DIGITAL TYPE SPEED CONTROLLER

1. Funtion chart

• Automatic computer control

Function	Contents
Change rotating direction	CW/CCW termianls(Default setting: Clockwise)
Run / Stop	Operated with RUN/STOP Key
Set RPM	Set digital(multiple magnification unit, 10rpm)
Set mark magnification	Set with Gear ratio(refer to gear ratio chat) & multiple magnification(Unit 0.005)
SLOW RUN SLOW STOP	0.1 sec. ~ 30 sec.(Unit 0.1)
POWER-ON/OFF	Set the mode when power is supplied
LOCK Function	Prevents malfunctions
Setup Parameters	Setup for powering off and saving the parameters

2. How to use

(1) Power on/off Switch (Default setting: 'NO')

The following features the functions when the power is supplied.

YES	It keeps running even when the power is off, if set to "Run". It stops when the power is off, if set to "Stop".
NO	It stops regardless of "Run/Stop".

• Setting up to "NO" can help prevent unexpected dangers.
• When using "YES" mode   (Please use in set mode)

The user can remotely control "RUN/STOP" regardless the power is on or off.

Installation   1. Set the switch to 'YES' when power is on
2. Operate RUN/STOP once when power is on
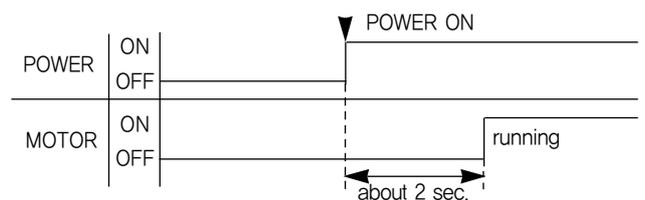(It recognizes YES)

⚠ Caution   1. It takes about 2 seconds to commence operation after the power is supplied.
2. Both "Run" and "Stop" may lighten up when the "Run/Stop" key is used over 10,000 times. In such a case, alter the switch to "No" for a second to restore its normal condition.

(2) Restoration after a blackout

The conditions will be restored in a same manner before the blackout occurred.

(3) Reset time

Reset time takes approximately 2 seconds. No digital indication will be made while resetting.

Operate the key after digital signal is on.
When "Run/Stop" key is set to "Run" before turning the power off, it will take 2 seconds to run when the power is supplied. Reset time applies to post-blackout as well.

(4) Automatic alteration of frequency

When set as 1400 rpm ~ 1800 rpm at 60 Hz, rpm becomes at 1500 at 50 Hz, but when set as 1500 rpm at 50 Hz, rpm remains 1500 even when Hz increases to 60.

(5) Trouble Indications

Whenever trouble occurs, "Run" and "Stop" signals are both indicated. It may be restored and set to default setting when the power is resupplied. If the trouble is not resolved after resupplying the power, please contact SPG's R&D department or refer to 7. Troubleshooting.
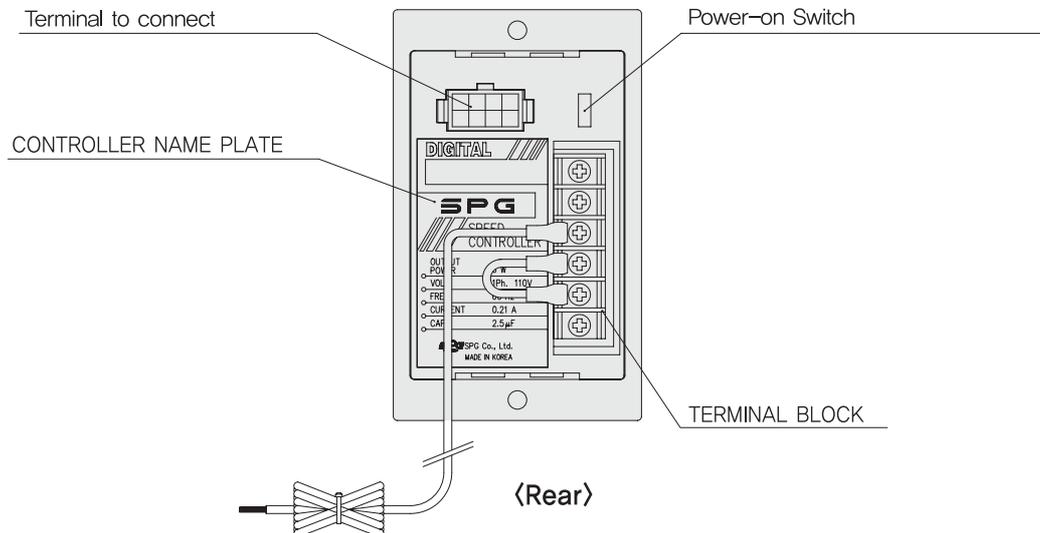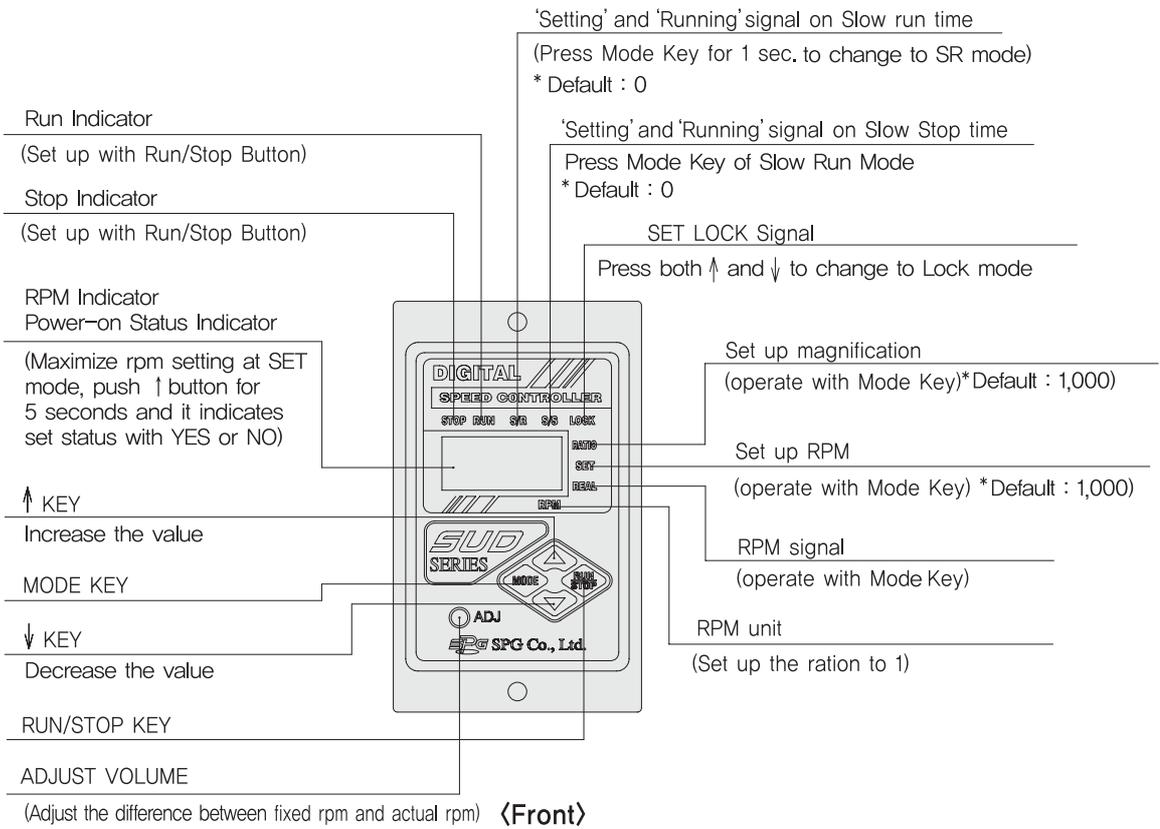
(6) Thermal protector

A thermal protector (TP) is installed in a motor to prevent the motor from overheating. When the motor overheats, the TP activates to stop the motor. It automatically deactivates when the motor cools down and start the motor again.

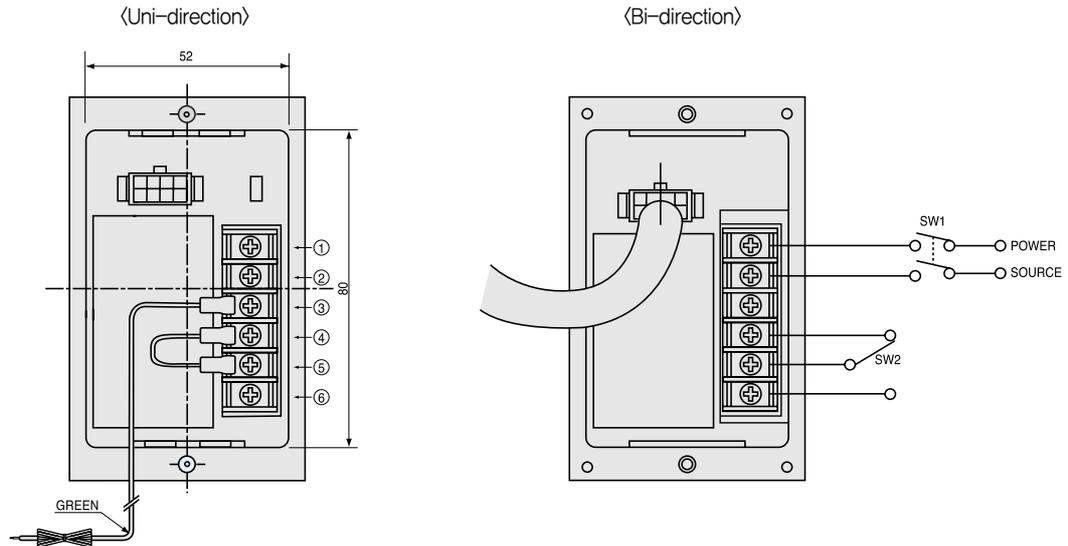## (7) Test for withstand voltage & Impulse voltage

Need to disconnect of two power codes from outer motor wire in the case of withstand voltage testing with line earth, impulse voltage testing and testing of heat transfer resistance.

3. Parts names and functions

'Setting' and 'Running' signal on Slow run time
(Press Mode Key for 1 sec. to change to SR mode)
* Default : 0

'Setting' and 'Running' signal on Slow Stop time
Press Mode Key of Slow Run Mode
* Default : 0

SET LOCK Signal
Press both ↑ and ↓ to change to Lock mode

Run Indicator
(Set up with Run/Stop Button)

Stop Indicator
(Set up with Run/Stop Button)

RPM Indicator
Power-on Status Indicator
(Maximize rpm setting at SET mode, push ↑ button for 5 seconds and it indicates set status with YES or NO)

Set up magnification
(operate with Mode Key)*Default : 1,000)

Set up RPM
(operate with Mode Key) *Default : 1,000)

↑ KEY
Increase the value

RPM signal
(operate with Mode Key)

MODE KEY

RPM unit
(Set up the ration to 1)

↓ KEY
Decrease the value

RUN/STOP KEY

ADJUST VOLUME
(Adjust the difference between fixed rpm and actual rpm) 〈Front〉

Terminal to connect

Power-on Switch

CONTROLLER NAME PLATE

TERMINAL BLOCK

〈Rear〉

4. Usage

(1) Transformation of rotation direction

⟨Uni-direction⟩　　　　　　　　　　　　　⟨Bi-direction⟩

⟨Fig.3⟩ Rear side of the digital type speed controller

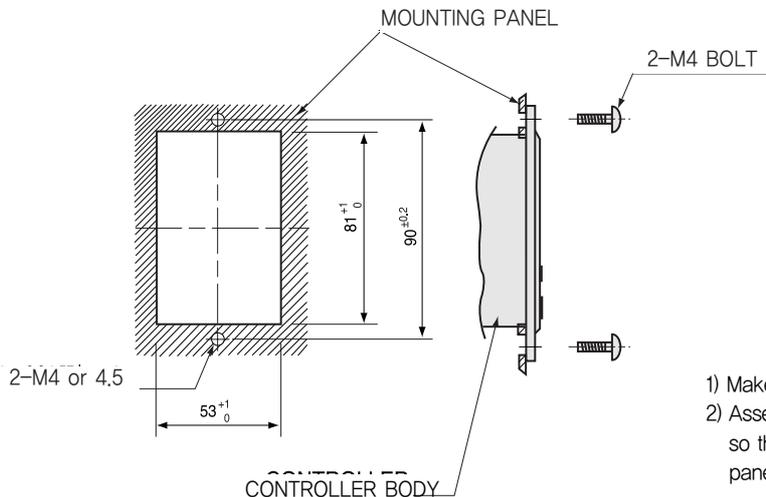### 1) Uni-direction continuous operation

- To reverse the direction of rotation from clockwise to counter-clockwise, connect ⑤COM and ⑥CCW instead of connecting ⑤ COM and ④CW.
- Power cords should always be connected to ①AC and ②AC terminals. Do not forget to turn the power off before connecting.

2) Bi-direction operation

- Install the switches as shown in ⟨Fig. 3⟩ ⟨Bi-direction?⟩
- The rotating direction cannot be reversed instantaneously. (SW1) must be turned off and the motor must be completely stopped before switching (SW2).

Switch number	Switch contact capacity
SW1	AC 125V or AC 250V more than 5A
SW2	AC 125V or AC 250V more than 5A

(2) Mounting procedure

1) Make rectangular holes in the combination panel.
2) Assemble the main body of the controller and the front cover so that the controller body fits in the rectangular holes of the panel. Use M4 bolts and nuts to fix

5. Mode Descriptions

(1) RATIO MODE

Ratio mode indicates the actual speed of gearhead output RPM and conveyor speed by multiplying rpm with magnification.

1) Gear Ratio (for indication conforming to gearhead output rpm)

〈"SET" or"REAL" value = Motor rpm÷Gearratio〉
Example) The Gear Ratio chart is listed. Select the required value with ↑, ↓ button 1.000 ↔ 3 ↔ ... ↔ 100 ... ↔ 202 ... ↔ 1000 ... ↔ 2515 [Refer to P14. Gear ratio]

2) Multiple magnification value (for indication conforming to the transfer speed of conveyor belt)

〈"SET" or"REAL" value =Motor rpm X Multiple magnification value 〉
Example) The Multiple magnifications are listed from 0.005 thru 0.995. Select the required value with ↑, ↓ button 1.000 ↔ 0.995 ↔... ↔ 0.015 ↔ 0.010 ↔ 0.005 (0.005 per tick)

(2) SET MODE

Set mode is used to setup RPM using ↑, ↓ button

| If the indicated magnification is 1.000 |

Term Value is 10 rpm
Example) • Frequency 50Hz : 90 ↔ 100 ↔ 110 ↔ ... ↔ 1400 ↔ 1500rpm
• Frequency 60Hz : 90 ↔ 100 ↔ 110 ↔ ... ↔ 1400 ↔ ... ↔ 1700 ↔ 1800rpm

| If the indicated magnification is not 1.000 |

Rpm can be set in connection with the Multiple Magnification value set on Ratio Mode.
Example) Gear ratio value = 3
Base Unit, 10÷3rpm. The value is rounded to nearest tenth.
• Frequency 50Hz : 29.9 ↔ 33.3 ↔ 36.6 ↔ ... ↔ 466.6 ↔ 500.0rpm
• Frequency 60Hz : 29.9 ↔ 33.3 ↔ 36.6 ↔ ... ↔ 466.6 ↔ ... ↔ 566.6 ↔ 600.0rpm
Example) Multiple magnifications value =0.500
Base Unit, 10X0.500. The value is rounded to nearest tenth.
• Frequency 50Hz : 45.0 ↔ 50.0 ↔ 55.0 ↔ ... ↔ 700.0 ↔ 750.0rpm
• Frequency 60Hz : 45.0 ↔ 50.0 ↔ 55.0 ↔ ... ↔ 700.0 ↔ ... ↔ 850.0 ↔ 900.0rpm

(3) REAL MODE

Real mode indicates the actual speed of a motor by multiplying with magnification.

「If the indicated magnification is 1.000」
Term Value is 5 rpm
Example) 0 ↔ 5 ↔ 10 ↔ ... ↔ 90 ↔ 95 ↔ 100 ↔ ... ↔ 1400 ↔ ... ↔ 1700rpm

「If the indicated magnification is not 1.000」
Operate on "Ratio" Mode by follows magnification and Gear ratio value

Example) Gear ratio value = 3
Base Unit, 5÷3rpm. The value is rounded to nearest tenth.
0 ↔ 1.6 ↔ ... ↔ 29.9 ↔ 31.6 ↔ 33.3 ↔ ... ↔ 466.6 ↔ ... ↔ 566.6rpm
Example) Multiple magnification value=0.500
Base Unit, 5X0.500. The value is rounded to nearest tenth.
Example) 0 ↔ 1.6 ↔ ... ↔ 29.9 ↔ 31.6 ↔ 33.3 ↔ ... ↔ 466.6 ↔ ... ↔ 566.6rpm

| NOTE | Nothing will be indicated if the magnification is under 1.000 |

(4) S/R MODE

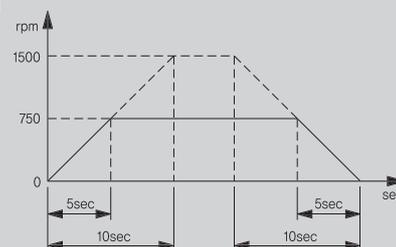S/R mode sets up the Slow Run time using ↑, ↓ button. 0.1 sec per tick, up to 30 seconds
0 ↔ 0.1 ↔ ... ↔ 0.2 ↔ 0.3 ↔ 0.4 ↔ ... ↔ 29.9 ↔ 30.0sec.

(5) S/S MODE

S/S mode sets up the Slow Stop time using ↑, ↓ button. 0.1 sec per tick, up to 30 seconds
0 ↔ 0.1 ↔ ... ↔ 0.2 ↔ 0.3 ↔ 0.4 ↔ ... ↔ 29.9 ↔ 30.0sec.

NOTE   1. SLOW RUN · SLOW STOP time

Slow Run and Slow Stop time refers to time required to change rpm from 0 to 1500 and vice versa.

(ex) When Slow Run time is 10sec. And "Set" rpm is 750rpm

$$10s \times \frac{750rpm}{1500rpm} = 5s$$

It takes about 5sec from 0rpm to 750rpm. The same time will be required for Slow Stop.

NOTE   2. Slow Run and Slow Stop time can be longer if Inertia of load is bigger

(6) Power-On Status Setup Mode

Power-On Status Setup mode enables selections of operation when the power is supplied.

1) Indicating "YES"

When the power is resupplied, it recovers its previous operating conditions.

Previous condition	After the power is resupplied
"RUN"	Run(after 2Sec.)
"STOP"	Stop

2) Indicating "NO"

When the power is resupplied, it stops regardless of its previous condition

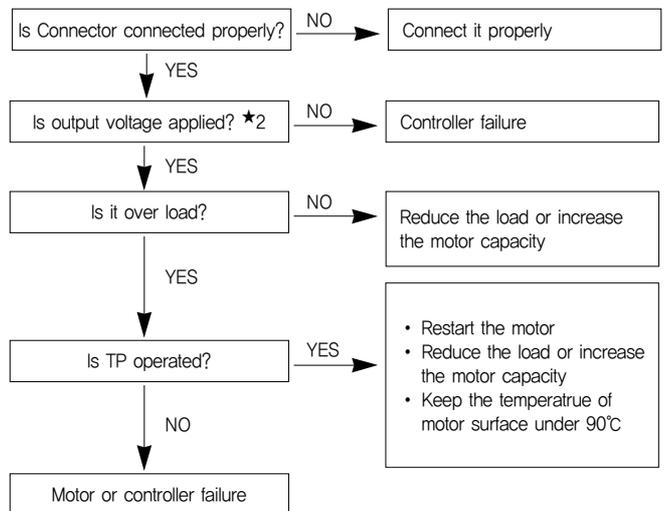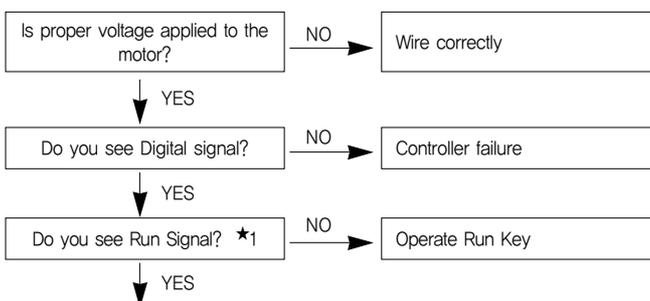| Previous condition	After the power is resupplied
"RUN"	Stop
"STOP"	Stop

6. Gear Ratio Char

The gear ratio between actual and nominal can be different. Prefer to the chart in below

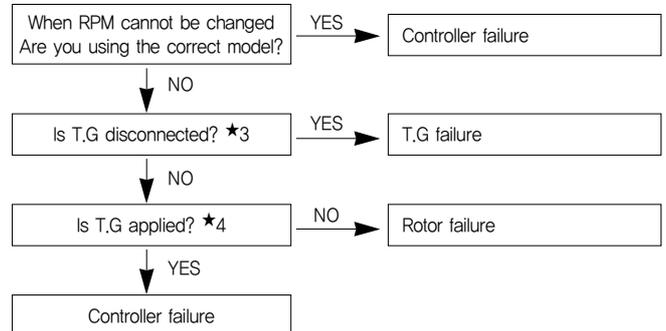| Nominal gear ratio	Actual gear ratio							Inter-decimal gear head
	60/6W	70/15W	80/15W	80/25W	90/40W	90/60W	90/90W	
3	3,00	3,00	3,00	3,00	3,00	3,00	3,00	
3,6	3,60	3,59	3,57	3,57	3,60	3,60	3,60	
5	5,00	5,00	5,00	5,00	5,00	5,04	5,04	
6	6,00	6,00	6,00	6,00	6,03	6,00	6,00	
7,5	7,50	7,50	7,50	7,50	7,50	7,50	7,50	
9	9,00	9,00	9,00	9,00	9,00	9,00	9,00	
10	10,00	10,00	10,29	10,00	10,00	10,00	10,00	
12,5	12,50	12,14	12,50	12,50	12,50	12,50	12,50	
15	15,00	15,00	15,00	15,00	15,00	15,00	15,00	
18	18,00	17,92	18,08	18,08	17,67	18,00	18,00	
20	19,90	20,00	20,00	20,00	20,00	20,19	20,19	10
25	25,06	24,80	25,00	25,00	24,73	25,00	25,00	
30	30,25	30,00	30,00	30,00	30,00	30,00	30,00	
36	36,30	36,00	36,00	36,00	36,00	36,00	36,00	
40	40,80	40,36	40,11	40,11	40,36	39,68	39,68	
50	50,00	50,00	50,00	50,00	50,00	50,00	50,00	
60	60,00	60,00	60,00	60,00	60,00	60,00	60,00	
75	75,00	75,00	75,00	75,00	75,00	76,02	76,02	
90	90,00	90,67	90,00	90,00	90,00	90,00	90,00	
100	100,0	100,0	100,0	100,0	100,0	100,0	100,0	
120	120,0	118,0	120,0	120,0	120,0	120,0	120,0	
150	150,0	154,0	150,0	150,0	150,0	149,9	149,9	
180	180,0	181,2	180,0	180,0	180,0	179,8	179,8	
200	198,9	194,8	200,0	200,0	201,8	197,2	197,2	
250	251,5	–	–	–	–	–	–	

7. Trouble shooting

Whenever the trouble occurs, check the following table to see if it can be repaired on site. If the trouble remains unresolved after corresponding to the following steps, please contact the dealer or manufacturer.
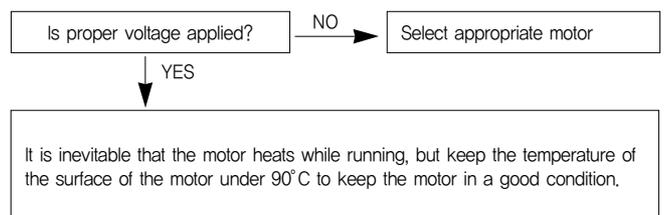
1. The motor does not rotate

Is proper voltage applied to the motor? — NO → Wire correctly

↓ YES

Do you see Digital signal? — NO → Controller failure

↓ YES

Do you see Run Signal? ★1 — NO → Operate Run Key

↓ YES

Is Connector connected properly? — NO → Connect it properly

↓ YES

Is output voltage applied? ★2 — NO → Controller failure

↓ YES

Is it over load? — NO → Reduce the load or increase the motor capacity

↓ YES

Is TP operated? — YES → • Restart the motor • Reduce the load or increase the motor capacity • Keep the temperatrue of motor surface under 90℃

↓ NO

Motor or controller failure

2. When RPM cannot be changed

When RPM cannot be changed Are you using the correct model? — YES → Controller failure

↓ NO

Is T.G disconnected? ★3 — YES → T.G failure

↓ NO

Is T.G applied? ★4 — NO → Rotor failure

↓ YES

Controller failure

3. When abnormal temperature occurs during running

Is proper voltage applied? — NO → Select appropriate motor

↓ YES

It is inevitable that the motor heats while running, but keep the temperature of the surface of the motor under 90°C to keep the motor in a good condition.

1. If "Run" and "Stop" signals are indicated simultaneously, it is caused either by a failure of the controller or as the operation limit of "Yes" mode has been reached. Use "No" mode instead.

2. **Check the voltage** : Check the motor voltage of black-white, black-gray during motor connector is plugged. ⟨C.W black-white=100V⟩ ⟨CCW black-grey=100V⟩ (Voltage doubles for 220V specifications)

3. **Turn on Test** Disconnect the motor connector and check the resistance of red-red wire.

4. **Check the voltage** Connect the motor connector and check the voltage of red-red wire.

8. Specifications

MODEL List	SUD☐IA-V12	SUD☐IB-V12	SUD☐IC-V12	SUD☐ID-V12	SUD☐IX-V12
Rated Voltage	1-phase 110V	1-phase 220V	1-phase 100V	1-phase 200V	1-phase 220~240V
Voltage range	±10%(Compared with arted Voltage)				
Frequency	60Hz	60Hz	50/60Hz	50/60Hz	50Hz
Speed control range	60Hz : 90-1700rpm 50Hz : 90-1400rpm				
Speed changing rate	5%(Standard)				
Set Speed	Digital setting				
Slow run/ Slow stop time	0.1~30sec.				
Temperature range	0~40℃				
Conservation temperature range	-10~60℃				
Humidity range	Less than 85%(There is not dewing)				

DIMENSIONS

✚ SPEED CONTROLLER (SCALE = 1/2)

- **90W and below**(interior condenser)
  → Except over 60W 110V types

- **60W and over**(exterior condenser)
  → 110V types