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SPEED CONTROLLER AND CONTROL MOTORS

INDEX

CHARACTERISTICS OF SPEED CONTROL MOTORS	114
UNIT(CONNECTOR) TYPE CONTROL MOTOR	
ANALOGUE TYPE SPEED CONTROLLER	118
DIGITAL TYPE SPEED CONTROLLER	121
UNIT TYPE SPEED CONTROL MOTOR	127
PACK TYPE CONTROLLER AND CONTROL MOTOR	
SR TYPE SPEED CONTROLLER	140
SS TYPE SPEED CONTROLLER	147
SS 표준 TYPE SPEED CONTROLLER	150
SH TYPE SPEED CONTROLLER	160
PACK TYPE SPEED CONTROL MOTORS	170
SPEED CONTROL INDUCTION MOTOR	171
SPEED CONTROL REVERSIBLE MOTOR	191
SPEED CONTROL ELECTROMAGNETIC BRAKE MOTOR(E · S MOTOR)	205



CHARACTERISTICS OF SPEED CONTROL MOTORS



1. Characteristics of Speed Control Motors

- By using it with the speed controller, a wide range of speed can be controlled (50Hz: 90~1400rpm, 60Hz: 90~1700rpm). The speed can be controlled easily with the speed controller.
- Depending on the type of speed controller, it can be combined with the motor for various purposes such as speed-control, braking, slow run, slow stop, etc.
- Built in T.G(Tacho Generator) to control the feedback. Thus, even if the power frequency changes the rotating numbers does not change.
- When the speed control motor with an electronic brake is used instantaneous braking and electronic braking operate simultaneously for strong braking power.
- The speed control motor with an electronic brake also has a non-excitation run type of electronic brake. Even if the power is off, braking remains active to maintain braking of a load.
- There are 3 types of speed control motors: induction motor, reversible motor and speed control motor, all with an electronic brake. An appropriate motor should be selected depending on its usage.
- Output range of the induction motor is 06W~90W (unit types are 06W~180W). The reversible motor has an output range of 06W~40W and the electronic brake motor has an output range of 06W~40W (However, SR types are 06W~90W).

2. Selection Method

(1) Selection of motor and controller

- Is speed control needed only?
- Is instantaneous braking needed?
- Is maintenance of braking power needed?
- How much is the output of the applicable motor?
- Are the slow run, slow stop functions needed?

(2) Selection of gear ratio of gearhead

- When the number of rotations of the output shaft of the gear requires A rpm to B rpm, the gear ratio is calculated by using the higher number of rotations (B rpm).
- For the AC speed control motor, the number of rotations for the motor is calculated with 1300rpm. (1300 rpm is used as a numerator since the largest output torque is required and 1300 rpm is most frequently used). Use the nearest approximated value of the gearhead (gear ratio = i)

$$\text{at Gear Ratio } i = \frac{1300[\text{rpm}]}{B[\text{rpm}]}$$

(3) Highest number of rotations and lowest number of rotations of the motor shaft

- When the highest number of rotations is NH and the lowest number of rotations is NL, they are as follows.
- Highest number of rotations of the required motor : $NH = B \times i[\text{rpm}]$
- Lowest number of rotations of the required motor : $NL = A \times i[\text{rpm}]$

(4) Required torque of the motor

The required torque of the motor is found as follows.

$$T_M = \frac{T_L}{i \times \eta} \quad [\text{g} \cdot \text{cm}]$$

T_M : required torque of the motor [g · cm]

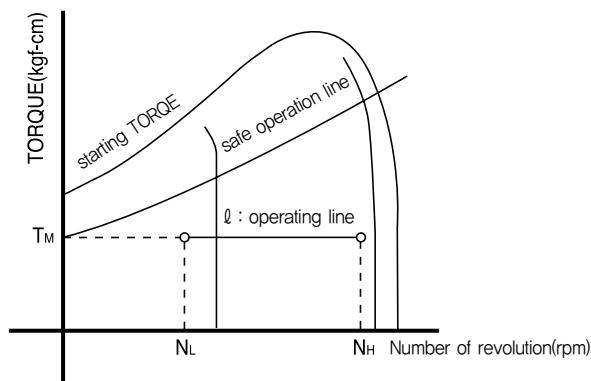
T_L : torque necessary to operate actual load [g · cm]

i : reduction ratio η : efficiency of the gearhead

(5) Selection of the motor

- The motor is decided by the required torque T_M , rotational frequencies $NL \sim NH$ and the torque-number of rotations curve (hereafter, N-T curve). When selecting an AC speed control motor, choose the motor with its operating line below the safe operation line shown in <Fig. 1>

(Even in the area above the limit curve, the motor can be used without any problems as long as the surface temperature remains below 90°C.



〈Fig.1〉 Torque-Number of revolutions (N-T) curve

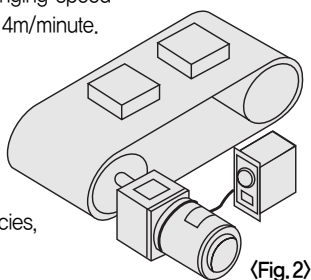
(6) Selection of gearhead

- After the motor is selected, the gearhead should be decided with consideration of the torque size of the load. Confirm that the torque of the load is within the torque allowed by the gearhead.

3. Example of selecting the appropriate motor

Conditions: One way rotation, changing speed within 1m/minute, 2m/minute and 4m/minute.

Drum diameter : 10cm
 Operating torque : 30kg · cm
 Power : single phase 110V 60Hz
 instantaneous braking in emergencies,
 but no holding power.



(1) Motor and controller

- Rotation is in one direction and there is no holding power. Therefore, the induction motor is selected.

(2) Revolutions of output shaft of gearhead

- The number of rotations of the gearhead shaft when the belt conveyor speed is 1m/minute.

$$\text{Number of rotations} = \frac{\text{Speed of belt conveyor}}{\text{Outer diameter of drum}} = \frac{100}{10\pi} \approx 3.18[\text{rpm}]$$

- Number of rotations of the gearhead shaft when the belt conveyor speed is 2m/minute.

$$\text{Number of rotations} = \frac{\text{Speed of belt conveyor}}{\text{Outer diameter of drum}} = \frac{200}{10\pi} \approx 6.37[\text{rpm}]$$

- Number of rotations of the gearhead shaft when the belt conveyor speed is 4m/minute.

$$\text{Number of rotations} = \frac{\text{Speed of belt conveyor}}{\text{Outer diameter of drum}} = \frac{400}{10\pi} \approx 12.74[\text{rpm}]$$

(3) Gear ratio

- The gear ratio is calculated using the higher number of rotations of the gearhead.

$$\frac{\text{Number of rotations of the motor}}{\text{Number of rotations of the gearhead}} = \frac{1300}{12.74} \approx 102$$

The nearest approximated reduction ratio is 1/100.

(4) Number of rotations of motor shaft

- The number of rotations of the motor shaft is calculated by the number of rotations of the gearhead shaft × reduction ratio for each speed of the belt conveyor.
 - 3.18 × 100 = 318 [rpm]
 - 6.37 × 100 = 637 [rpm]
 - 12.74 × 100 = 1274 [rpm]

(5) Required torque of motor

The transfer efficiency of a gear head with gear ratio 100 is 66%, so the required torque of the motor is

$$\frac{\text{operating torque}}{\text{gear ratio} \times \text{Efficiency}} = \frac{30}{100 \times 0.66} \approx 0.45 [\text{kg} \cdot \text{cm}]$$

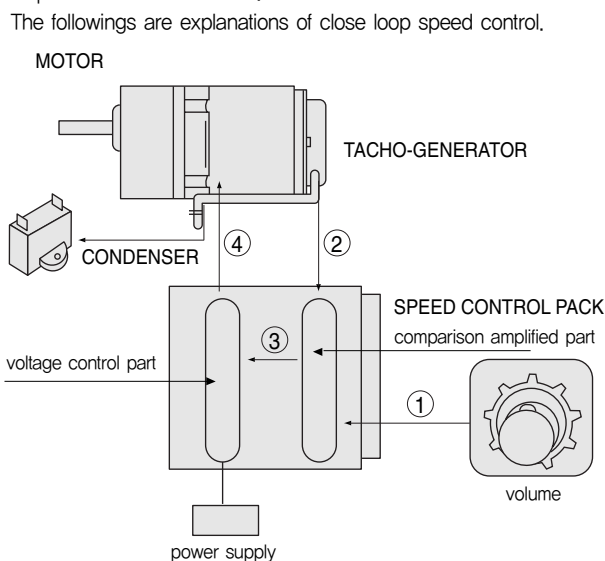
(6) Selection of motor

- From the N-T curve of the induction motor, the S8125GB-V12 motor and the S8KA100B gearhead can be combined to use. However, in such a case, make sure that the inertia load should fall within the specification of the selected motor.

4. The Principle of Speed Control

(1) The Principle of Speed Control

- 〈Fig. 3〉 shows is the basic speed control structure of the close loop current control method.

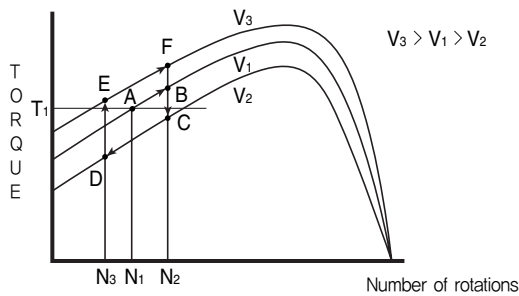


〈Fig.3〉 Basic structure of speed control for the close loopvoltage control method

- If Tacho-Generator changes the voltage that is proportional to the rotations, make comparison between the number of rotations of the motor and the voltage preset by the volume.
- This difference in voltage is called "comparative voltage".
- Comparative voltage operates the motor through the voltage amplifier and the voltage controller.
- Comparative voltage is mostly controlled by zero-crossing.
- Number of rotations is decided by the value that the speed controller selects.
- Even when the load changes, the number of rotations does not change. When the Tacho-Generator changes, the number of rotations immediately changes with the value.
- Accordingly, CLOSE LOOP speed control detects the number of rotations of the motor and controls the operating voltage to maintain it constantly.

(2) Primary voltage control by CLOSE LOOP

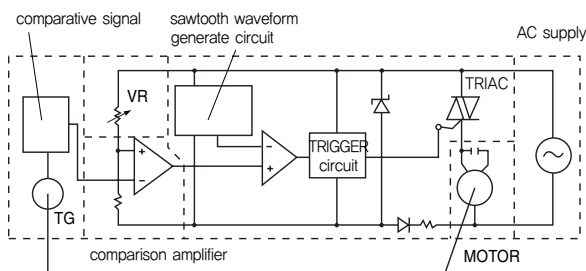
- <Fig. 4> shows the relationship between the torque of the induction motor and the number of rotations as applied voltage (primary voltage) changes.



<Fig.4>

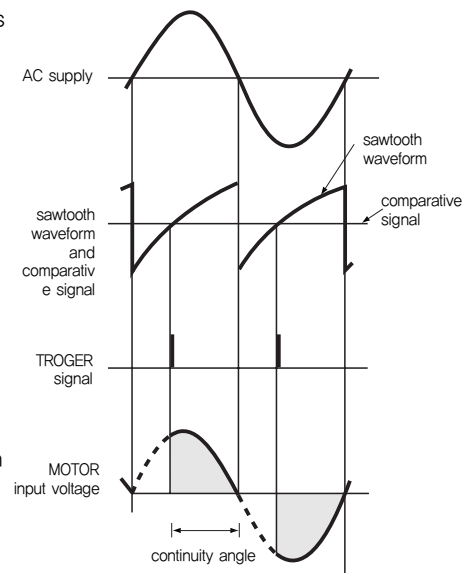
- Point A indicates current voltage (V_1), torque of the load (T_1), and the number of rotations (N_1). When rpm increases to N_2 and voltages changes to V_2 , torque of the load changes to C
- At C, the torque of the load T_1 is larger than the torque of the motor, thus the number of rotations drops below N_2 .
- When the number of rotations becomes N_3 and the voltage is raised to V_3 , then the generated torque becomes larger than the torque of the load to move to E, and then the speed increases toward F.
- To stabilize the number of rotations, it has to make loop smaller like C→D→E→F by controlling the primary voltage.
- During the primary voltage control by close loop, to meet the changes according to the number of rotations of the motor, it should have the primary voltage controlled and maintain the number of rotations constant.

<Fig.5>



(3) Operation of speed controller

- The speed controller is explained in <Fig. 5.>
- Number of rotations of the motor comes from the Tacho-Generator through feedback voltage through the rectifying circuit.
- The difference between the selected voltage of the speed controller which was controlled in the VR and the feedback voltage is amplified in the comparative amplifier.
- A trigger signal is generated from the sawtooth waveform which comes from the sawtooth waveform generator, comparator from the comparative signal and triac from the trigger circuit.
- The angle of the triac is controlled with the trigger signal to control voltage in the motor.
- This makes the number of rotations of the motor constant, thereby controlling it. Refer to <Fig. 6>.

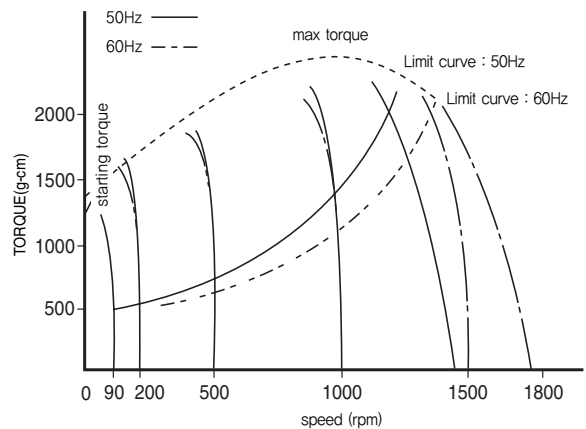


<Fig.6>

5. Limit of Use

(1) Limit curve

- In the AC speed control motor N-T graph <Fig. 7>, the area below the Limit curve is called the continuous operation area.



<Fig.7> Torque-number of revolutions N-T curve

- The limit curve does not go beyond the highest temperature allowed by the motor (continuous for induction motors and 30 minutes rating for reversible motors) and because continuous operation is possible Limit curve does not go beyond the highest temperature within its continuous operation(continuous for induction motors, 30 minutes rating for reversible motors), and the curve is decided by the motor's temperature. is decided by the temperature of the motor.

- Our speed control motor has a class E insulation and the permitted temperature of the winding section is 120°C. Therefore, if the temperature of the winding section is less than 120°C, continuous operation is possible, But since measuring the temperature of the winding section is difficult, continuous operation is generally possible when the surface temperature of the motor housing is less than 90°C. The temperature difference between the winding section and the housing surface is generally around 10°C to 20°C, but may vary depending on the type of the motor.

(2) Surface temperature of 90°C or less

- The highest part of the motor's rising temperature is the winding section. Thus, the highest allowable temperature is decided by the insulation level of the winding section.
(SPG's small AC motors have a class E insulation and the highest allowable temperature is 120°C.)
- The difference between the temperature of the surface of the motor and the winding section is about 10°C~20°C.
(A motor with a cooling fan has about 30°C difference because the cooling fan cools the surface of the motor.)
- When the temperature of the winding section is 120°C, the surface temperature is about 100°C. Therefore 90°C is the sufficient value.

ANALOGUE TYPE SPEED CONTROLLER



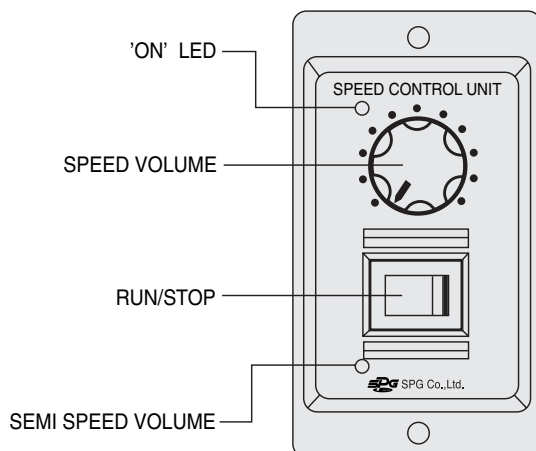
1. How to use

(1) Operation

- 1) The speed control unit and the lead wire connector of the motor are connected and then the plug cord is connected to AC power.
- 2) When the 「RUN/STOP」 switch of the control unit is switched to 「RUN」, it turns clockwise.
- 3) The product is made so that it will rotate in the clockwise direction. However, at times, due to gear ratio, the gearhead shaft rotates counterclockwise.

(2) Speed control

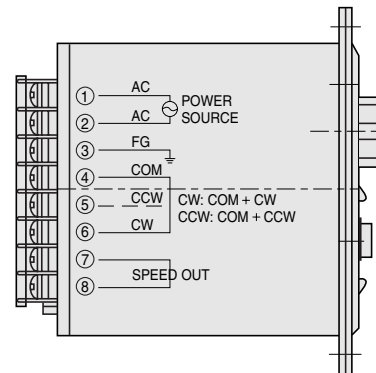
- 1) If the 「SPEED VOLUME」 switch of the analogue type speed controller is turned clockwise, number of rotation of the motor increases and when turned counterclockwise, it slows down.
- 2) It is possible to control and designate the speed of the motor between 90[rpm]~1400[rpm] at 50Hz and 90[rpm]~1700[rpm] at 60Hz.



〈Fig.1〉 Front of the analogue type speed controller

(3) Stop

- 1) If the 「RUN/STOP」 switch of the analogue type speed controller is switched to 「STOP」, the motor stops.
- 2) This switch is not an on-off switch for power. When the motor needs to be stopped for a long time, a separate power source should be installed and turned off.



〈Fig.2〉 Side of the unit type speed controller

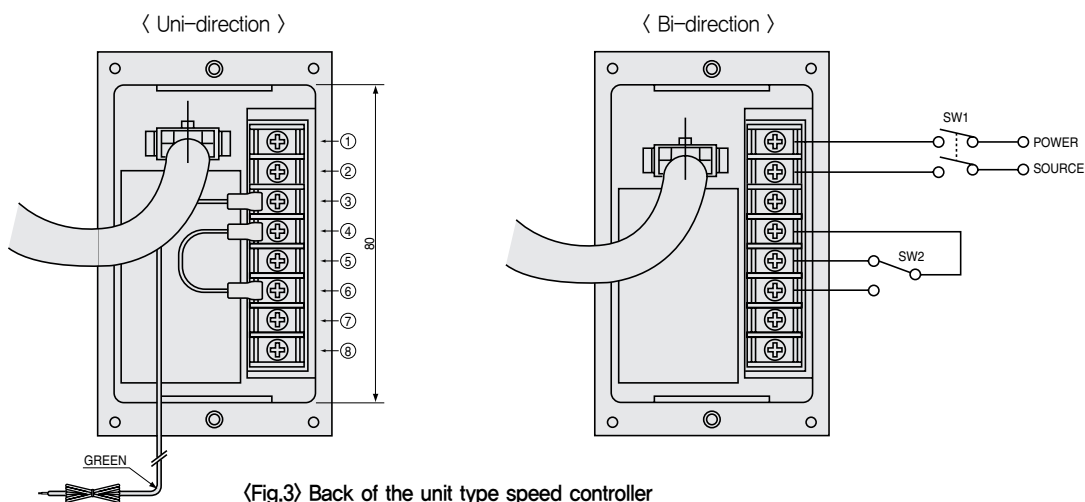
(4) Changing of rotation direction 〈Fig.3〉

1) Continuous operation by uni-direction

- When ④COM and ⑤CCM are connected, the motor will rotate in an opposite direction with that of the conveyer unit.
- Power cords should always be connected to the ①AC and ② AC terminals. Make sure the unit is off when connecting.

2) Normal/reverse operation

- Install the power supply switch (SW1) and the switch (SW2) to changeover between normal and reverse direction as shown in 〈Fig. 3〉 to change the direction of rotation.
- The motor should completely stop after the power switch (SW1) is turned off in order to turn switch (SW2) on. Therefore, instantaneous reverse is not possible.



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

(5) SPEED OUT

- ⑦ and ⑧ are jacks to connect the rpm meter.
- 1) Number of rotation can be seen by connecting a digital display rpm meter(both of Digital and Analogue).
- (Note) Use the spec, suitable as 2000 rpm, AC 10V products.

3. Combination

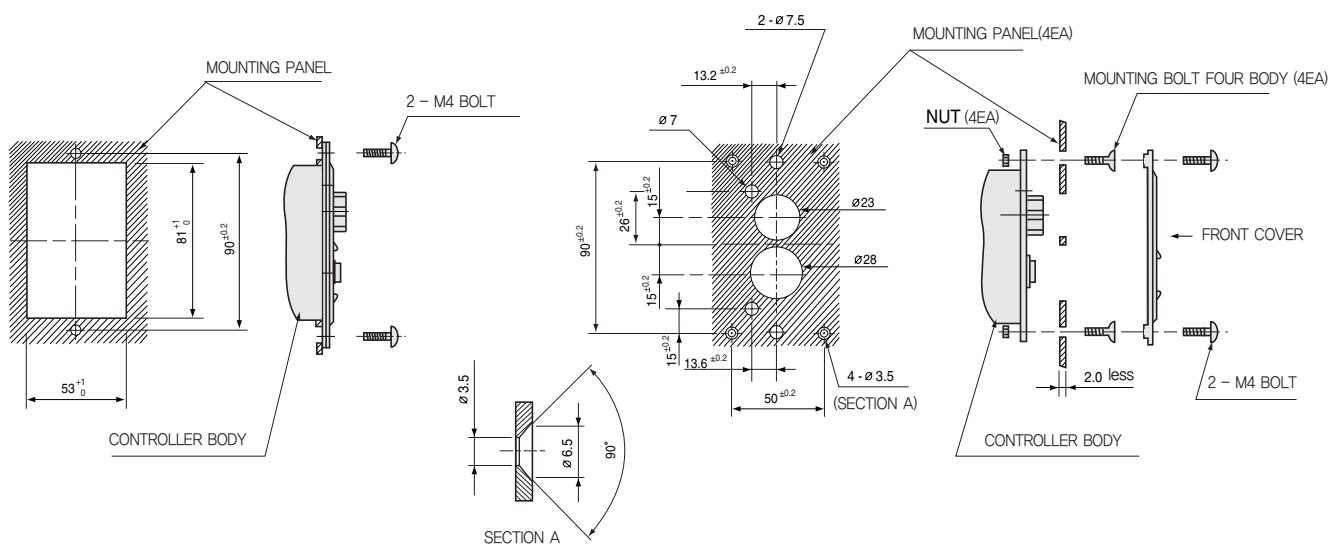
- There are 2 ways to combine the control unit

(1) Combination by making a rectangular hole (Refer to Fig. 4A)

- 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.

(2) Combination without making a rectangular hole (Refer to Fig. 4B)

- 1) Make holes in the combination panel.
- 2) Separate the main body of the controller and the front cover.
- 3) Put the controller surface in the combination panel hole and fix with M3 flat-head bolts and nuts.
- 4) Attach the front cover of the controller to the combination panel and fix with M4 bolts and nuts.
- 5) The combination panel should be less than 2mm thick.



(A) Combination by making a rectangular hole

(B) Combination without making a rectangular hole

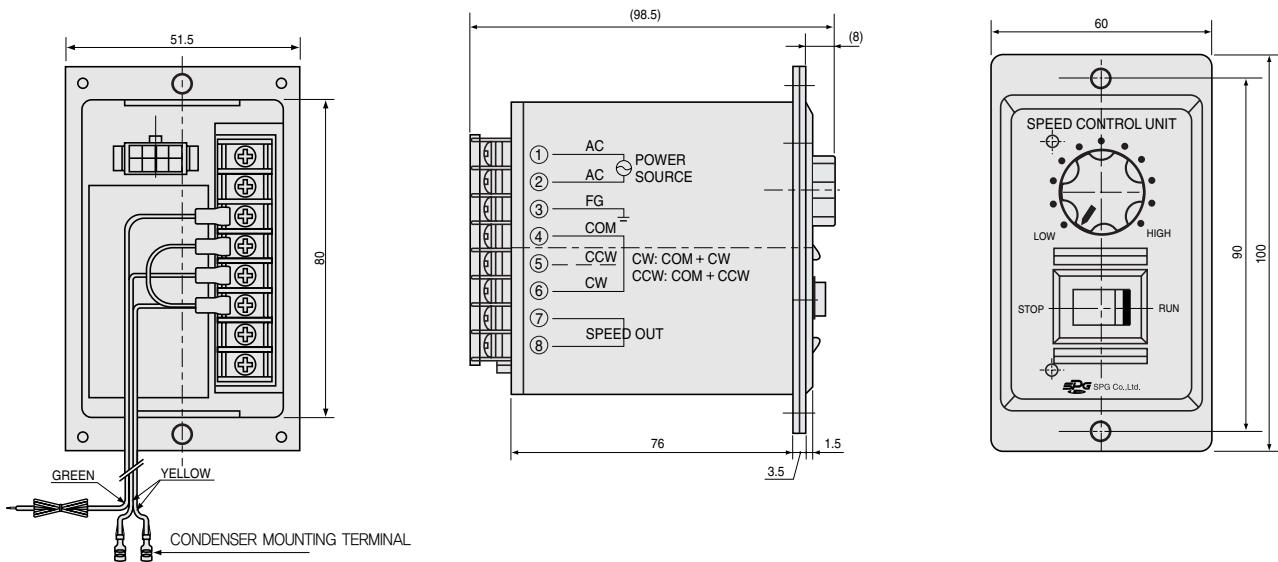
(Fig.4) Analogue controller combination

4. SPECIFICATIONS

SPEC \ MOTOR	SUA□IA-V12	SUA□IB-V12	SUA□IC-V12	SUA□ID-V12	SUA□IX-V12
Rated Voltage	AC 110V	AC 220V	AC 100V	AC 200V	AC 220V~240V
Operation Voltage Range	±10%				
Power Source Frequency	60Hz	60Hz	50/60Hz	50/60Hz	50Hz
Speed control range	60Hz : 90~1700rpm 50Hz : 90~1400rpm				
Speed variation	5%(Standard)				
Speed setting device	Built in external speed setting device attachable				
Slow run Slow stop	None				
Operation Temperature	0~40°C				
Storage Temperature	-10~60°C				
Ambient humidity	85% Maximum(non condensing)				

DIMENSIONS

+ SPEED CONTROLLER



DIGITAL TYPE SPEED CONTROLLER



1. Function chart

- Automatic computer control

Function	Contents
Change rotating direction	CW/CCW terminals(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

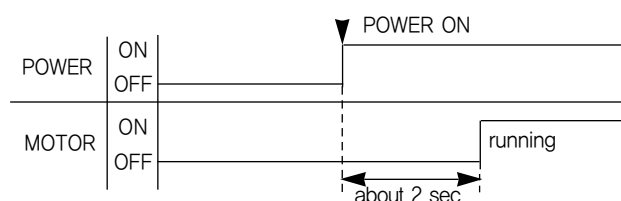
1. It takes about 2 seconds to commence operation after the power is supplied.
2. Both "Run" and "Stop" may lighten up when the "Run/Stop" key is used over 10,000 times. In such a case, alter the switch to "No" for a second to restore its normal condition.

(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.

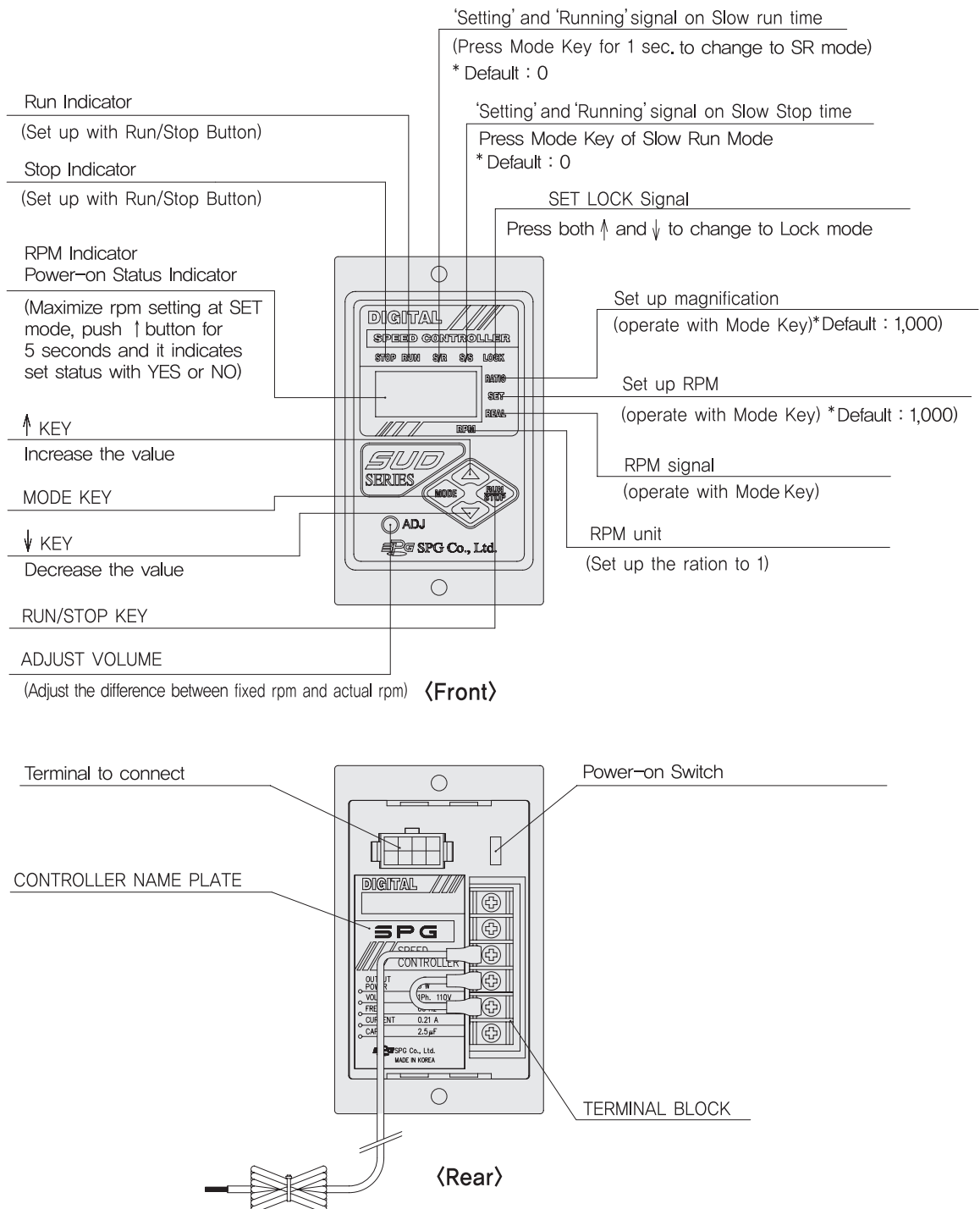
(6) Thermal protector

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

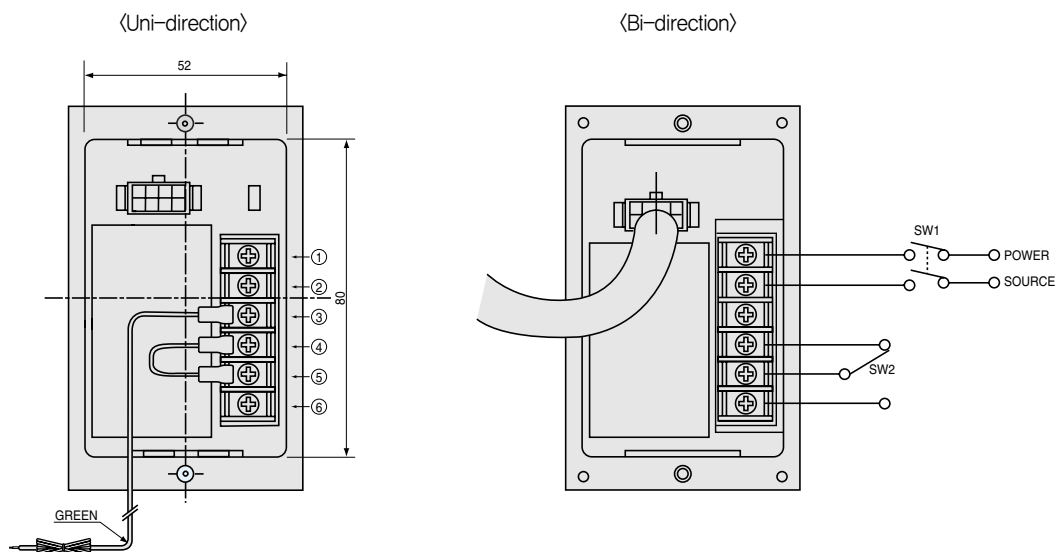
Need to disconnect of two power codes from outer motor wire in the case of withstand voltage testing with line earth, impulse voltage testing and testing of heat transfer resistance.

3. Parts names and functions



4. Usage

(1) Transformation of rotation direction



(Fig.3) Rear side of the digital type speed controller

1) Uni-direction continuous operation

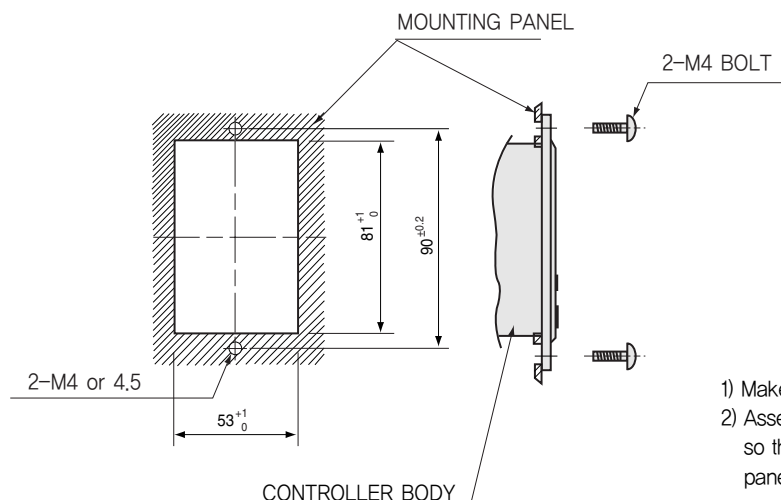
- To reverse the direction of rotation from clockwise to counter-clockwise, connect ⑤COM and ⑥CCW instead of connecting ⑤COM and ④CW.
- Power cords should always be connected to ①AC and ②AC terminals. Do not forget to turn the power off before connecting.

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.

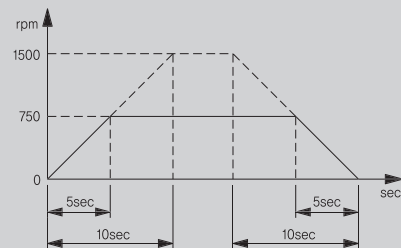
(5) S/S MODE

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

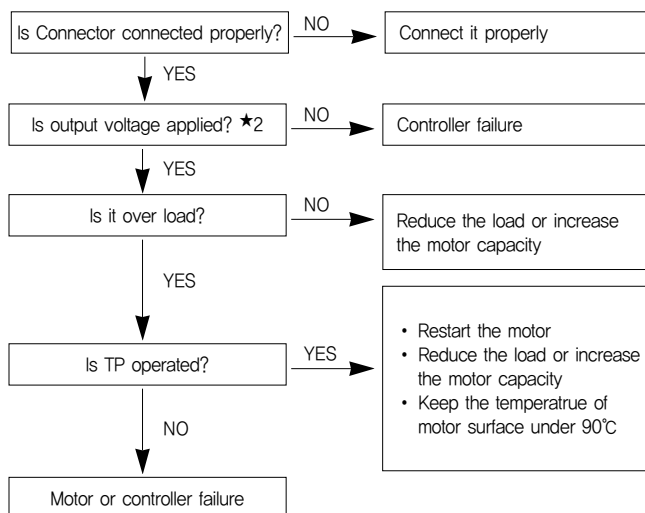
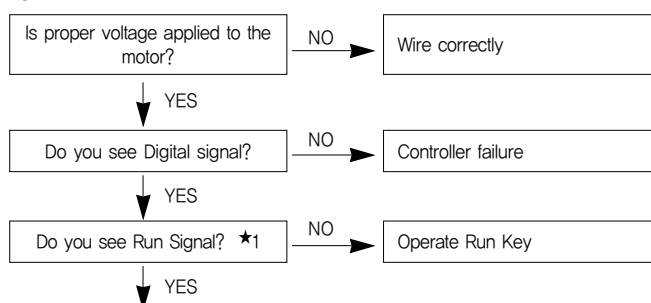
The gear ratio between actual and nominal can be different. Prefer to the chart in below

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	10
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	10,29	10,00	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	
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	-	-	-	-	-	-	

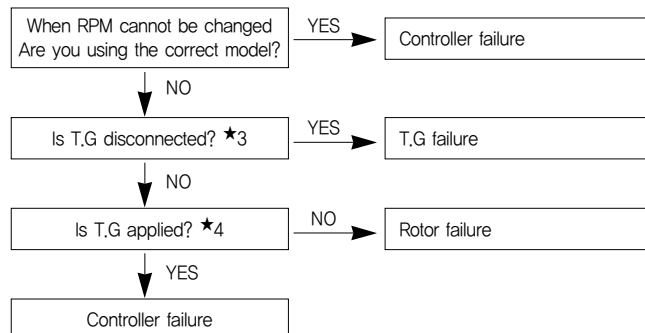
7. Trouble shooting

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.

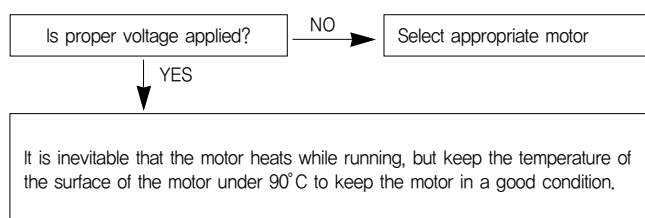
1. The motor does not rotate



2. When RPM cannot be changed



3. When abnormal temperature occurs during running



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

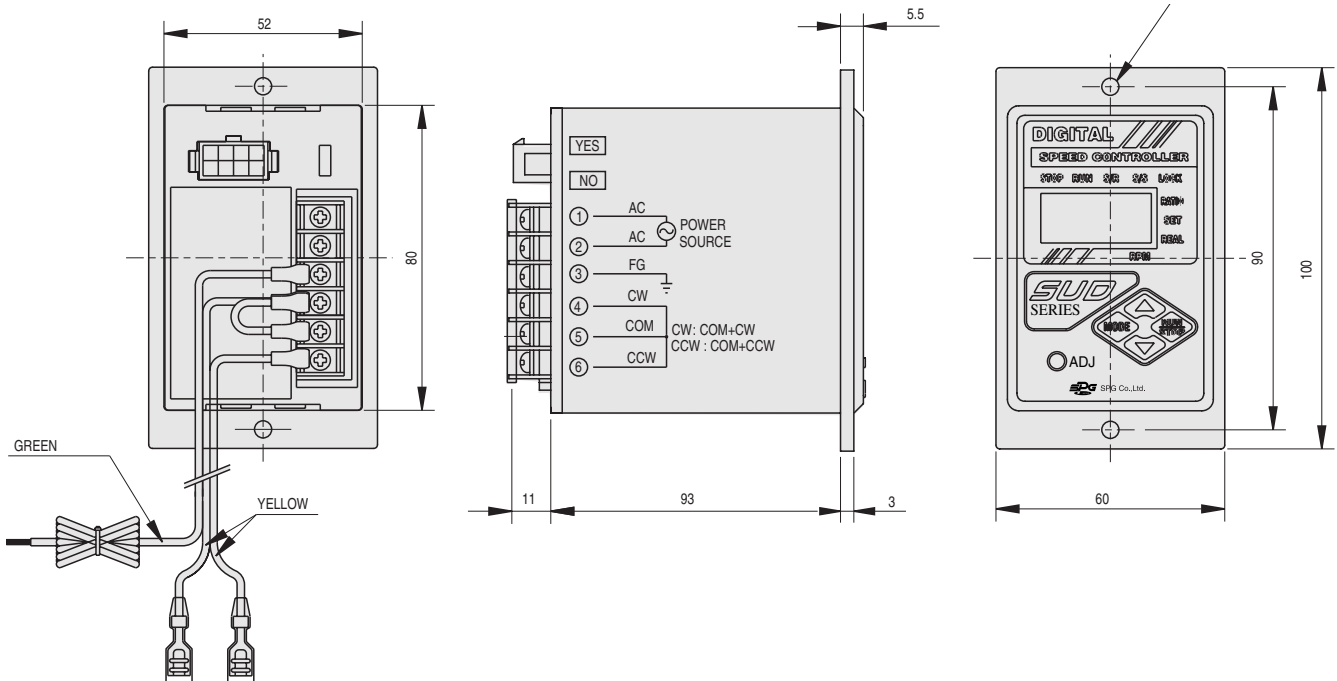
Connect the motor connector and check the voltage of red-red wire.

8. Specifications

MODEL	SUD□IA-V12A	SUD□IB-V12B
List		
Rated Voltage	1Ph. 100 – 120V	1Ph. 200 – 240V
Voltage range	±10%(Compared with arted Voltage)	
Frequency	50/60Hz	
Speed control range	50Hz:90–1400rpm 60Hz:90–1700rpm	
Speed changing rate	5%(Standard)	
Set Speed	Digital setting	
Slow run/ Slow stop time	None	
Temperature range	0~40°C	
Conservation temperature range	-10~60°C	
Humidity range	Less than 85%(There is not dewing)	

DIMENSIONS

+ SPEED CONTROLLER



UNIT TYPE SPEED CONTROL MOTOR



Characteristics of the unit type speed control motor

- This is a unit product that uses the separate unit type controller and motor simultaneously.
- The motor and the controller are connected with one touch.
AC power is connected and does not require a separate connection method. Speed can be controlled by a volume switch on the exterior. Therefore, it is appropriate for uses requiring remote control.
- The unit type controller has a speed controller circuit, a condenser for the motor and the volume. (By the size of the condenser, some units have to use the condenser on the outside.)
- The unit type controller does not have an instantaneous braking function.
- By using an extension cable (sold separately), it is possible to have a max distance of 2m between the motor and the controller.
- The control range is 90[rpm]~1400[rpm] for 50Hz and 90[rpm]~1700[rpm] for 60Hz.

GENERAL SPECIFICATIONS OF SPEED CONTROL MOTORS

ITEM	Specification
Insulation Resistance	100M Ω or more when 500V megger is applied between the windings and the housing after rated motor operation under normal ambient temperature and humidity
Dielectric Strength	Sufficient to withstand 1.5V at 50/60Hz applied between the windings and the case after rated motor operation under normal ambient temperature and humidity for 1min.
Temperature Rise	80°C or less increase measured by thermometer after rated operation. (45°C less than the motor with fan motors with fan)
Insulation Class	B Class (130°C)
Overheat Protection Device	Built-in thermal protector (automatic return type): Open 120°C \pm 5°C, Close 76°C \pm 15°C
Ambient Temperature	-10°C~40°C
Ambient Humidity	85% maximum(non condensing)



6W INDUCTION SPEED CONTROL MOTOR

□ 60mm CONNECTOR TYPE



■ MOTOR

Motor Model	Controller Model	Poles	Voltage		Freq. (Hz)	Duty	Current (A)	Speed Range (r/min)	Permissible Torque				Starting Torque		Capacitor (μF)	Degree of Protection	Insulation Classification	Protected Type								
			Phase	(V)					at 1200 r/min (kgf·cm)	(mN·m)	at 90 r/min (kgf·cm)	(mN·m)	(kgf·cm)	(mN·m)												
SG6106GA-V12 SG6106DA-V12 SG6106SA-V12	SUA061A-V12A SUD061A-V12A	4	1	100	50	Cont. S1	0.22	90-1400	0.45	45	0.30	30	0.58	58	3.5 (250V)	IP23	B(130)	Z.P.								
				60	0.20		90-1700	0.35	35	0.25	25	0.58	58													
				110	60		0.19	90-1700	0.35	35	0.25	25	0.50	50												
SG6106GB-V12 SG6106DB-V12 SG6106SB-V12	SUA061B-V12B SUD061B-V12B	4	1	200	50	Cont. S1	0.10	90-1400	0.45	45	0.30	30	0.52	52	0.8 (450V)	IP23	B(130)	Z.P.								
				60	0.10		90-1700	0.35	35	0.25	25	0.52	52													
				220	50		0.12	90-1400	0.45	45	0.30	30	0.45	45												
				60	0.09		90-1700	0.35	35	0.25	25	0.45	45													
														230	50				0.12	90-1400	0.45	45	0.30	30	0.52	52
														60	0.09				90-1700	0.35	35	0.25	25	0.52	52	

❖ All the model of SG series received UL, TÜV, CCC certificate.

❖ output 6W product is Impedance Protected, 15~90W product is Thermally Protected type.

❖ Depend on the voltage, the capacitors are divided into two model. Please inquire separately when operational voltage is AC 100V or 200V.

■ GEARED MOTOR – 50Hz

Model	Ratio	r/min																											
		5	6	7.5	9	10	12.5	15	18	20	25	30	36	40	50	60	75	90	100	120	150	180	200	250	300	360			
SG6KA □	kgf·cm	2.10	2.50	3.11	3.73	4.14	5.20	6.21	7.50	8.30	10.4	11.9	14.2	15.8	19.8	23.7	29.7	35.6	39.6	47.5	55.9	60.0	60.0	60.0	60.0	60.0			
SG6DA □	N·m	0.21	0.25	0.31	0.37	0.41	0.52	0.62	0.75	0.83	1.04	1.19	1.42	1.58	1.98	2.37	2.97	3.56	3.96	4.75	5.59	6.00	6.00	6.00	6.00	6.00			
SG6SA □		0.21	0.25	0.31	0.37	0.41	0.52	0.62	0.75	0.83	1.04	1.19	1.42	1.58	1.98	2.37	2.97	3.56	3.96	4.75	5.59	6.00	6.00	6.00	6.00	6.00			

■ GEARED MOTOR – 60Hz

Model	Ratio	r/min																											
		5	6	7.5	9	10	12.5	15	18	20	25	30	36	40	50	60	75	90	100	120	150	180	200	250	300	360			
SG6KA □	kgf·cm	1.71	2.10	2.60	3.10	3.42	4.30	5.13	6.20	6.84	8.60	9.80	11.8	13.1	16.3	19.6	24.5	29.4	32.7	39.2	46.2	55.4	60.0	60.0	60.0	60.0			
SG6DA □	N·m	0.17	0.21	0.26	0.31	0.34	0.43	0.51	0.62	0.68	0.86	0.98	1.18	1.31	1.63	1.96	2.45	2.94	3.27	3.92	4.62	5.54	6.00	6.00	6.00	6.00			
SG6SA □		0.17	0.21	0.26	0.31	0.34	0.43	0.51	0.62	0.68	0.86	0.98	1.18	1.31	1.63	1.96	2.45	2.94	3.27	3.92	4.62	5.54	6.00	6.00	6.00	6.00			

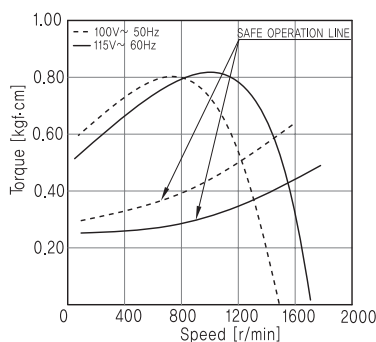
❖ Among GEAR HEAD model names, □ is reduction gear ratio.

❖ Value of the chart is allowable torque of reduction gear of GEARED MOTOR.

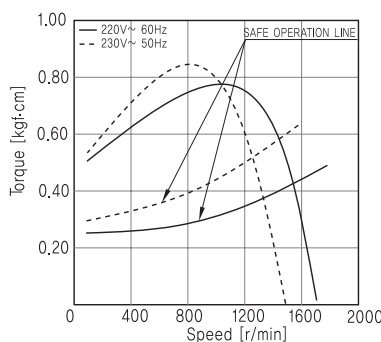
❖ Regarding direction of rotation, in case of ■, its reduction gear ratio has same direction with MOTOR's and in case of □, its reduction gear ratio has the opposite direction of MOTOR's.

❖ rotation speed is calculated with synchronous rotation number of MOTOR(50Hz : 1500 r/min, 60Hz : 1800 r/min).

Actual rotation speed can be less than (2~20%) depend on the size of the load 2~20%.



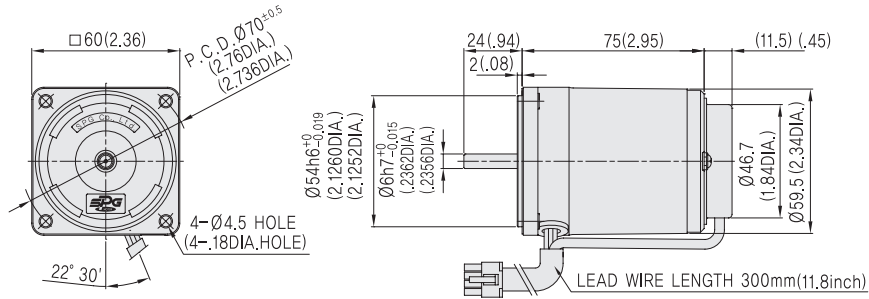
- ▶ SG6106GA-V12
- ▶ SG6106DA-V12
- ▶ SG6106SA-V12



- ▶ SG6106GB-V12
- ▶ SG6106DB-V12
- ▶ SG6106SB-V12

MOTOR

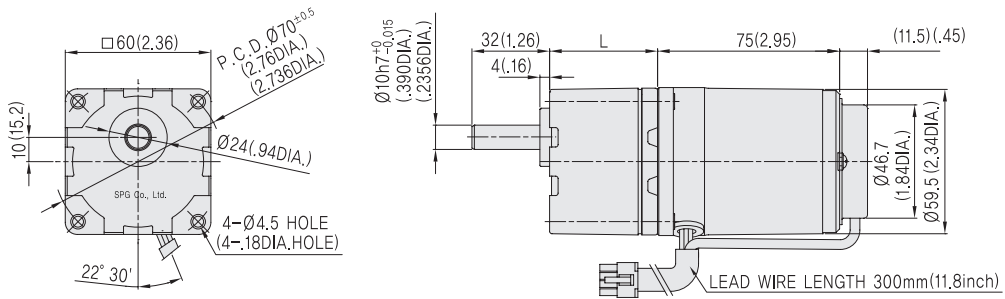
Unit : mm(inch)



MOTOR OUTPUT SHAFT	GEAR TYPE	D-CUT TYPE	STRAIGHT TYPE
	SG6I06G□-V12	SG6I06D□-V12	SG6I06S□-V12

GEARED MOTOR

Unit : mm(inch)



GEAR HEAD OUTPUT SHAFT	KEY TYPE	D-CUT TYPE	STRAIGHT TYPE
	SG6KA□	SG6DA□	SG6SA□

MODEL	GEAR RATIO	L	WEIGHT(kg)	
GEAR HEAD	SG6□A□	5~25	34	0.28
		30~120	38	0.33
		150~360	43	0.37
MOTOR	SG6I06□□-V12		0.76	



15W INDUCTION SPEED CONTROL MOTOR

□ 70mm CONNECTOR TYPE



■ MOTOR

Motor Model	Controller Model	Poles	Voltage		Freq. (Hz)	Duty	Current (A)	Speed Range (r/min)	Permissible Torque				Starting Torque		Capacitor (μF)	Degree of Protection	Insulation Classification	Protected Type
			Phase	(V)					at 1200 r/min (kgf·cm)	(mN·m)	at 90 r/min (kgf·cm)	(mN·m)	(kgf·cm)	(mN·m)				
SG7115GA-V12 SG7115DA-V12 SG7115SA-V12	SUA7151A-V12A SUD7151A-V12A	4	1	100	50	Cont. S1	0.37	90-1400	1.10	110	0.60	60	0.80	80	5.5 (250V)	IP23	B(130)	T.P.
				110			60	0.32	90-1700	0.90	90	0.50	50	0.80				
				115	60	0.32	90-1700	0.90	90	0.50	50	0.70	70	4.5 (250V)				
SG7115GB-V12 SG7115DB-V12 SG7115SB-V12	SUA7151B-V12B SUD7151B-V12B	4	1	200	50	Cont. S1	0.18	90-1400	1.20	120	0.60	60	1.00	100	1.5 (450V)	IP23	B(130)	T.P.
				60			0.19	90-1700	0.90	90	0.50	50	1.00	100				
				220	50	0.18	90-1400	1.10	110	0.60	60	0.70	70	1.0 (450V)				
				60		0.15	90-1700	0.90	90	0.50	50	0.70	70					
				230	50	0.18	90-1400	1.10	110	0.60	60	0.80	80					
				60		0.15	90-1700	0.90	90	0.50	50	0.80	80					

- ❖ All the model of SG series received UL, TÜV, CCC certificate.
- ❖ output 6W product is Impedance Protected, 15~90W product is Thermally Protected type.
- ❖ Depend on the voltage, the capacitors are divided into two model. Please inquire separately when operational voltage is AC 100V or 200V.

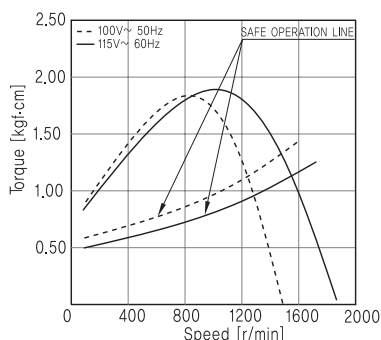
■ GEARED MOTOR – 50Hz

Model	Ratio	r/min																								
		5	6	7.5	9	10	12.5	15	18	20	25	30	36	40	50	60	75	90	100	120	150	180	200	250	300	360
SG7KA □	kgf·cm	5.20	6.21	7.80	9.32	10.4	12.9	15.5	18.6	20.7	25.9	29.7	35.6	39.6	49.5	59.3	74.2	89.0	98.9	100	100	100	100	100	100	100
SG7DA □	N·m	0.52	0.62	0.78	0.93	1.04	1.29	1.55	1.86	2.07	2.59	2.97	3.56	3.96	4.95	5.93	7.42	8.90	9.89	10.0	10.0	10.0	10.0	10.0	10.0	10.0
SG7SA □																										

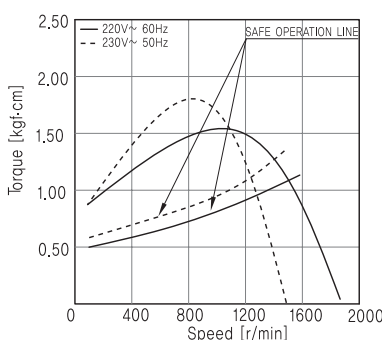
■ GEARED MOTOR – 60Hz

Model	Ratio	r/min																								
		5	6	7.5	9	10	12.5	15	18	20	25	30	36	40	50	60	75	90	100	120	150	180	200	250	300	360
SG7KA □	kgf·cm	4.20	5.02	6.30	7.53	8.40	10.5	12.6	15.1	16.7	20.9	24.0	28.8	32.0	40.0	48.0	60.0	72.0	80.0	96.0	100	100	100	100	100	100
SG7DA □	N·m	0.42	0.50	0.63	0.75	0.84	1.05	1.26	1.51	1.67	2.09	2.40	2.88	3.20	4.00	4.80	6.00	7.20	8.00	9.60	10.0	10.0	10.0	10.0	10.0	10.0
SG7SA □																										

- ❖ Among GEAR HEAD model names, □ is reduction gear ratio.
- ❖ Value of the chart is allowable torque of reduction gear of GEARED MOTOR.
- ❖ Regarding direction of rotation, in case of □, its reduction gear ratio has same direction with MOTOR's and in case of □, its reduction gear ratio has the opposite direction of MOTOR's.
- ❖ rotation speed is calculated with synchronous rotation number of MOTOR(50Hz : 1500 r/min, 60Hz : 1800 r/min). Actual rotation speed can be less than (2~20%) depend on the size of the load 2~20%.



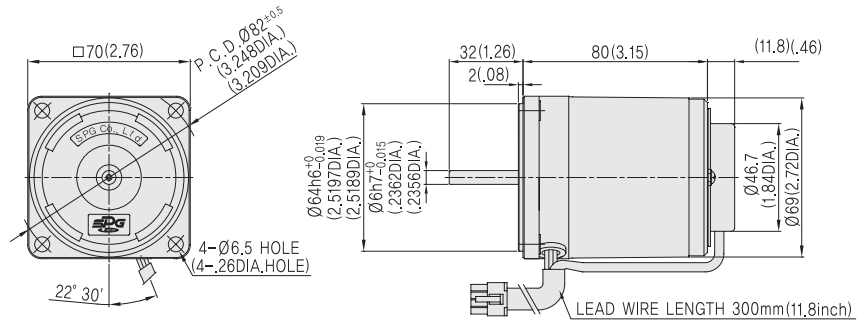
- ▶ SG7115GA-V12
- ▶ SG7115DA-V12
- ▶ SG7115SA-V12

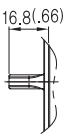
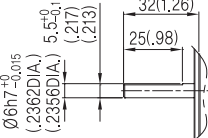
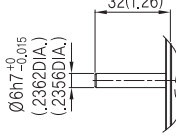


- ▶ SG7115GB-V12
- ▶ SG7115DB-V12
- ▶ SG7115SB-V12

MOTOR

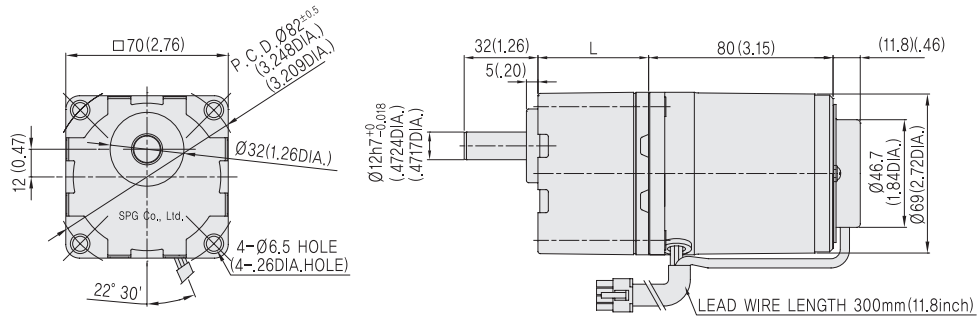
Unit : mm(inch)

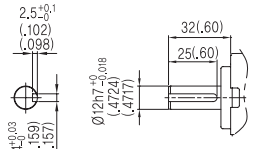
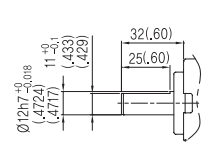
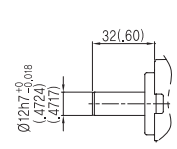


MOTOR OUTPUT SHAFT	GEAR TYPE	D-CUT TYPE	STRAIGHT TYPE
	SG7I15G□-V12	SG7I15D□-V12	SG7I15S□-V12
			

GEARED MOTOR

Unit : mm(inch)



GEAR HEAD OUTPUT SHAFT	KEY TYPE	D-CUT TYPE	STRAIGHT TYPE
	SG7KA□	SG7DA□	SG7SA□
			

MODEL		GEAR RATIO	L	WEIGHT(kg)
GEAR HEAD	SG7□□□	5~120	43	0.42
		150~360	48	0.52
MOTOR	SG7I15□□-V12			1.04



25W INDUCTION SPEED CONTROL MOTOR

□ 80mm CONNECTOR TYPE



■ MOTOR

Motor Model	Controller Model	Poles	Voltage		Freq. (Hz)	Duty	Current (A)	Speed Range (r/min)	Permissible Torque				Starting Torque		Capacitor (μF)	Degree of Protection	Insulation Classification	Protected Type
			Phase	(V)					at 1200 r/min (kgf·cm)	(mN·m)	at 90 r/min (kgf·cm)	(mN·m)	(kgf·cm)	(mN·m)				
SG8I25GA-V12	SUA25IA-V12A SUD25IA-V12A	4	1	100	50	Cont. S1	0.49	90-1400	1.90	190	1.00	100	1.80	0.18	8.0 (250V)	IP23	B(130)	T.P.
SG8I25KA-V12				60	0.47		90-1700	1.50	150	0.80	80	1.70	0.17					
SG8I25DA-V12				110	60		0.45	90-1700	1.50	150	0.80	80	1.60	0.16				
SG8I25SA-V12			1	115	60		0.45	90-1700	1.50	150	0.80	80	2.00	0.20	6.5 (250V)			
SG8I25GB-V12	SUA25IB-V12B SUD25IB-V12B	4	1	200	50	Cont. S1	0.24	90-1400	2.00	200	1.00	100	1.40	0.14	1.5 (450V)	IP23	B(130)	T.P.
SG8I25KB-V12				60	0.24		90-1700	1.60	160	0.80	80	1.40	0.14					
SG8I25DB-V12				220	50		0.23	90-1400	1.90	190	1.00	100	1.60	0.16				
SG8I25SB-V12			1	230	60		0.21	90-1700	1.50	150	0.80	80	1.60	0.16	1.0 (450V)			
			1	50	60		0.23	90-1400	1.90	190	1.00	100	1.70	0.17				
			1	60	60		0.21	90-1700	1.50	150	0.80	80	1.80	0.18				

- ◆ All the model of SG series received UL, TÜV, CCC certificate.
- ◆ output 6W product is Impedance Protected, 15~90W product is Thermally Protected type.
- ◆ Depend on the voltage, the capacitors are divided into two model. Please inquire separately when operational voltage is AC 100V or 200V.

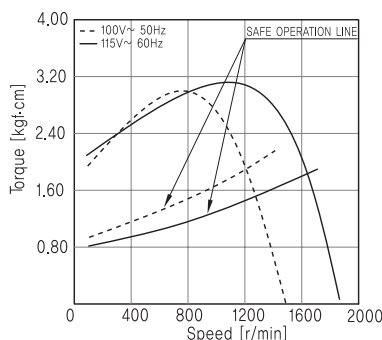
■ GEARED MOTOR – 50Hz

Model	Ratio	r/min	5	6	7.5	9	10	12.5	15	18	20	25	30	36	40	50	60	75	90	100	120	150	180	200	250	300	360
			kgf·cm	8.90	10.7	13.4	16.0	17.8	22.3	26.7	32.1	35.6	44.6	51.1	61.3	68.1	85.1	102	128	153	160	160	160	160	160	160	160
SG8KA □																											
SG8DA □																											
SG8SA □																											

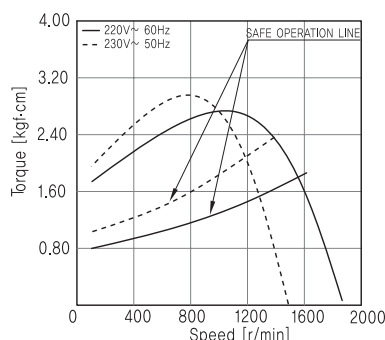
■ GEARED MOTOR – 60Hz

Model	Ratio	r/min	5	6	7.5	9	10	12.5	15	18	20	25	30	36	40	50	60	75	90	100	120	150	180	200	250	300	360
			kgf·cm	7.30	8.80	10.9	13.1	14.6	18.2	21.9	26.2	29.2	36.5	41.8	50.2	55.7	69.7	83.6	105	125	139	160	160	160	160	160	160
SG8KA □																											
SG8DA □																											
SG8SA □																											

- ◆ Among GEAR HEAD model names, □ is reduction gear ratio.
- ◆ Value of the chart is allowable torque of reduction gear of GEARED MOTOR.
- ◆ Regarding direction of rotation, in case of ■, its reduction gear ratio has same direction with MOTOR's and in case of □, its reduction gear ratio has the opposite direction of MOTOR's.
- ◆ rotation speed is calculated with synchronous rotation number of MOTOR(50Hz : 1500 r/min, 60Hz : 1800 r/min). Actual rotation speed can be less than (2~20%) depend on the size of the load 2~20%.



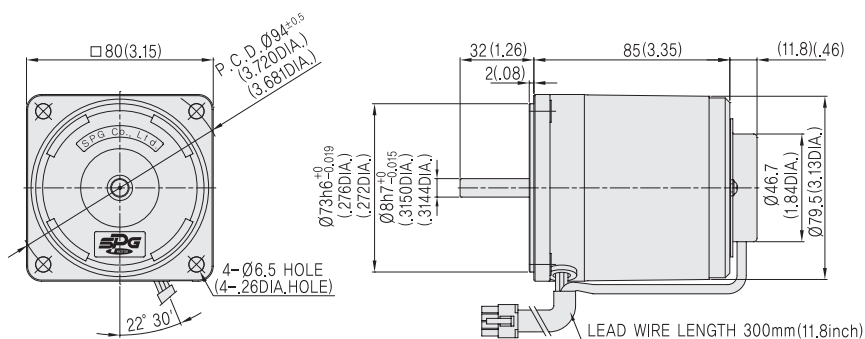
▶ SG8I25GA-V12 ▶ SG8I25KA-V12
▶ SG8I25DA-V12 ▶ SG8I25SA-V12



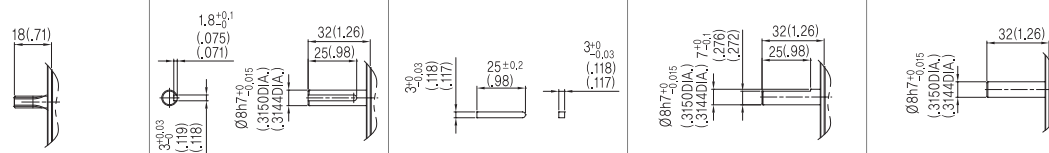
▶ SG8I25GB-V12 ▶ SG8I25KB-V12
▶ SG8I25DB-V12 ▶ SG8I25SB-V12

MOTOR

Unit : mm(inch)

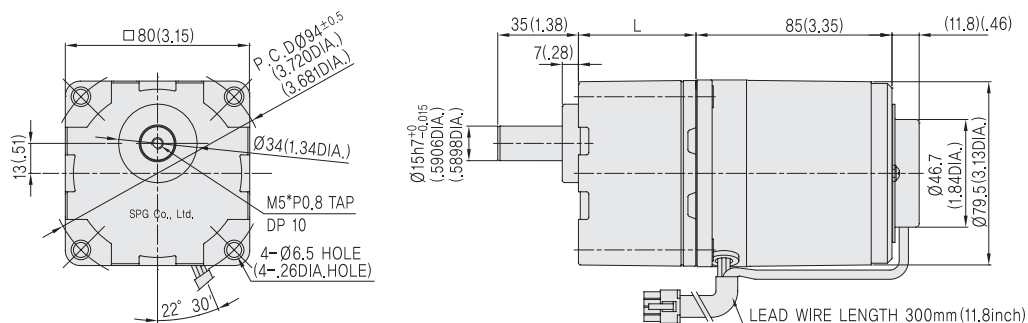


MOTOR OUTPUT SHAFT	GEAR TYPE	KEY TYPE	D-CUT TYPE	STRAIGHT TYPE
	SG8I25G□-V12	SG8I25K□-V12	SG8I25D□-V12	SG8I25S□-V12

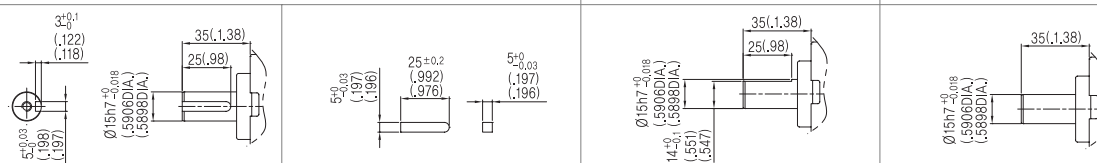


GEARED MOTOR

Unit : mm(inch)



GEAR HEAD OUTPUT SHAFT	KEY TYPE	D-CUT TYPE	STRAIGHT TYPE
	SG8KA□	SG8DA□	SG8SA□



MODEL	GEAR RATIO	L	WEIGHT(kg)	
GEAR HEAD	SG8□A□	5~25	41	0.61
		30~120	46	0.72
		150~360	51	0.80
MOTOR	SG8I25□□-V12		1.60	



40W INDUCTION SPEED CONTROL MOTOR

□ 90mm CONNECTOR TYPE



■ MOTOR

Motor Model	Controller Model	Poles	Voltage		Freq. (Hz)	Duty	Current (A)	Speed Range (r/min)	Permissible Torque				Starting Torque		Capacitor (μF)	Degree of Protection	Insulation Classification	Protected Type
			Phase	(V)					at 1200 r/min (kgf·cm)	(mN·m)	at 90 r/min (kgf·cm)	(mN·m)	(kgf·cm)	(mN·m)				
SG9140GA-V12	SUA401A-V12A SUD401A-V12A	4	1	100	50	Cont. S1	0.70	90-1400	3.00	0.30	1.20	0.12	2.20	0.22	11.0 (250V)	IP23	B(130)	T.P.
SG9140KA-V12				60			0.71	90-1700	2.40	0.24	1.00	0.10	2.30	0.23				
SG9140DA-V12			1	110	60		0.63	90-1700	2.40	0.24	1.00	0.10	2.10	0.21	9.0 (250V)			
SG9140SA-V12				115	60		0.61	90-1700	2.30	0.23	1.00	0.10	2.60	0.26				
SG9140GB-V12	SUA401B-V12B SUD401B-V12B	4	1	200	50	Cont. S1	0.34	90-1400	2.90	0.29	1.20	0.12	2.70	0.27	3.0 (450V)	IP23	B(130)	T.P.
SG9140KB-V12				60			0.38	90-1700	2.40	0.24	1.00	0.10	2.90	0.29				
SG9140DB-V12			1	220	50		0.35	90-1400	2.90	0.29	1.20	0.12	2.40	0.24	2.3 (450V)			
				60	0.30		90-1700	2.40	0.24	1.00	0.10	2.40	0.24					
SG9140SB-V12			1	230	50		0.35	90-1400	2.90	0.29	1.20	0.12	2.40	0.24	2.3 (450V)			
				60	0.30		90-1700	2.40	0.24	1.00	0.10	2.80	0.28					

- ❖ All the model of SG series received UL, TÜV, CCC certificate.
- ❖ output 6W product is Impedance Protected, 15~90W product is Thermally Protected type.
- ❖ Depend on the voltage, the capacitors are divided into two model. Please inquire separately when operational voltage is AC 100V or 200V.

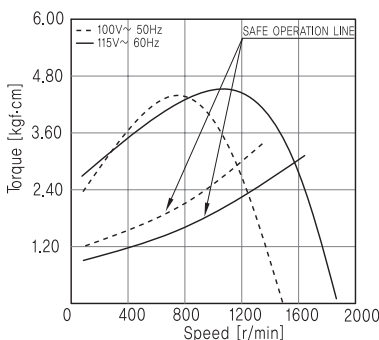
■ GEARED MOTOR – 50Hz

Model	Ratio	r/min																						
		5	6	7.5	9	10	12.5	15	18	20	25	30	36	40	50	60	75	90	100	120	150	180	200	250
SG9K□	kgf·cm	13.4	16.1	20.1	24.1	26.8	33.5	40.2	48.3	51.3	64.1	76.9	92.3	103	128	154	192	231	256	290	300	300	300	300
SG9D□	N·m	1.34	1.61	2.01	2.41	2.68	3.35	4.02	4.83	5.13	6.41	7.69	9.23	10.3	12.8	15.4	19.2	23.1	25.6	29.0	30.0	30.0	30.0	30.0

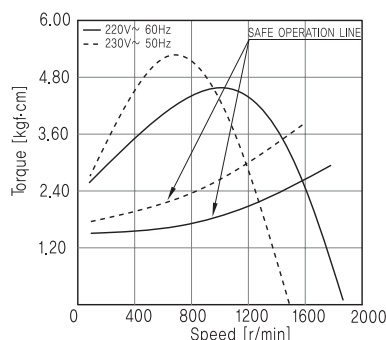
■ GEARED MOTOR – 60Hz

Model	Ratio	r/min																						
		5	6	7.5	9	10	12.5	15	18	20	25	30	36	40	50	60	75	90	100	120	150	180	200	250
SG9K□	kgf·cm	10.9	13.1	16.3	19.6	21.8	27.2	32.7	39.2	41.6	52.0	62.4	74.9	83.2	104	125	156	187	208	235	294	300	300	300
SG9D□	N·m	1.09	1.31	1.63	1.96	2.18	2.72	3.27	3.92	4.16	5.20	6.24	7.49	8.32	10.4	12.5	15.6	18.7	20.8	23.5	29.4	30.0	30.0	30.0

- ❖ Among GEAR HEAD model names, □ is reduction gear ratio.
- ❖ Value of the chart is allowable torque of reduction gear of GEARED MOTOR.
- ❖ Regarding direction of rotation, in case of □, its reduction gear ratio has same direction with MOTOR's and in case of □, its reduction gear ratio has the opposite direction of MOTOR's.
- ❖ rotation speed is calculated with synchronous rotation number of MOTOR(50Hz : 1500 r/min, 60Hz : 1800 r/min). Actual rotation speed can be less than (2~20%) depend on the size of the load 2~20%.



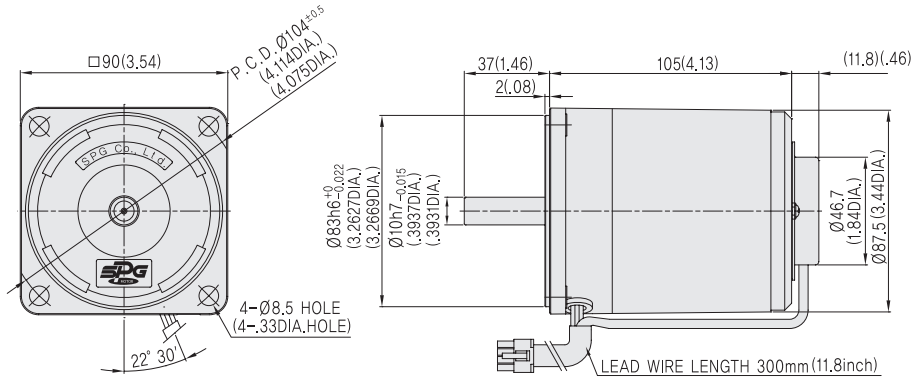
▶ SG9140GA-V12 ▶ SG9140KA-V12
▶ SG9140DA-V12 ▶ SG9140SA-V12



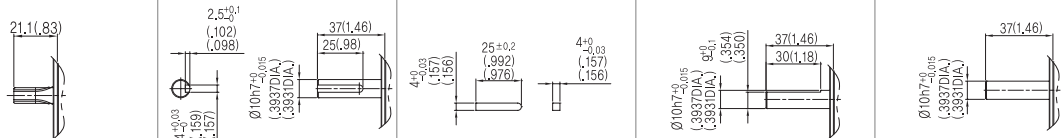
▶ SG9140GB-V12 ▶ SG9140KB-V12
▶ SG9140DB-V12 ▶ SG9140SB-V12

MOTOR

Unit : mm(inch)

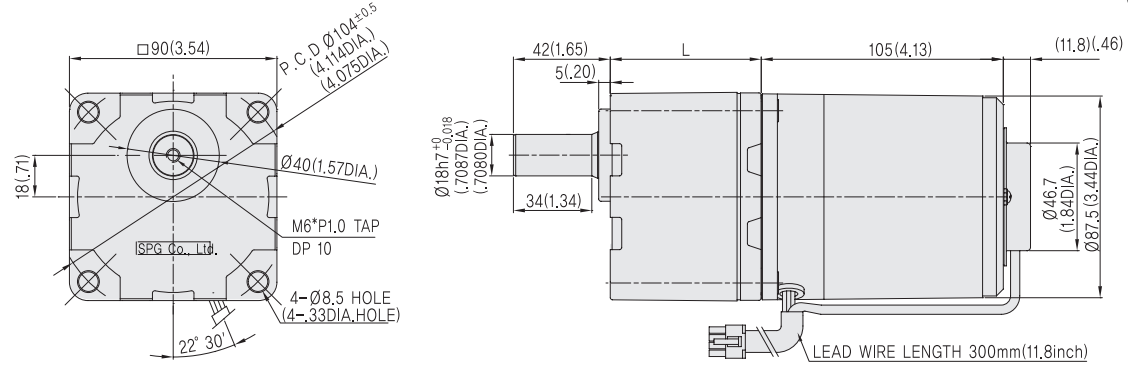


MOTOR OUTPUT SHAFT	GEAR TYPE	KEY TYPE	D-CUT TYPE	STRAIGHT TYPE
	SG9I40G□-V12	SG9I40K□-V12	SG9I40D□-V12	SG9I40S□-V12

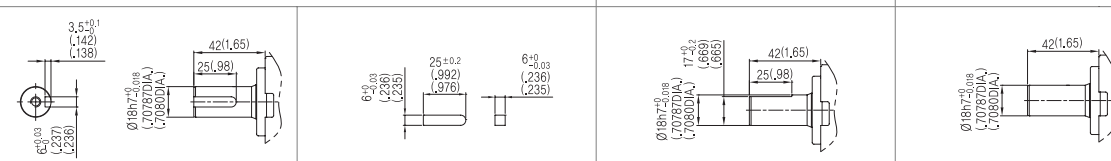


GEARED MOTOR

Unit : mm(inch)



GEAR HEAD OUTPUT SHAFT	KEY TYPE	D-CUT TYPE	STRAIGHT TYPE
	SG9KB□	SG9DB□	SG9SB□



MODEL		GEAR RATIO	L	WEIGHT(kg)
GEAR HEAD	SG9□B□	5~20	45	0.85
		25~100	58	1.15
		120~300	64	1.30
MOTOR	SG9I40□□-V12			2.42



60W INDUCTION SPEED CONTROL MOTOR

□ 90mm CONNECTOR TYPE



■ MOTOR

Motor Model	Controller Model	Poles	Voltage		Freq. (Hz)	Duty	Current (A)	Speed Range (r/min)	Permissible Torque				Starting Torque		Capacitor (μF)	Degree of Protection	Insulation Classification	Protected Type
			Phase	(V)					at 1200 r/min (kgf·cm)	(mN·m)	at 90 r/min (kgf·cm)	(mN·m)	(kgf·cm)	(mN·m)				
SG9160GA-V12	SUA601A-V12A SUD601A-V12A	4	1	100	50	Cont. S1	1.03	90-1400	4.40	0.44	1.80	0.18	4.10	0.41	20.0 (250V)	IP23	B(130)	T.P.
SG9160KA-V12				60	1.17		90-1700	3.60	0.36	1.50	0.15	4.30	0.43					
SG9160DA-V12			110	60	1.08	90-1700	3.50	0.35	1.40	0.14	4.60	0.46	18.0 (250V)					
SG9160SA-V12			115	60	1.08	90-1700	3.50	0.35	1.40	0.14	5.30	0.53						
SG9160GB-V12	SUA601B-V12B SUD601B-V12B	4	1	200	50	Cont. S1	0.52	90-1400	4.30	0.43	1.80	0.18	4.50	0.45	5.0 (450V)	IP23	B(130)	T.P.
SG9160KB-V12				60	0.60		90-1700	3.60	0.36	1.50	0.15	4.80	0.48					
SG9160DB-V12			220	50	0.54	90-1400	4.30	0.43	1.80	0.18	4.50	0.45	4.0 (450V)					
SG9160SB-V12				60	0.48	90-1700	3.50	0.35	1.40	0.14	4.50	0.45						
SG9160SB-V12			230	50	0.58	90-1400	4.30	0.43	1.80	0.18	4.90	0.49						
				60	0.48	90-1700	3.50	0.35	1.40	0.14	4.80	0.48						

- ❖ All the model of SG series received UL, TÜV, CCC certificate.
- ❖ output 6W product is Impedance Protected, 15~90W product is Thermally Protected type.
- ❖ Depend on the voltage, the capacitors are divided into two model. Please inquire separately when operational voltage is AC 100V or 200V.

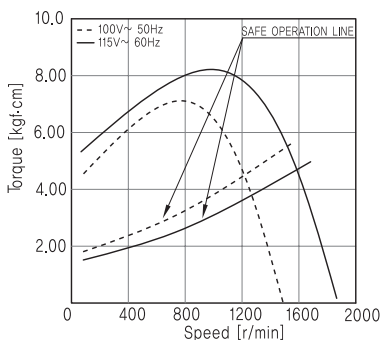
■ GEARED MOTOR – 50Hz

Model	Ratio	r/min																							
		5	6	7.5	9	10	12.5	15	18	20	25	30	36	40	50	60	75	90	100	120	150	180	200	250	300
SG9KB□	kgf·cm	19.7	23.7	29.6	35.5	39.4	49.3	59.1	71.0	75.3	94.2	113	136	151	188	226	283	300	300	300	300	300	300	300	300
SG9DB□	N·m	1.97	2.37	2.96	3.55	3.94	4.93	5.91	7.10	7.53	9.42	11.3	13.6	15.1	18.8	22.6	28.3	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
SG9SB□																									

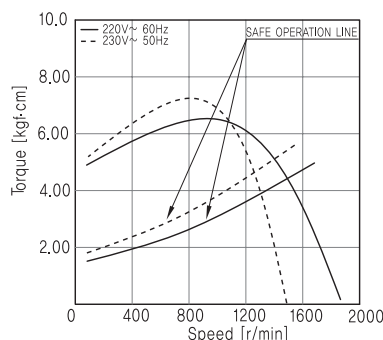
■ GEARED MOTOR – 60Hz

Model	Ratio	r/min																							
		5	6	7.5	9	10	12.5	15	18	20	25	30	36	40	50	60	75	90	100	120	150	180	200	250	300
SG9KB□	kgf·cm	16.5	19.8	24.8	29.7	33.0	41.3	49.6	59.5	63.1	78.9	94.7	114	126	158	189	237	284	300	300	300	300	300	300	300
SG9DB□	N·m	1.65	1.98	2.48	2.97	3.30	4.13	4.96	5.95	6.31	7.89	9.47	11.4	12.6	15.8	18.9	23.7	28.4	30.0	30.0	30.0	30.0	30.0	30.0	30.0
SG9SB□																									

- ❖ Among GEAR HEAD model names, □ is reduction gear ratio.
- ❖ Value of the chart is allowable torque of reduction gear of GEARED MOTOR.
- ❖ Regarding direction of rotation, in case of □, its reduction gear ratio has same direction with MOTOR's and in case of □, its reduction gear ratio has the opposite direction of MOTOR's.
- ❖ rotation speed is calculated with synchronous rotation number of MOTOR(50Hz : 1500 r/min, 60Hz : 1800 r/min). Actual rotation speed can be less than (2~20%) depend on the size of the load 2~20%.



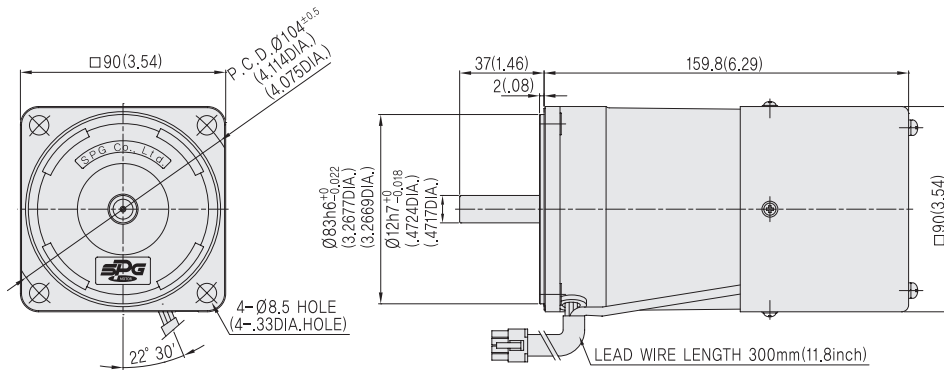
▶ SG9190GA-V12 ▶ SG9190KA-V12
▶ SG9190DA-V12 ▶ SG9190SA-V12



▶ SG9190GB-V12 ▶ SG9190KB-V12
▶ SG9190DB-V12 ▶ SG9190SB-V12

MOTOR

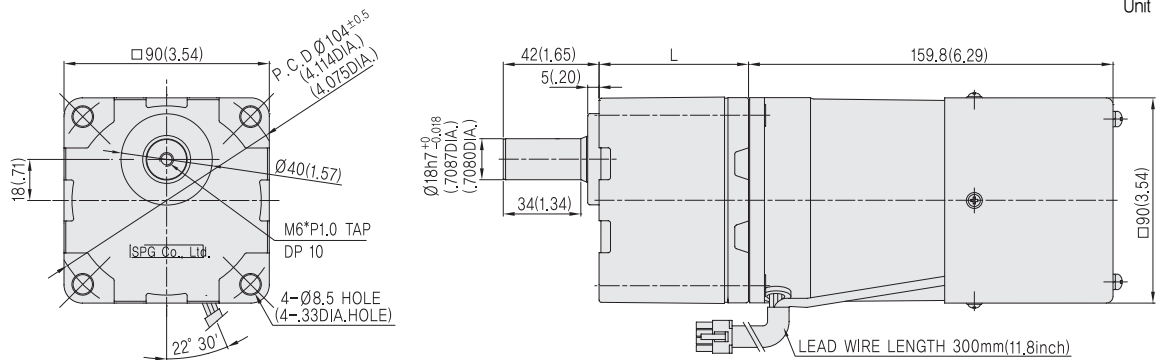
Unit : mm(inch)



MOTOR OUTPUT SHAFT	GEAR TYPE	KEY TYPE	D-CUT TYPE	STRAIGHT TYPE
	SG9I60G□-V12	SG9I60K□-V12	SG9I60D□-V12	SG9I60S□-V12

GEARED MOTOR

Unit : mm(inch)



GEAR HEAD OUTPUT SHAFT	KEY TYPE	D-CUT TYPE	STRAIGHT TYPE
	SG9KB□	SG9DB□	SG9SB□

MODEL		GEAR RATIO	L	WEIGHT(kg)
GEAR HEAD	SG9□B□	5~20	45	0.85
		25~100	58	1.15
		120~300	64	1.30
MOTOR	SG9I60□□-V12			2.93



90W INDUCTION SPEED CONTROL MOTOR

□ 90mm CONNECTOR TYPE



■ MOTOR

Motor Model	Controller Model	Poles	Voltage		Freq. (Hz)	Duty	Current (A)	Speed Range (r/min)	Permissible Torque				Starting Torque		Capacitor (μF)	Degree of Protection	Insulation Classification	Protected Type
			Phase	(V)					at 1200 r/min (kgf·cm)	(mN·m)	at 90 r/min (kgf·cm)	(mN·m)	(kgf·cm)	(mN·m)				
SG9190GA-V12	SUA901A-V12A SUD901A-V12A	4	1	100	50	Cont. S1	1.46	90-1400	6.50	0.65	2.60	0.26	4.70	0.47	28.0 (250V)	IP23	B(130)	T.P.
SG9190KA-V12				60	1.78		90-1700	5.30	0.53	2.20	0.22	5.10	0.51					
SG9190DA-V12			110	60	1.29	90-1700	5.30	0.53	2.20	0.22	4.60	0.46	20.0 (250V)					
SG9190SA-V12			115	60	1.26	90-1700	5.20	0.52	2.10	0.21	5.20	0.52						
SG9190GB-V12	SUA901B-V12B SUD901B-V12B	4	1	200	50	Cont. S1	0.74	90-1400	6.50	0.65	2.60	0.26	5.70	0.57	7.0 (450V)	IP23	B(130)	T.P.
SG9190KB-V12				60	0.92		90-1700	5.30	0.53	2.20	0.22	5.90	0.59					
SG9190DB-V12			220	50	0.67	90-1400	6.40	0.64	2.60	0.26	5.90	0.59	6.0 (450V)					
SG9190SB-V12				60	0.79	90-1700	5.20	0.52	2.10	0.21	6.10	0.61						
SG9190SB-V12			230	50	0.68	90-1400	6.30	0.63	2.60	0.26	7.00	0.70						
				60	0.78	90-1700	5.20	0.52	2.10	0.21	6.40	0.64						

- ❖ All the model of SG series received UL, TÜV, CCC certificate.
- ❖ output 6W product is Impedance Protected, 15~90W product is Thermally Protected type.
- ❖ Depend on the voltage, the capacitors are divided into two model. Please inquire separately when operational voltage is AC 100V or 200V.

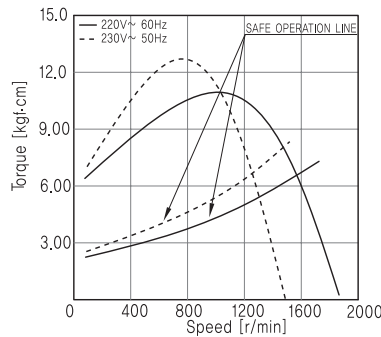
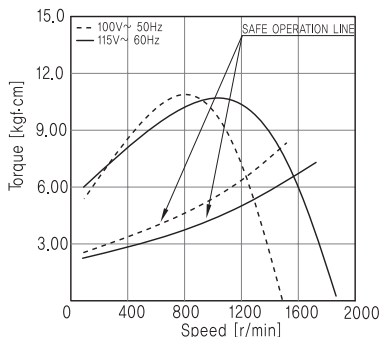
■ GEARED MOTOR – 50Hz

Model	Ratio	r/min	5	6	7.5	9	10	12.5	15	18	20	25	30	36	40	50	60	75	90	100	120	150	180	200
			SG9KC□	kgf·cm	31.1	37.3	46.6	56.0	62.2	77.7	93.3	107	119	149	178	214	238	297	357	400	400	400	400	400
SG9DC□	N·m	3.11	3.73	4.66	5.60	6.22	7.77	9.33	10.7	11.9	14.9	17.8	21.4	23.8	29.7	35.7	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
SG9SC□																								

■ GEARED MOTOR – 60Hz

Model	Ratio	r/min	5	6	7.5	9	10	12.5	15	18	20	25	30	36	40	50	60	75	90	100	120	150	180	200
			SG9KC□	kgf·cm	25.7	30.8	38.5	46.2	51.3	64.1	77.0	88.2	98.0	123	147	177	196	245	294	346	400	400	400	400
SG9DC□	N·m	2.57	3.08	3.85	4.62	5.13	6.41	7.70	8.82	9.80	12.3	14.7	17.7	19.6	24.5	29.4	34.6	40.0	40.0	40.0	40.0	40.0	40.0	40.0
SG9SC□																								

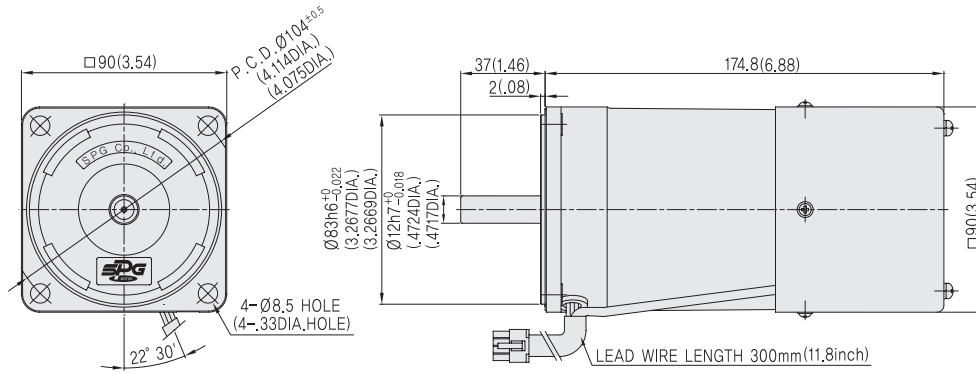
- ❖ Among GEAR HEAD model names, □ is reduction gear ratio.
- ❖ Value of the chart is allowable torque of reduction gear of GEARED MOTOR.
- ❖ Regarding direction of rotation, in case of □, its reduction gear ratio has same direction with MOTOR's and in case of □, its reduction gear ratio has the opposite direction of MOTOR's.
- ❖ rotation speed is calculated with synchronous rotation number of MOTOR(50Hz : 1500 r/min, 60Hz : 1800 r/min). Actual rotation speed can be less than (2~20%) depend on the size of the load 2~20%.



- ▶ SG9190GA-V12 ▶ SG9190KA-V12
- ▶ SG9190DA-V12 ▶ SG9190SA-V12
- ▶ SG9190GB-V12 ▶ SG9190KB-V12
- ▶ SG9190DB-V12 ▶ SG9190SB-V12

MOTOR

Unit : mm(inch)

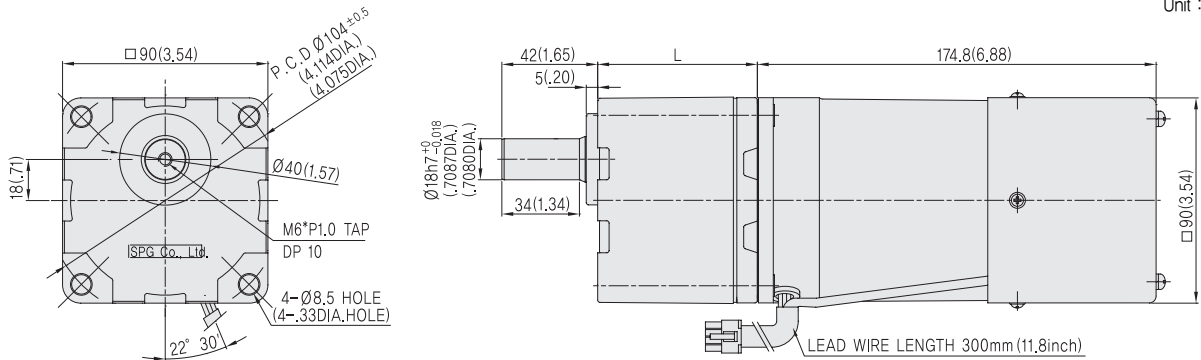


MOTOR OUTPUT SHAFT	GEAR TYPE	KEY TYPE	D-CUT TYPE	STRAIGHT TYPE
	SG9190G□-V12	SG9190K□-V12	SG9190D□-V12	SG9190S□-V12

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GEARED MOTOR

Unit : mm(inch)



GEAR HEAD OUTPUT SHAFT	KEY TYPE	D-CUT TYPE	STRAIGHT TYPE
	SG9K□	SG9DC□	SG9SC□

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MODEL		GEAR RATIO	L	WEIGHT(kg)
GEAR HEAD	SG9□□	5~15	45	0.85
		18~36	58	1.15
		50~180	70	1.42
MOTOR	SG9190□□-V12			3.53

SPEED CONTROLLER

: SR TYPE

Characteristics

- This is a speed controller for small geared motors which was developed to meet the motor's variable speed demands.
- It uses the IC circuit that SPG Motor independently developed and is small, lightweight and reliable.
- Speed control is possible by controlling the number of revolutions with the variable resistor on the front of the case.
- Remote control is possible by installing a speed controller(speed setter).
- Instantaneous braking is possible with an electric brake.
- The small 8 pin plug in method was used.



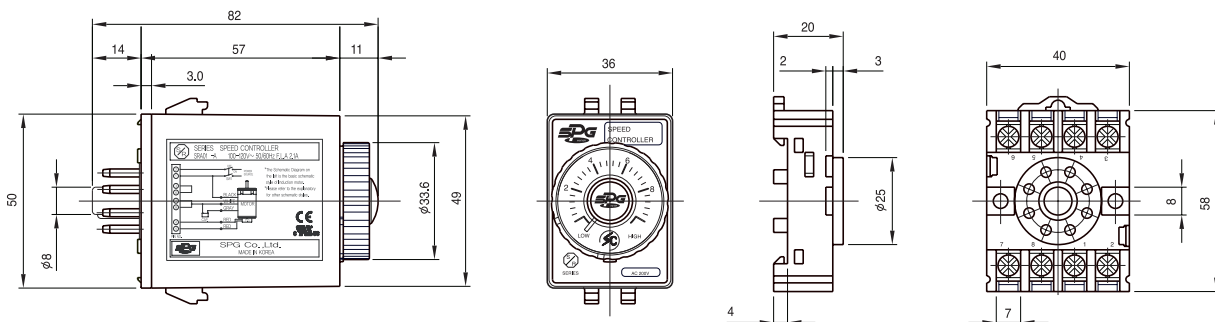
SPECIFICATIONS

SPEC		MODEL	SR TYPE			
		SRA01-A	SRA02-A	SRB01-B	SRB02-B	
Rated Voltage		1Ph, 100 - 120V		1Ph, 200 - 240V		
Operation Voltage Range		±10%				
※1 APPLICABLE MOTOR OUTPUT	INDUCTION	6W	15W~90W	6W	15W~90W	
	REVERSIBLE	6W	15W~40W	6W	15W~40W	
	E · S	6W	15W~90W	6W	15W~90W	
Speed control range		50Hz : 90~1400r/min		60Hz : 90~1700r/min		
Speed variation		5%(standard)				
Speed setting device		Built in external speed setting device attachable				
Braking		Possible to stop brake for certain period by electric brake				
※2	Braking period	0.5sec(standard)				
Parallel operation		Not suitable for parallel operation				
Slow Run, Slow Stop		none				
Operation Temperature		-10~50°C				
Storage Temperature		-20~60°C				
Ambient humidity		85%Maximum(non condensing)				

※ 1: Suitable motors are Socket Type Speed Control Motor. (Use for 12V motor T.G)

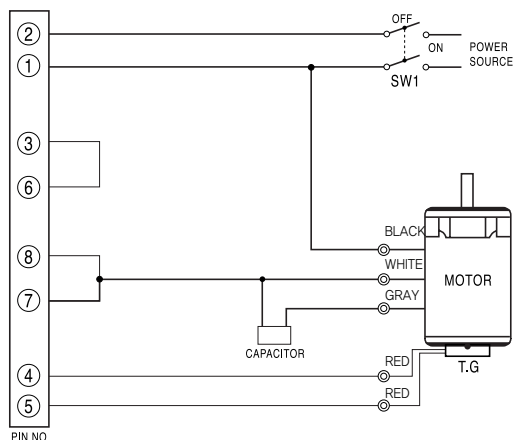
※ 2: The electric brake does not have holding torque.

+ DIMENSIONS SR TYPE SPEED CONTROLLER



+ SCHEMATIC DIAGRAM (INDUCTION MOTOR)

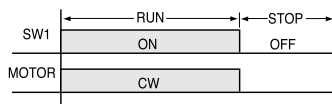
1-1 Uni Direction+Variable Speed INDUCTION MOTOR (6W~90W) REVERSIBLE MOTOR (6W~40W)



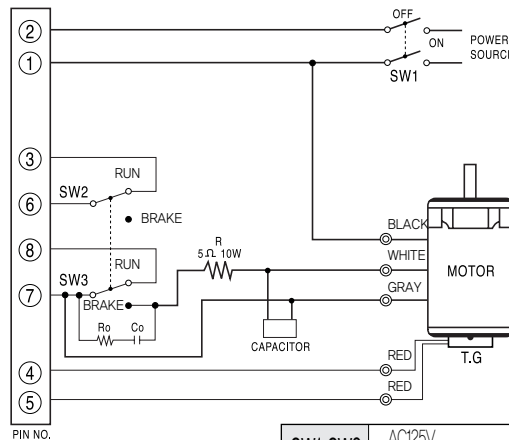
SW1	AC 125V or AC 250V	MIN. 5A
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- Note) 1. The motor rotating direction is CW when viewed from output shaft. When adjusting to CCW, change and connect white and gray wire of motor.
2. The connection of a fan motor is applicable only if the output of the motor is greater than 60W and refer to page 178 for the connection method.

◆ Example of operation



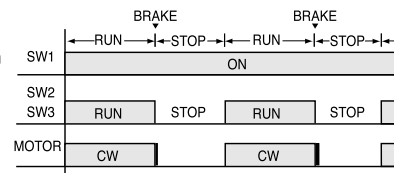
1-2 Uni Direction + Variable Speed + Brake INDUCTION MOTOR (6W~25W) REVERSIBLE MOTOR (6W~25W)



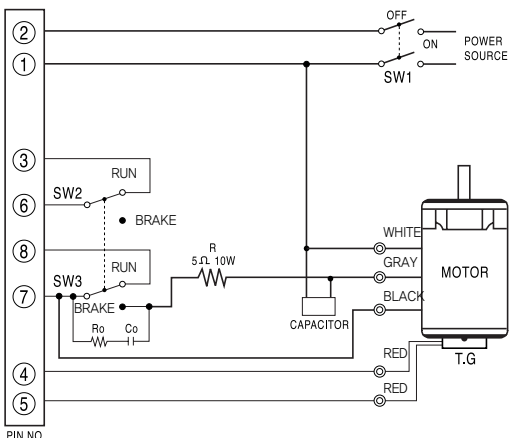
SW1,SW3	AC125V or AC250V	MIN 5A
SW2	DC 20V	10mA
Ro,Co	Ro=10~200Ω (MIN. 1/4W) Co=0.1~0.2μF (AC125V, AC250V)	
R	4.7Ω~6.8Ω	MIN. 10W

- Note) 1. The motor rotating direction is CW when viewed from output shaft. When adjusting to CCW, change and connect white and gray wire of motor.
2. When switched from Run to Stop, electric brake will function about 0.5 sec and motor will stop instantaneously.

◆ Example of operation



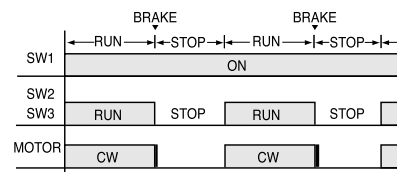
1-3 Uni Direction + Variable Speed + Brake INDUCTION MOTOR (40W~90W) REVERSIBLE MOTOR (40W)



SW1,3	AC125V or AC250V	MIN 5A
SW2	DC 20V	10mA
Ro,Co	Ro=10~200Ω (MIN. 1/4W) Co=0.1~0.2μF (AC125V, AC250V)	
R	4.7Ω~6.8Ω	MIN. 10W

- Note) 1. The motor rotating direction is CW when viewed from output shaft. When adjusting to CCW, change and connect white and gray wire of motor.
2. When switched from Run to Stop, electric brake will function about 0.5 sec and motor will stop instantaneously.
3. The connection of a fan motor is applicable only if the output of the motor is greater than 60W and refer to page 178 for the connection method.

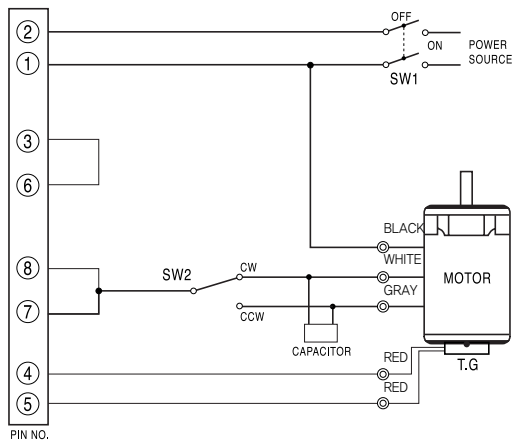
◆ Example of operation



Note) The power switch should be off and check the PIN number when inserting a control pack into socket groove. (There is a possibility to be burned.)

+ SCHEMATIC DIAGRAM (REVERSIBLE MOTOR)

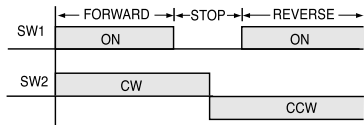
2-1 Reverse+Variable Speed INDUCTION MOTOR (6W~90W) REVERSIBLE MOTOR (6W~40W)



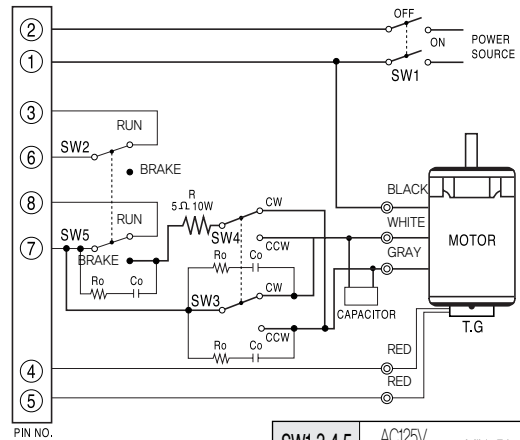
SW1,2	AC125V or AC 250V	MIN. 5A
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- Note) 1. Set "Stop" period for induction motor and switch SW2 after rotation has stopped.
 2. Rversible Motor does not need "Stop" period. It has no relation operating SW2 when SW1 is on.
 3. The connection of a fan motor is applicable only if the output of the motor is greater than 60W and refer to page 178 for the connection method.

◆ Example of operation



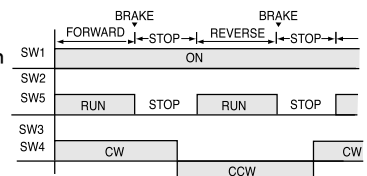
2-2 Reverse + Variable Speed + Brake INDUCTION MOTOR (6W~25W) REVERSIBLE MOTOR (6W~25W)



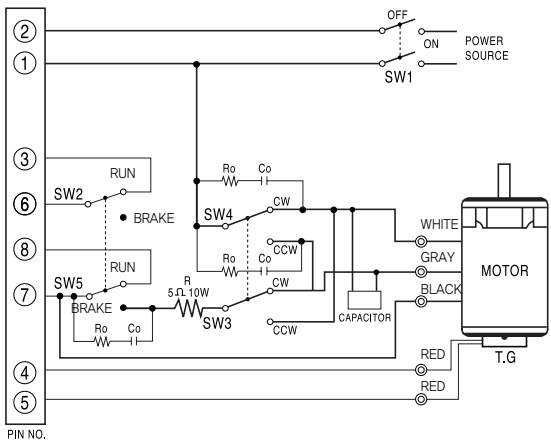
SW1,3,4,5	AC125V or AC250V	MIN. 5A
SW2	DC 20V 10mA	
Ro,Co	Ro=10~200Ω (MIN. 1/4W) Co=0.1~0.2μF (AC125V, AC250V)	
R	4.7Ω~6.8Ω	MIN. 10W

- Note) 1. When switched from Run to Stop, electric brake will function for 0.5sec. and motor will stop instantaneously.
 2. Do not operate SW4, SW5 for this 0.5 sec.
 3. Changing period of SW4, SW5 should be done quicker than Stop to Run of SW2, SW3.

◆ Example of operation



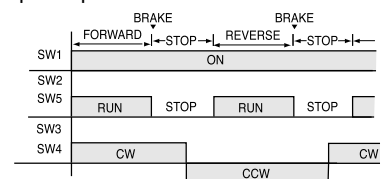
2-3 Reverse + Variable Speed + Brake INDUCTION MOTOR (40W~90W) REVERSIBLE MOTOR (40W)



SW1,3,4,5	AC125V or AC250V	MIN. 5A
SW2	DC 20V 10mA	
Ro,Co	Ro=10~200Ω (MIN. 1/4W) Co=0.1~0.2μF (AC125V, AC250V)	
R	4.7Ω~6.8Ω	MIN. 10W

- Note) 1. When switched from Run to Stop, electric brake will function for 0.5sec. and motor will stop instantaneously.
 2. Do not operate SW4, SW5 for this 0.5 sec.
 3. Changing period of SW4, SW5 should be done quicker than Stop to Run of SW2, SW3.
 4. The connection of a fan motor is applicable only if the output of the motor is greater than 60W and refer to 178 page for the connection method.

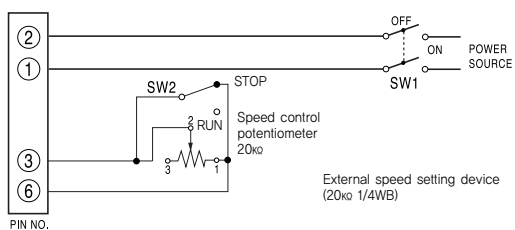
◆ Example of operation



Note) The power switch should be off and check the PIN number when inserting a control pack into socket groove.
 (There is a possibility to be burned.)

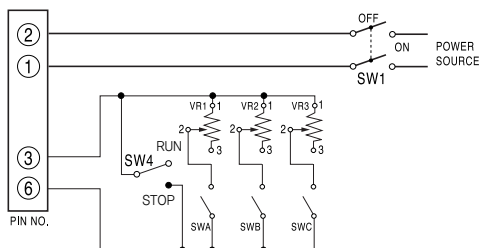
3-1 External speed setting device

When Distance Control is Necessary



- Note) 1. Set the volume to 'LOW'.
2. Shorten the connection cable as much as possible.

When Multi-Stage Speed Setting is Necessary

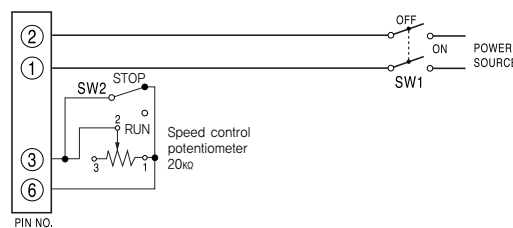


- Note) 1. Set the volume to 'LOW'.
2. If multi-stage speed control is needed, install VR1, VR2, and VR3 respectively and the speed can be changed by SWA, SWB, and SWC. The open/close time of the switch is advised to follow the open/close time of the relay contact point.

3-2 For prompt start(1)

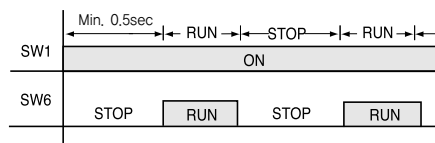
Without braking

※ When the motor starts slowly while starting signal is input at Run switch(SW1), use external volume VR at SW2 for Run/Stop.



SW2	DC 20V 10mA	External speed setting device (20kΩ 1/4WB)
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Example of operation

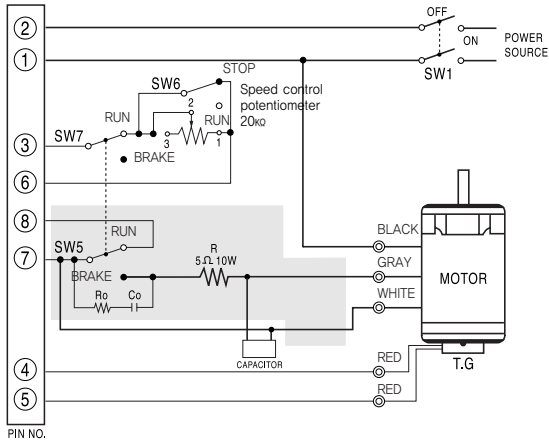


- Note) 1. Input time of SW1 should be about 0.5sec earlier than starting signal of SW2.
2. Set the volume to "LOW" and use external volume VR to control speed.
3. During Run/Stop operation, control SW2 while SW1 is on. Even with small signal motor can be controlled.
4. When not in use for long period turn SW1 off.

Note) The power switch should be off and check the PIN number when inserting a control pack into socket groove.
(There is a possibility to be burned.)

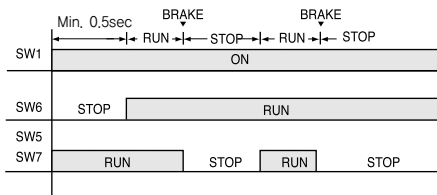
3-3 For prompt start(2)

▼ While braking INDUCTION MOTOR(6W~25W)
REVERSIBLE MOTOR (6W~25W)



SW1,5	AC125V or AC250V MIN. 5A
SW6,7	DC 20V 10mA
Ro,Co	Ro=10~200Ω (MIN. 1/4W) Co=0.1~0.2μF (AC125VV, AC250VV)
R	4.7Ω~6.8Ω MIN. 10W

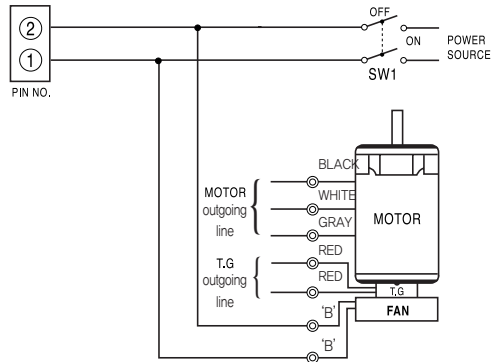
◆ Example of operation



- Note) 1. This wiring is for unidirection+variable speed+braking of motors 25W or less. For motors 40W over part of wiring is different. Refer to the electrical wiring diagram for the corresponding connection.
 2. Input time of SW1 should be about 0.5sec earlier than SW6.
 3. Set the volume to "LOW" and use external volume VR to control speed.
 4. When not in use for long period turn SW1 off.

Note) The power switch should be off and check the PIN number when inserting a control pack into socket groove. (There is a possibility to be burned.)

3-4 Box fan motor connection method

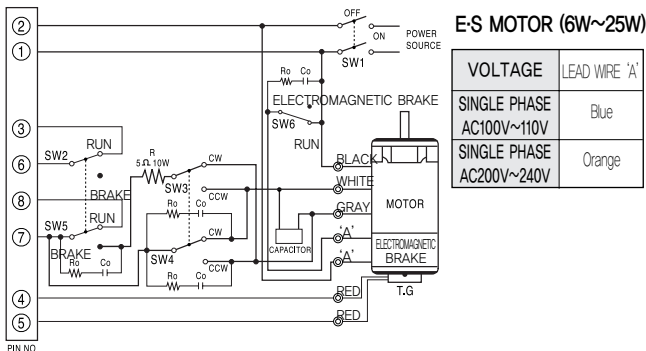


VOLTAGE	LEAD WIRE COLOR 'B'
SINGLE PHASE AC100V~110V	BROWN
SINGLE PHASE AC200V~240V	YELLOW

※ For the connection of something other than the box fan, refer to the electrical wiring diagram for the corresponding connection.

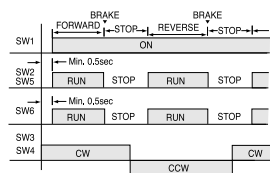
4-1 Wire connection for electromagnetic brake motor

When electric brake of controller is used at the same time



SW1,3,4,5,6	AC125V or AC250V MIN. 5A
SW2	DC 20V 10mA
Ro,Co	Ro=10~200Ω (MIN. 1/4W) Co=0.1~0.2μF (AC125V, AC250V)
R	4.7Ω~6.8Ω MIN. 10W

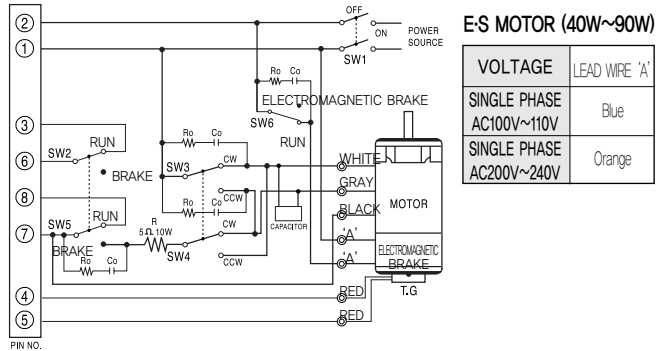
Example of operation



- Note) 1. When switched from Run to Stop, electromagnetic brake will function for about 0.5sec. and motor will stop instantaneously.
 2. Operate SW3, SW4 after the motor has stopped.
 3. Changing period of SW3, SW4 should be done quicker than stop to run of SW2, SW5, SW6.
 4. Power input for SW1 should be at least 0.5sec. earlier than starting signals of SW2, SW5, SW6.
 5. When Run/Stop, operate with SW2, SW5, SW6 while SW1 is On condition. Even with small signal it can control the motor. Turn SW1 off when not used for long period.

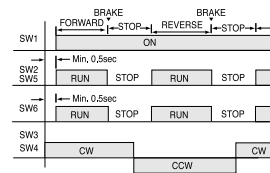
4-2 Wire connection for electromagnetic brake motor

When electric brake of controller is used at the same time



SW1,3,4,5,6	AC125V or AC250V MIN. 5A
SW2	DC 20V 10mA
Ro,Co	Ro=10~200Ω (MIN. 1/4W) Co=0.1~0.2μF (AC125V, AC250V)
R	4.7Ω~6.8Ω MIN. 10W

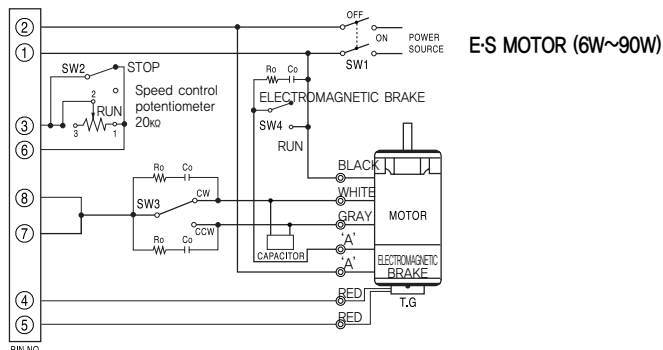
Example of operation



- Note) 1. When switched from Run to Stop, electromagnetic brake will function for about 0.5sec. and motor will stop instantaneously.
 2. Operate SW3, SW4 after the motor has stopped.
 3. Changing period of SW3, SW4 should be done quicker than stop to run of SW2, SW5, SW6.
 4. Power input for SW1 should be at least 0.5sec. earlier than starting signals of SW2, SW5, SW6.
 5. When Run/Stop, operate with SW2, SW5, SW6 while SW1 is 'On' condition. Even with small signal it can control the motor. Turn SW1 off when not used for long period.
 6. The connection of a fan motor is applicable only if the output of the motor is greater than 60W and refer to page 178 for the connection method.

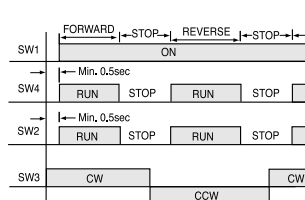
4-3 Wire connection for electromagnetic brake motor

When electric brake of controller is used at the same time



- Note) 1. Set the stop period to stop and convert to SW2 after rotation has stopped
 2. Input period for power switch SW1 should be about 0.5sec. earlier than the signal of start operating of SW6, SW9

Example of operation



SW 1,3,4	AC125V or AC250V MIN. 5A
SW 2	DC 20V 10mA
Ro,Co	Ro=10~200Ω (MIN. 1/4W) Co=0.1~0.2μF (AC125V, AC250V)

3. When Run/Stop, operate with SW2, SW4 while SW1 is on. Even with small signal it can control the motor Turn SW1 off when not used for long period.
 4. Set the volume low and control the speed with external speed setting device VR
 5. The connection of a fan motor is applicable only if the output of the motor is greater than 60W and refer to page 178 for the connection method.

Note) The power switch should be off and check the PIN number when inserting a control pack into socket groove. (There is a possibility to be burned.)