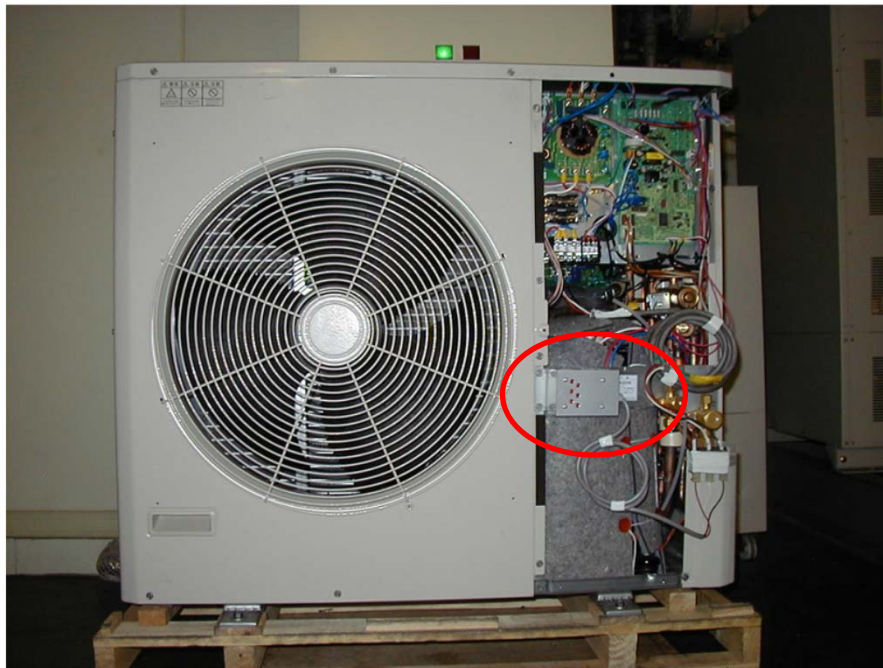


MHI MITSUBISHI
/ GROUP HEAVY
INDUSTRIES



The control logic after a period time, the unit will activate and stop on under-current

How to judgement by Inverter checker?



LED indication at normal inverter output



LED indication in compressor protection control



Example of LEDs indication at open failure of arm on V phase of power module.



LED indication when V phase is open.

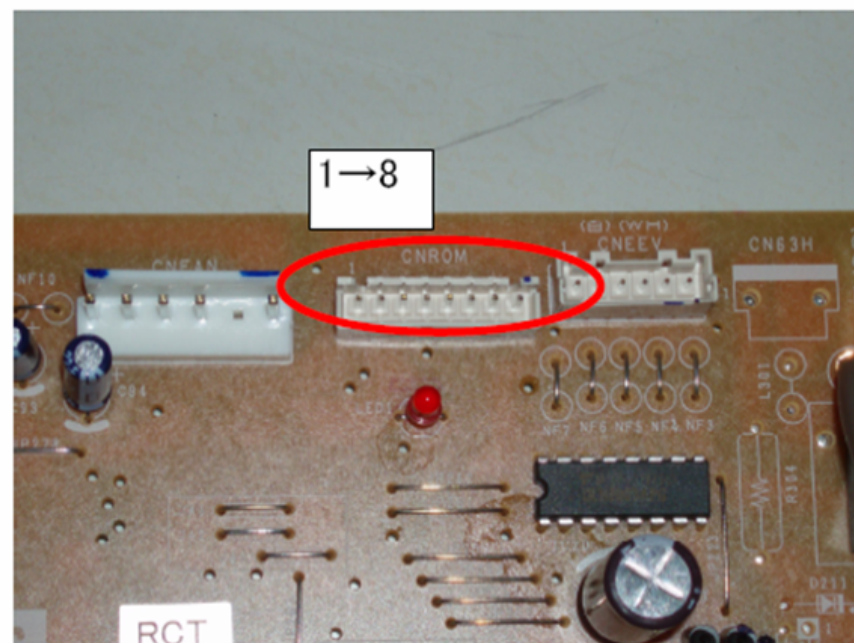
INVERTER CHECKER FOR RAC

How to use Inverter checker for RAC

1.Objective products

Inverter checker is applicable with category 1 and 2. In case of category 2, it is necessary to short between pin 2 and pin 3 of the connector whose name is "CNROM" due to different protocol to operate a compressor. By shorting between pin 2 and pin3, the protocol to operate a compressor is changed and inverter checker is applicable.

On the other hands, in case of category 3, it is not possible to apply inverter checker since it is not changeable for the protocol to operate a compressor.



Inverter checker for RAC and SCM

CAN BUT HAVE TO SHORT PIN

(1)Category 1

SRC50ZD-S1	CAN
SRC63/71ZE-S1	
SRC71ZET-S	
SRC50ZFX-S	
SRC50ZFXA-S	
SCM40/45/48/60/80ZF-S	
SCM80ZFC-S	
SRC50ZG-S	
SRC50ZGX-S	
SRC50ZGT-S	
SRC50ZG-SS	
SCM40/45/48/60/80ZG-S	
SCM80ZGT-S	
SCM80ZGC-S	
SCM100/125ZJ-S1	
(Dip switch setting is necessary)	

(2)Category 2

SRC22/25/28/36RM	SRCRS40E8M2
SRC22/25/28/36TM	SRC40/50/60ZJX-S
SRC22/25/28/36TMT	SRC63/71/80ZK-S
SRC22/25/28TM-S	SRC63/71/80ZKH-S
SRCT22/25/28E8M	SRC71ZKT-S
SRCR22/25/28E8M	DXC21/24/28Z4-S
SRC28/40/56TM2	SRC22,25,28,36RMA
SRC40RM2	SRC40RMA2
SRC40TM2T	SRC22,25,28TMN
SRC40TM2-S	SRC50ZJA-S
SRCR40E8M2	SRC50/60ZJXA-S
SRCT40E8M2	SRC63/71/80ZKA-S
SRC22/25/28/36RSM	DXC09/12/18Z4-S
SRCRS28E8M	SRC20/25/35ZJA-S
SRC40RSM2	SRC20/25/35ZJXA-S

Inverter checker is applicable with category 1 and 2. In case of category 2, it is necessary to short between pin 2 and pin 3 of the connector whose name is "CNROM" due to different protocol to operate a compressor. By shorting between pin 2 and pin3, the protocol to operate a compressor is changed and inverter checker is applicable.

CASE 3 → CANNOT USE

(3)Category 3

SRC40/50/60ZHX-S	SRC40/50/56SI2	SRC28/40TK2
SRC40/50/60ZIX-S	SRC40/50/63SJ2	SRC22/25/28/36TL
SCM40/45/50/60/71/80ZJ-S	SRC40/50/63SK2	SRC28/40/56TL2
SCM50/60/71/80ZJ-S1	SRC40/50SL2	SRC20/25/35ZIX-S
SRC22/25/28/36SH	SRC63SLA2	SRC20/25/35/50ZJ-S
SRC22/25/28/36SI	SRC22/25/28RK	SRC20/25/35ZJX-S
SRC22/25/28/36SJ	SRC40RK2	DXC09/12Z3-S
SRC22/25/28/36SK	SRC22/25/28/36RL	SRC10/13YJ-S
SRC22/25/28/36SL	SRC40RL2	
SRC40/50/56SH2	SRC22/25/28TK	

CANNOT USE

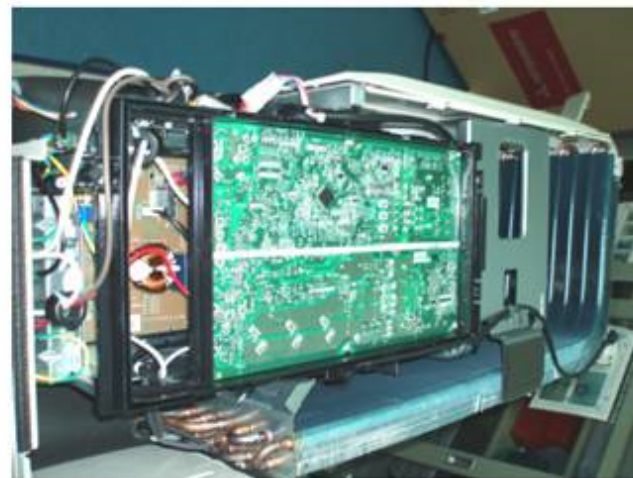
On the other hands, in case of category 3, it is not possible to apply inverter checker since it is not changeable for the protocol to operate a compressor.

In case of SRK63ZK-S

(1)Open the top panel

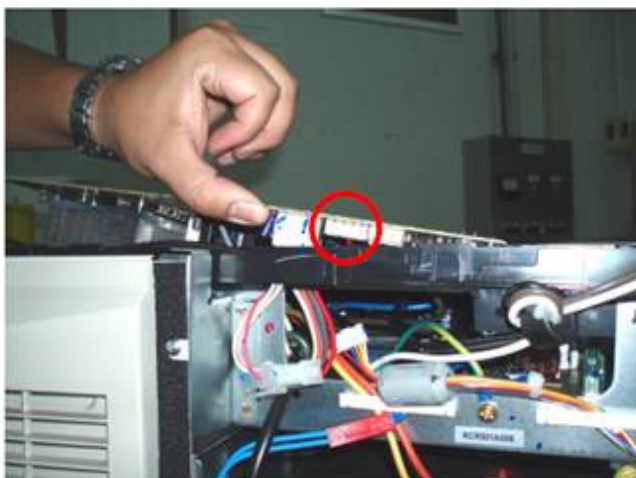


(2) Take away a cover of control box



(3) Short between pin 2 and pin 3 **before energizing an unit**

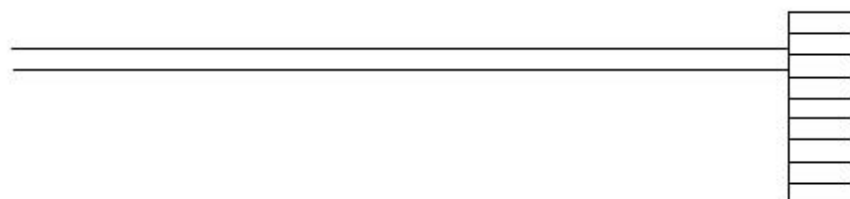
Special connector shown below is useful to short between pin 2 and pin 3.



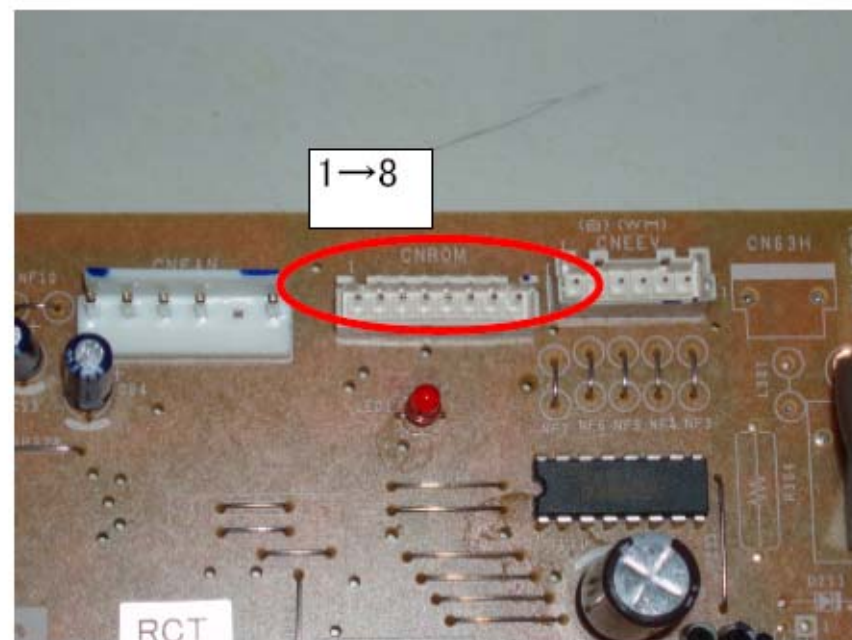
INVERTER CHECKER FOR RAC

Inverter checker is applicable with category 1 and 2. In case of category 2, it is necessary to short between pin 2 and pin 3 of the connector whose name is "CNROM" due to different protocol to operate a compressor. By shorting between pin 2 and pin3, the protocol to operate a compressor is changed and inverter checker is applicable.

On the other hands, in case of category 3, it is not possible to apply inverter checker since it is not changeable for the protocol to operate a compressor.

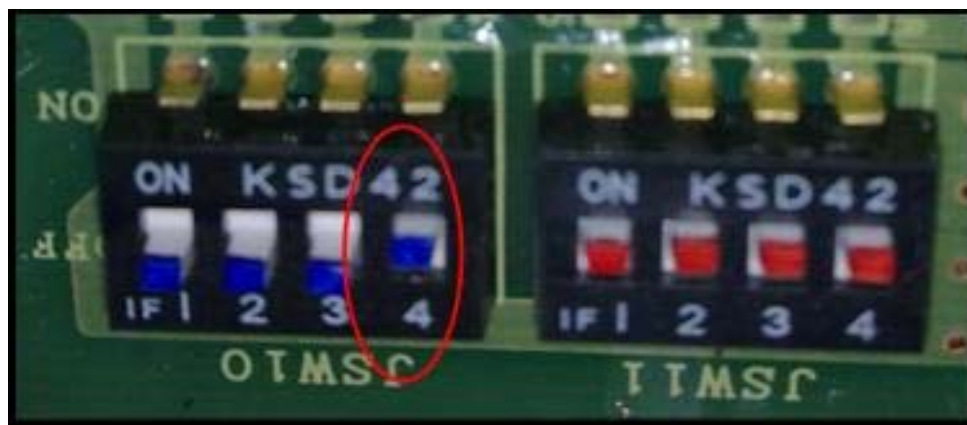


Jumper for RAC-SCM

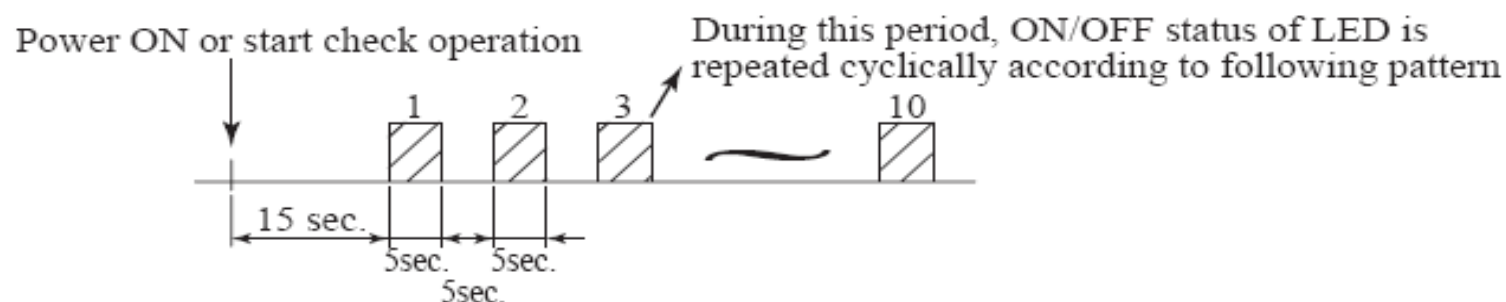


Inverter Checker For SCM100-125

【Improved】 In case of new SCM inverter (SCM100-125)
Inverter “**Test mode**” function is added in order to use inverter checker.
(Turn SW10-4 on the inverter PCB ON and power ON)

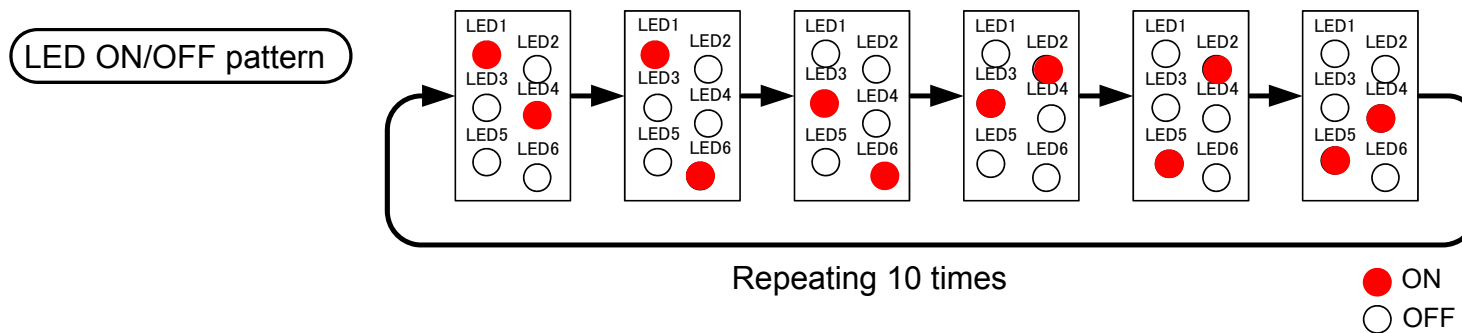


ON/OFF status of LED	If all of LED are ON/OFF according to following pattern	If all of LED stay OFF or some of LED are ON/OFF
Inverter PCB	Normal	Anomalous

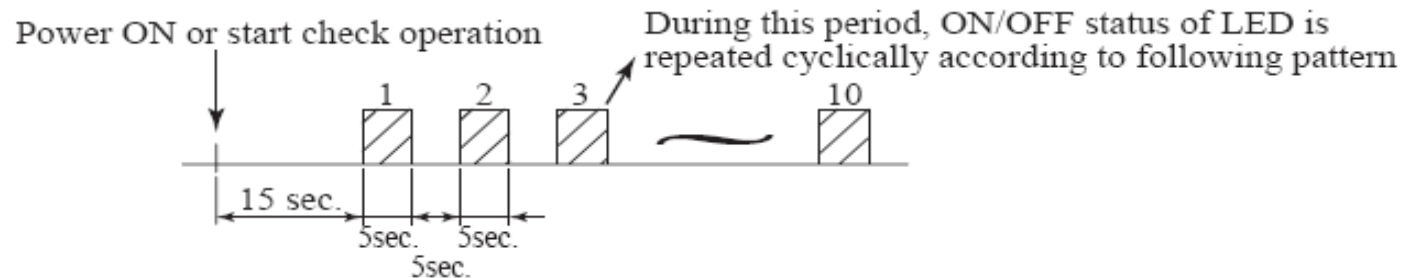


Inverter Checker

It becomes available for all inverter models

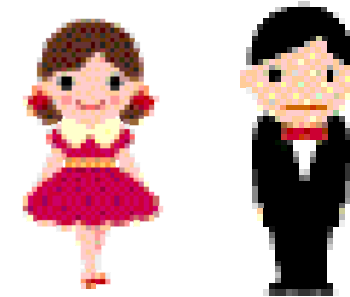


ON/OFF status of LED	If all of LED are ON/OFF according to following pattern	If all of LED stay OFF or some of LED are ON/OFF
Inverter PCB	Normal	Anomalous



Be sure to turn off JSW 10-4 on outdoor inverter PCB, after finishing the check operation.

End



Thank you!

a group company of



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Practical Examination ?

1. Please check Motor
by DMCT ?

3. Please check PWB
by Inverter checker ?



2. Please check PWB
by CCCT ?

