Speed controller

MGSD type

EX type

• Features

<MGSD type>

- Internal speed changer
  Motor speed can be adjusted from the speed setting knob on the front panel.
  Not necessary to install and connect an external speed changer to the controller.
- Electric brake enables instantaneous stop.
- Compact 8P plug-in configuration.
- Variable installation options are available.
  Terminal blocks, sockets and other various options (from Panasonic Electric Works Co.,Ltd.) for panel board can be used.
- Compliant with international standards: c UL us CE

<EX type>

- Soft-start/soft-down
  Time can be adjusted up to 5 seconds.
  Excellent soft-start/soft-down linearity.
- Selectable response
  High-stable and high-response can be selected with the internal changeover switch to meet the characteristic of the application.
  (Factory setting: high-response)
- Excellent instantaneous stop capability
- Parallel operation
  Two or more motors can be controlled from a single control knob.
- Can link with various control systems
  Can control motor(s) in conjunction with different controlling systems such as sequencer. The voltage signal can also be used as control signal.

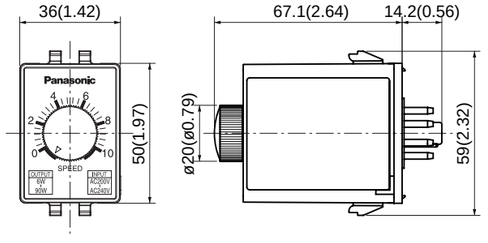
• Standard specification (MGSD type)

	MGSDA1	MGSDB1	MGSDB2
Supply voltage	Single phase 100 to 120 VAC		Single phase 200 to 240 VAC
Supply voltage tolerance	±10% (at rated voltage)		
Power frequency	50/60 Hz		
Rated input current	1.0 A	2.0 A	1.0 A
Compatible motor output	3 to 40 W	60 to 90 W	6 to 90 W
Speed control range	50Hz : 90 to 1400 r/min 60Hz : 90 to 1700 r/min		
Speed regulation (against load)	5% : 1000 r/min, Typical variation at 80% rated torque		
Speed setting	Internal		
Braking *1	Activated while electric braking current is flowing.		
Electric braking time	0.5 sec (typ.): Amount of braking current is 2 to 3 times the rated current.		
Parallel operation	Not applicable		
Product weight	80 g		

*1 Electric braking has no mechanical holding mechanism.

• Outline drawing

MGSD type



Socket is not supplied with the product. Use octal pin socket (DV0P4560), option, or Socket (AW68102) recommended by Panasonic Electric Works Co.,Ltd.

Unit: mm (inch)

* Please read your User's manual carefully so that you will understand the operation and safety precautions before attempting to operate the system.

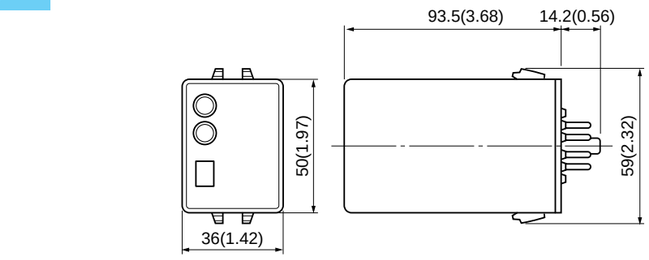
• Standard specification (EX type)

Part No. / Characteristic	EX type				
	DV1131	**DV1132**	**DV1134**	**DV1231**	**DV1234**
Rated voltage	Single phase 100 VAC			Single phase 200 VAC	
Operating voltage range	±10% (at rated voltage)				
Power frequency	50/60 Hz				
Rated current	0.4 A	1 A	2.0 A	0.3 A	1 A
Compatible motor output *1	3 to 10 W	15 to 40 W	60 to 0 W	6 to 20 W	25 to 90 W
Operation change	High-response		High-stability		
Speed control range	90 to 1400 r/min / 90 to 1700 r/min		50 to 1400 r/min / 50 to 1700 r/min		
Speed variation	5% or more		3% or less		
Speed setting	From external controller, e.g. external speed changer *3				
Braking*2	Active while electric braking current is flowing.				
Electric braking time	5 sec typ. The braking current will be turned off before the 5-sceond limit as the motor stops. (Braking current is 2 to 3 times the rated current.)				
Parallel operation	Enabled				
Soft-start/soft-down capability	Available (typically up to 5 sec (0 to max. speed))				
Operating temperature range	–10 to 50˚C				
Storage temperature	–20 to 60˚C				

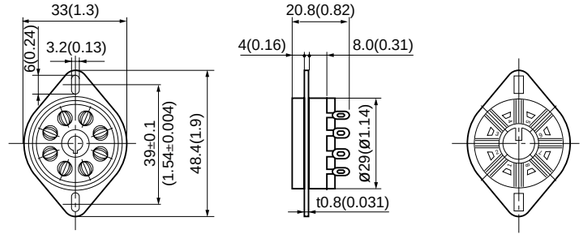
*1 Applicable to Panasonic compact speed variable geared motors. Select motors with applicable output.
*2 Electric braking has no mechanical brake holding mechanism.
To provide brake holding, use our C&B motor or variable speed motor containing electromagnetic brake.
When braking a load having excessively high inertia, durability and life expectancy of motor shaft and gear should be taken into consideration. Use the motor within the allowable inertia.
*3 EX type is supplied with the external speed changer.

• Outline drawing

EX type



Socket (accessory)



Unit: mm (inch)

* Please read your User's manual carefully so that you will understand the operation and safety precautions before attempting to operate the system.

• Connection diagram list

Connection diagram	Function	Speed controller	Page
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6	Wiring to electromagnetic brake (40 W or smaller)	MGSD type	C-12
7	Wiring diagram (for unidirectional rotation)	EX type	C-13
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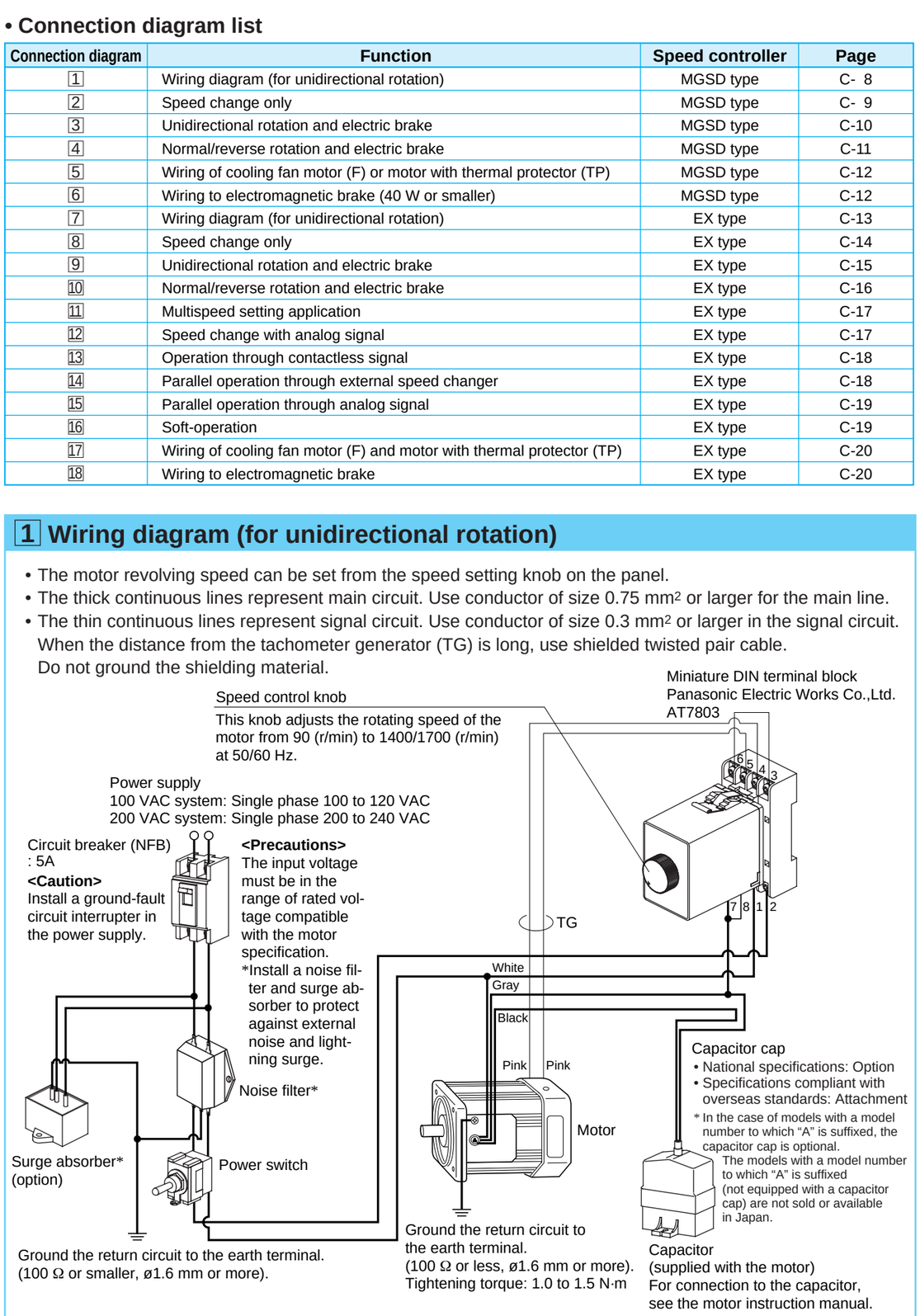
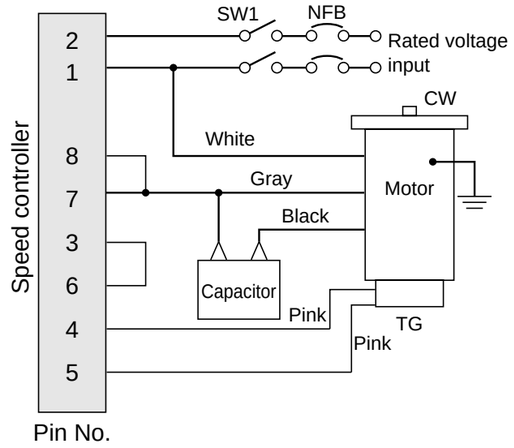
1 Wiring diagram (for unidirectional rotation)

- The motor revolving speed can be set from the speed setting knob on the panel.
- The thick continuous lines represent main circuit. Use conductor of size 0.75 mm² or larger for the main line.
- The thin continuous lines represent signal circuit. Use conductor of size 0.3 mm² or larger in the signal circuit. When the distance from the tachometer generator (TG) is long, use shielded twisted pair cable. Do not ground the shielding material.

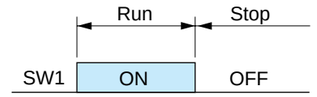


2 Speed change only

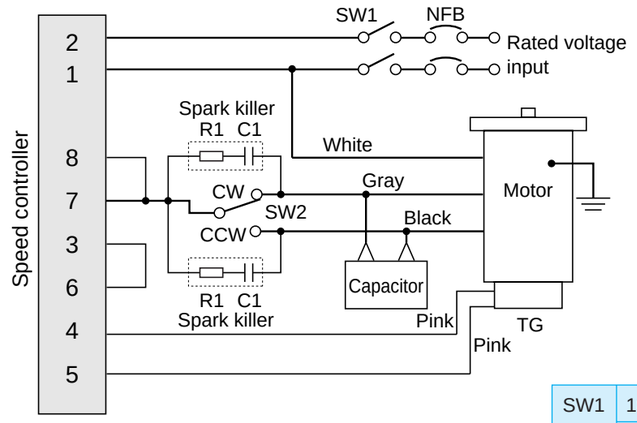
Unidirectional rotation

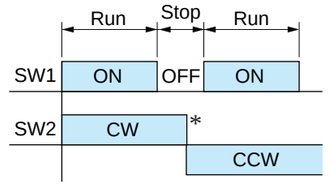


Rotating direction viewed from shaft end	
CW	Clockwise
CCW	Counterclockwise



Normal/reverse rotation





SW1 : Power switch
SW2 : Normal/reverse selector switch

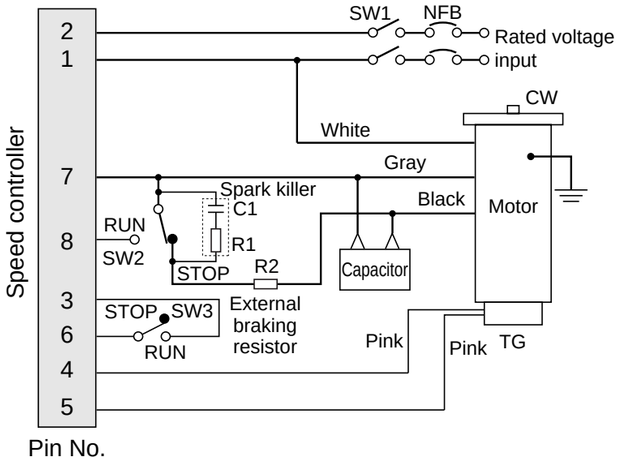
SW1	100 V supply system	5 A or more at 125 VAC
SW2	200 V supply system	5 A or more at 250 VAC
Spark killer R1+C1		DV0P008 (option)

<Precautions>

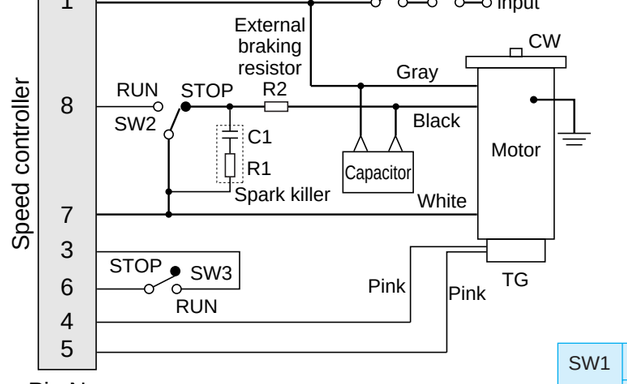
1. To change rotating direction of induction motor:
   Provide a motor halt period. Switch over SW2 after complete stop of the motor.
2. To change rotating direction of reversible motor:
   A motor halt period is not necessary. Switch over SW2 while keeping SW1 turned ON. When configuring SW2 with relay contacts, use a relay having large gap between contacts (e.g. HG/HP relay from Panasonic Electric Works Co.,Ltd.) to prevent malfunction due to short-circuited capacitor.
3. For motors for cooling fan and motors with thermal protector, also refer to page C-12.
4. When using independent relay contacts for SW2 to change over normal/reverse, interlock both contacts so that they will not close simultaneously.
5. The spark killer consisting of R1 and C1 must be used to protect the relay contacts.

3 Unidirectional rotation and electric brake

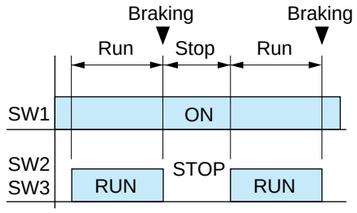
25 W or smaller



40 W or larger



- Connection according to this wiring diagram causes the motor to rotate clockwise when viewed from the motor shaft end. To run the motor counterclockwise, interchange the connecting point of black and gray leads.



SW1 : Power switch
SW2 : RUN/STOP switch
SW3 : Brake start switch

SW1	100 V supply system	5 A or more at 125 VAC
SW2	200 V supply system	5 A or more at 250 VAC
SW3		DC10 V 10 mA
Spark killer R1+C1		DV0P008 (option)
External braking resistor R2		DV0P003 (option)

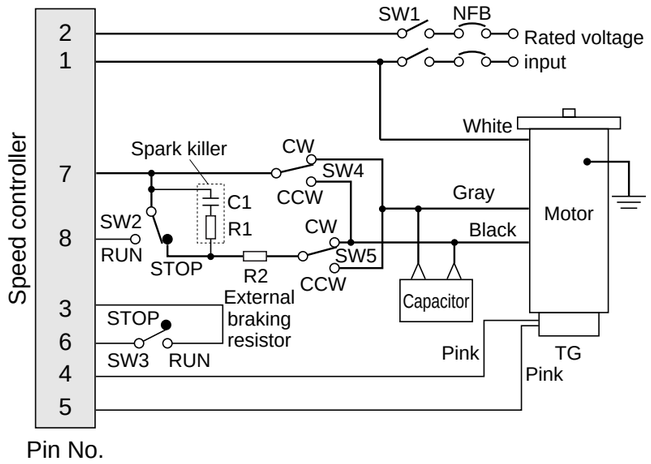
<Precautions>

1. When SW2 and SW3 are switched from RUN to STOP, electric braking is applied for approx. 0.5 sec, and the motor stops instantly.
   Difference in switching time between SW2 and SW3 must be 0.1 sec or shorter. If SW2 (SW3) is in RUN position while SW3 (SW2) is in STOP, abnormal operation occurs (full speed rotation for a short time) and motor temperature rises excessively.
2. The number of start/stop operations must be 6/min. or less.
3. For motors for cooling fan and motors with thermal protector, also refer to page C-12.
4. The spark killer consisting of R1 and C1 must be used to protect the relay contacts.
5. R2 limits flow of discharging current upon short-circuiting of the capacitor during braking.

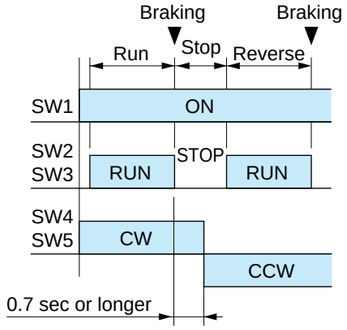
* Please read your User's manual carefully so that you will understand the operation and safety precautions before attempting to operate the system.

4 Normal/reverse rotation and electric brake

25 W or smaller

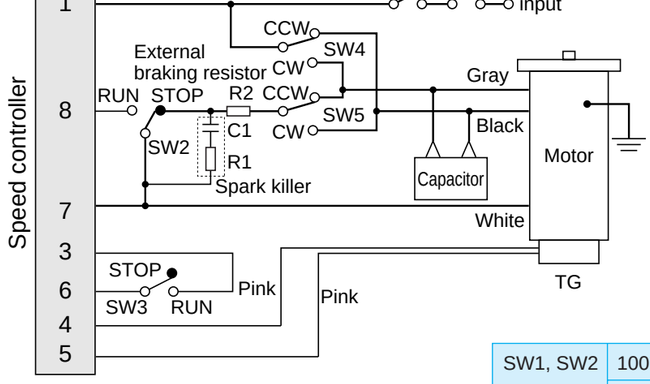


Rotating direction viewed from shaft end	
CW	Clockwise
CCW	Counterclockwise



SW1 : Power switch
SW2 : RUN/STOP switch
SW3 : Braking start switch
SW4 : Normal/reverse selector switch

40 W or larger



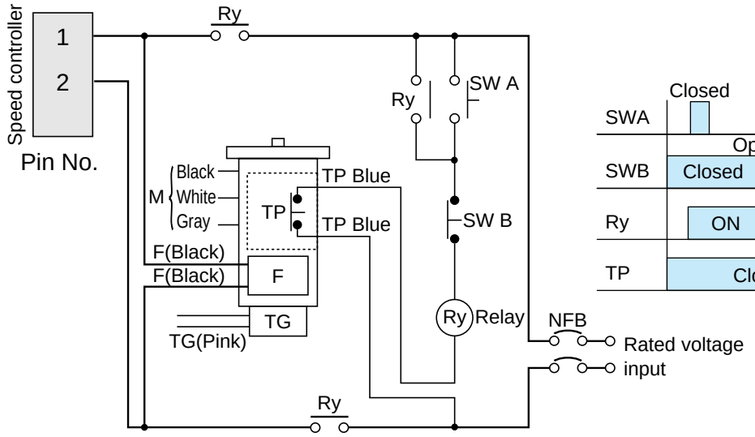
SW1, SW2	100 V supply system	5 A or more at 125 VAC
SW4, SW5	200 V supply system	5 A or more at 250 VAC
SW3		DC10 V 10m A
Spark killer R1+C1		DV0P008 (option)
External braking resistor R2		DV0P003 (option)

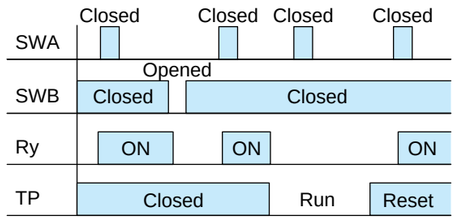
<Precautions>

1. When SW2 and SW3 are switched from RUN to STOP, electric braking is applied for approx. 0.5 sec, and the motor stops instantly. (Do not operate SW4 and SW5 until the motor stops.)
   Difference in switching time between SW2 and SW3 must be 0.1 sec or smaller. If SW2 (SW3) is in RUN position while SW3 (SW2) is in STOP, abnormal operation occurs (full speed rotation for a short time) and motor temperature rises excessively.
2. Do not change the motor rotating direction (SW4, SW5) while the motor is running.
3. The number of start/stop operations must be 6/min. or less.
4. For motors for cooling fan and motors with thermal protector, also refer to page C-12.
5. The spark killer consisting of R1 and C1 must be used to protect the relay contacts.

* Please read your User's manual carefully so that you will understand the operation and safety precautions before attempting to operate the system.

5 Wiring of cooling fan motor (F) or motor with thermal protector (TP)





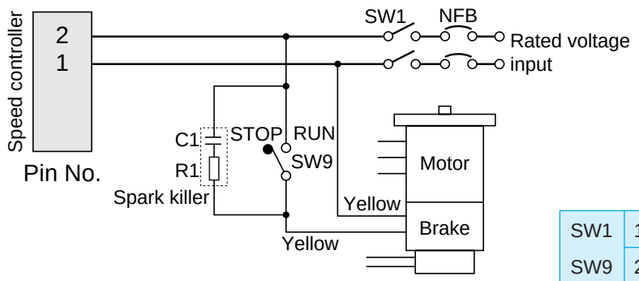
SW A		Momentary N.O. contact
SW B		Momentary N.C. contact
Relay Ry	100 V supply system	125 VAC 5 A or more 3a contact
	200 V supply system	250 VAC 5 A or more 3a contact

<Precautions>

1. The thermal protector (TP) is an automatic reset type. To prevent hazards caused by restarting, connect the TP as shown above. Don't connect TP directly to the power supply.
2. Once the TP operates, cooling period is required before the operation can restart.
3. Connect the cooling fan motor (F) across pins 1 and 2 on the power terminal.
4. Motor (M) and tachometer generator (TG) should be connected according to corresponding wiring diagram shown later.

6 Wiring to electromagnetic brake (40 W or smaller)

• Variable speed motor with electromagnetic brake should be wired as shown below.



SW1	100 V supply system	5 A or more at 125 VAC
SW9	200 V supply system	5 A or more at 250 VAC
Spark killer R1+C1		DV0P008 (option)

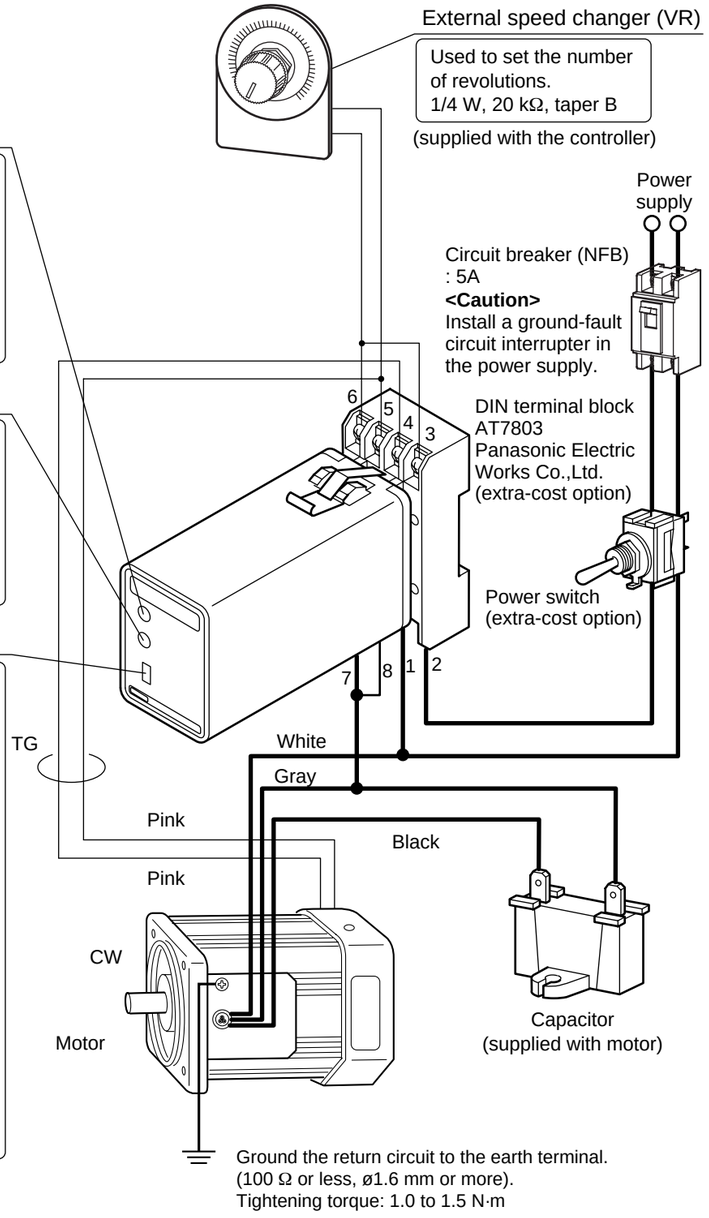
<Precautions>

1. Operate SW9 simultaneously with RUN/STOP switching of other switches, if any. Placing other switch to RUN position while the brake is active (SW9 at STOP position) causes the motor to generate heat.
2. For remaining wirings, refer to corresponding wiring diagram.

* Please read your User's manual carefully so that you will understand the operation and safety precautions before attempting to operate the system.

7 Wiring diagram (for unidirectional rotation)

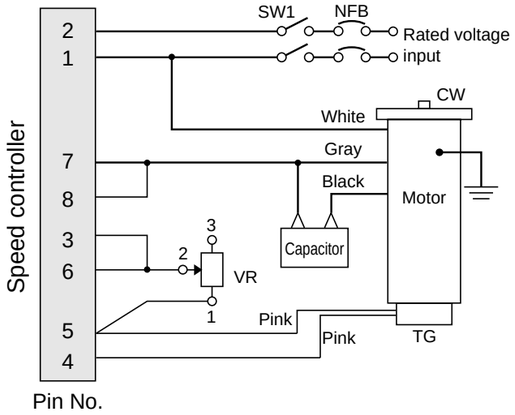
- The thick continuous lines represent main circuit. Use conductor of size 0.75 mm² or larger for the main line.
- The thin continuous lines represent signal circuit. Use conductor of size 0.3 mm² or larger in the signal circuit. When the distance from the tachometer generator (TG) is long, use shielded twisted pair cable.



* Please read your User's manual carefully so that you will understand the operation and safety precautions before attempting to operate the system.

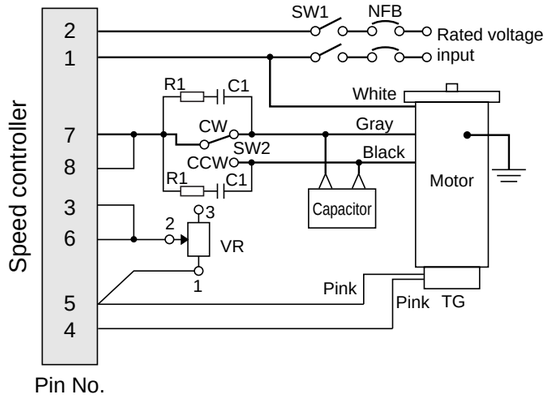
8 Speed change only

Unidirectional rotation



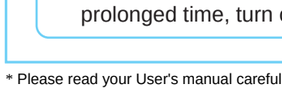
Pin No.

Normal/reverse rotation

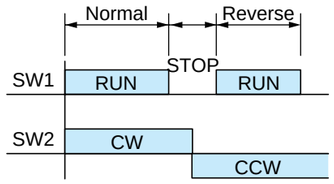


Pin No.

This wiring diagram causes the motor to rotate clockwise when viewed from the motor shaft end.
To run the motor counterclockwise, interchange the connecting point of black and gray leads.



SW1	100 V supply system	5 A or more at 125 VAC
SW2	200 V supply system	5 A or more at 250 VAC
R1+C1		DV0P008 (option)



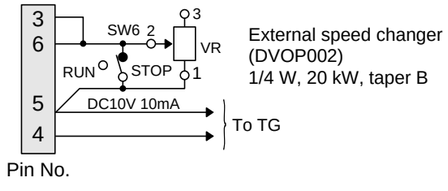
SW1 : Power switch
SW2 : Normal/reverse selector switch

<Precautions>

1. To change rotating direction of induction motor:
   Provide a motor halt period. Switch over SW2 after complete stop of the motor.
2. To change rotating direction of reversible motor:
   A motor halt period is not necessary. Switch over SW2 while keeping SW1 turned ON. When configuring SW2 with relay contacts, use a relay having large gap between contacts (e.g. HG/HP relay from Panasonic Electric Works Co.,Ltd.) to prevent malfunction due to short-circuited capacitor.
3. For motors for cooling fan and motors with thermal protector, also refer to page C-20.
4. When using independent relay contacts for SW2 to change over normal/reverse, interlock both contacts so that they will not close simultaneously.
5. The spark killer consisting of R1 and C1 must be used to protect the relay contacts.

Start/stop control with small signal

- With the external speed changer connected, the motor can be started/stopped with a small signal through SW6 contact while the power switch SW1 (see diagram above) is on. The SW6 provides shorter start-up time than SW1.



External speed changer (DVOP002)
1/4 W, 20 kW, taper B

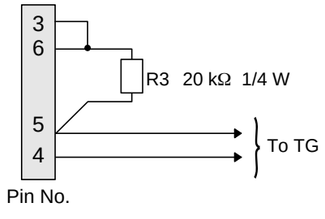
Pin No.

<Precautions>

1. Power (SW1) should be turned on at least 0.5 sec before turning on of the start signal (SW6).
2. When the motor is not operated for a prolonged time, turn off power switch (SW1).

Operation from maximum speed control

- When no external speed changer is required, the speed can be adjusted from the maximum speed control.



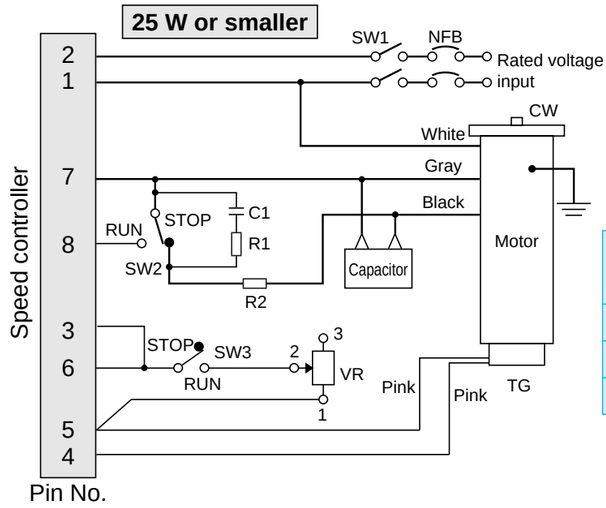
Pin No.

<Precautions>

1. Connect a fixed resistor (R3) in place of external speed changer (VR).

9 Unidirectional rotation and electric brake

25 W or smaller

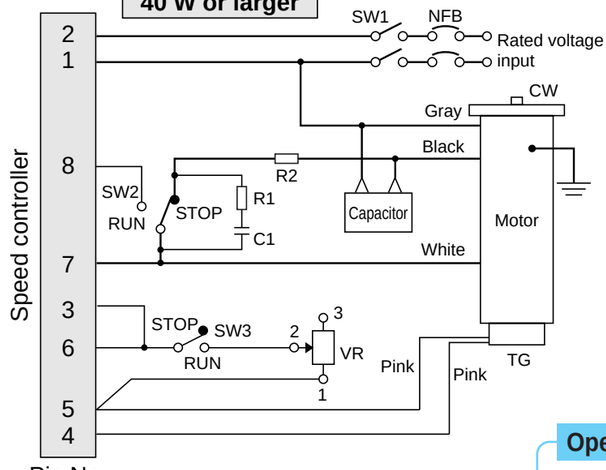


Pin No.

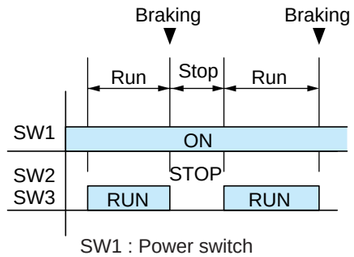
- Connection according to this wiring diagram causes the motor to rotate clockwise when viewed from the motor shaft end. To run the motor counterclockwise, interchange the connecting point of black and gray leads.

SW1	100 V supply system	5 A or more at 125 VAC
SW2	200 V supply system	5 A or more at 250 VAC
SW3		DC10 V 10 mA
R1+C1		DV0P008 (option)
R2		DV0P003 (option)

40 W or larger



Pin No.



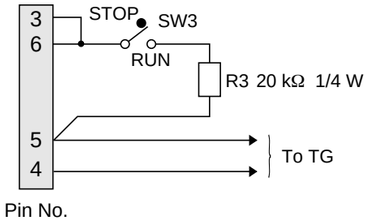
SW1 : Power switch
SW2 : RUN/STOP switch
SW3 : Brake start switch

<Precautions>

1. When SW2 and SW3 are switched from RUN to STOP, electric braking is applied for approx. 5 sec, or until the motor stops.
   SW2 and SW3 must be operated simultaneously. Otherwise, abnormal operation occurs (full speed rotation for a short time), causing the motor temperature rises excessively.
2. The number of start/stop cycles must be 6/min. or less.
3. When using cooling fan motor or motor with thermal protector, also see page C-20.
4. Insert R1 and C1 to protect relay contact.
5. R2 restricts discharge current in case of capacitor short circuit during braking.

Operation from maximum speed control

- When no external speed changer is required, the speed can be adjusted from the maximum speed control.



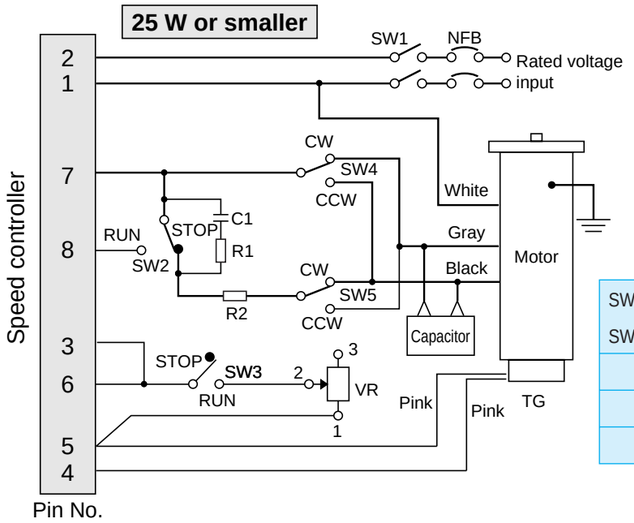
Pin No.

<Precautions>

1. Connect a fixed resistor (R3) in place of external speed changer (VR).

10 Normal/reverse rotation and electric brake

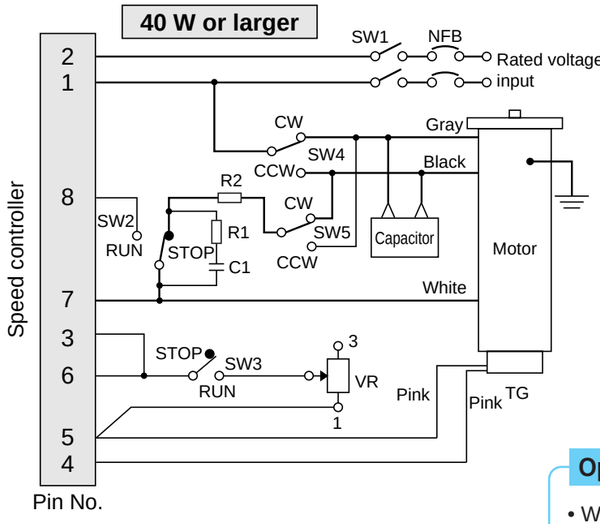
25 W or smaller

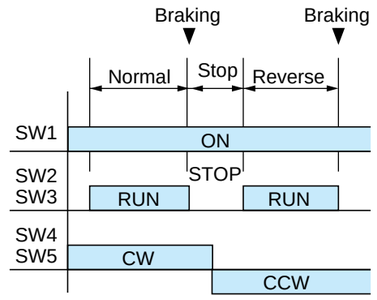


Rotating direction viewed from shaft end	
CW	Clockwise
CCW	Counterclockwise

SW1, SW2	100 V supply system	5 A or more at 125 VAC
SW4, SW5	200 V supply system	5 A or more at 250 VAC
SW3		DC10 V 10 mA
R1+C1		DV0P008 (option)
R2		DV0P003 (option)

40 W or larger





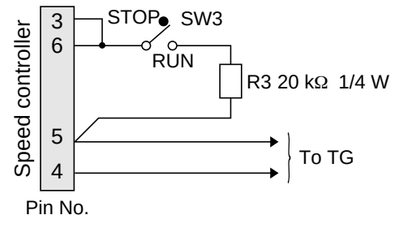
SW1 : Power switch
SW2 : RUN/STOP switch
SW3 : Braking start switch
SW4,SW5 : Normal/reverse selector switch

<Precautions>

1. When SW2 and SW3 are switched from RUN to STOP, electric braking is applied for approx. 5 sec, or until the motor stops. (Do not operate SW4 and SW5 until the motor stops completely.) SW2 and SW3 must be operated simultaneously. Otherwise, abnormal operation occurs (full speed rotation for a short time), causing the motor temperature rises excessively.
2. Do not change the rotating direction (SW4, SW5) while the motor is running.
3. The number of start/stop cycles must be 6/min. or less.
4. When using cooling fan motor or motor with thermal protector, also see page C-20.
5. Insert R1 and C1 to protect relay contact.
6. R2 restricts discharge current in case of capacitor short circuit during braking.

Operation from maximum speed control

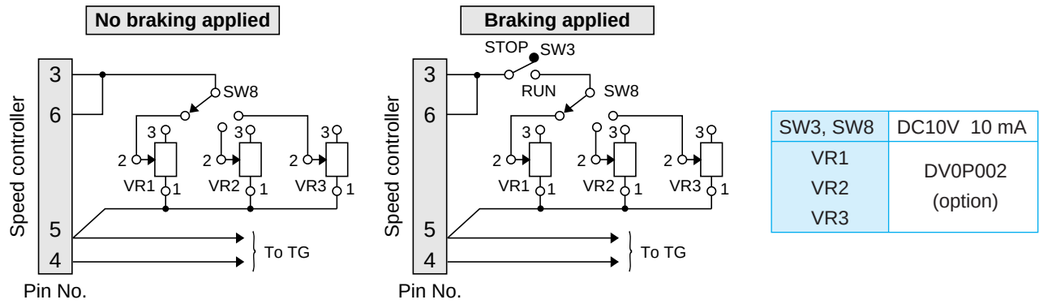
• When no external speed changer is required, the speed can be adjusted from the maximum speed control.



<Precautions>

1. Connect a fixed resistor (R3) in place of external speed changer (VR).

11 Multispeed setting application

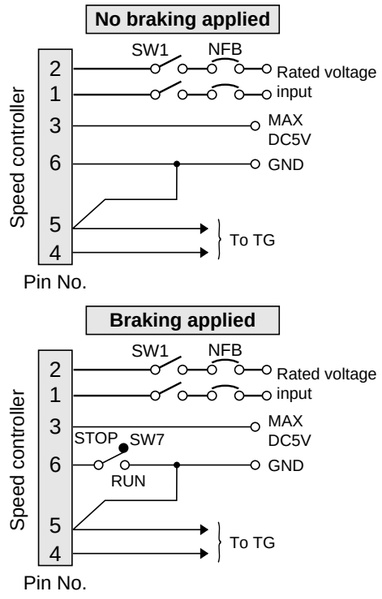


SW3, SW8	DC10V 10 mA
VR1 VR2 VR3	DV0P002 (option)

<Precautions>

1. Set external speed changers VR1, VR2 and VR3 to 3 different speeds and select the desired speed from SW8.
2. When activating the brake, simultaneously switch over SW3 and RUN-STOP of other switches.
3. For remaining wirings, refer to the corresponding wiring diagrams.

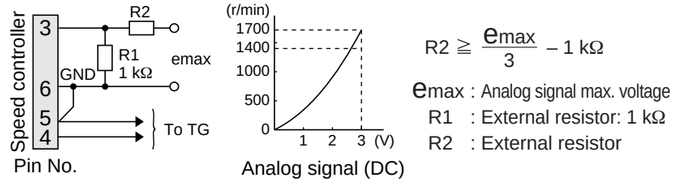
12 Speed change with analog signal



SW1	100 V supply system	5 A or more at 125 VAC
	200 V supply system	5 A or more at 250 VAC
SW7		DC10 V 10 mA

<Precautions>

1. Turn on power switch SW1 approx. 0.5 sec earlier than the analog start signal.
2. For repetitive run/stop operations, use the analog signal while keeping SW1 ON.
3. Soft-operation can be adjusted from the soft-start and soft-down controls or by using analog signal.
4. On the maximum speed control, set the maximum motor revolving speed that may be achieved at the maximum analog signal value (e.g. 3 VDC).
5. The absolute maximum rating of analog signal is 5 VDC. The system should be designed to use standard 3 VDC analog signal. If the signal voltage exceeds 3 VDC, the circuit diagram shown below should be used for wiring.



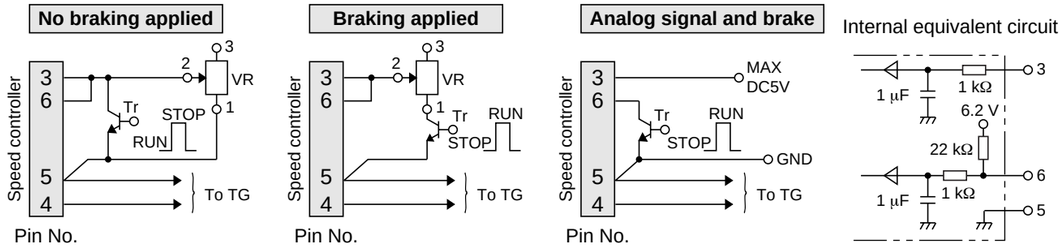
$R2 \geqq \frac{e_{max}}{3} - 1\ k\Omega$

emax : Analog signal max. voltage
R1 : External resistor: 1 kΩ
R2 : External resistor

6. Revolution speed “0” signal should not exceed 0.1 VDC.
7. The input speed pattern (curve) may not be exactly reflected on the motor speed, due to inertial effect of the load, especially during stop sequence.
8. The percentage ripple of analog voltage signal should be 2% or less.
9. For other wirings, refer to the corresponding circuit/wiring diagrams.
10. When using the braking feature, motor wiring (pins 1, 7 and 8) should be in accordance with pages C-8 and C-9. To activate braking, switch SW2 and SW7 at the same time.
    If SW2 is in RUN position while SW7 is in STOP, abnormal operation occurs (full speed rotation for a short time); or if SW7 is in RUN position while SW2 is in STOP, motor temperature rises excessively.

13 Operation through contactless signal

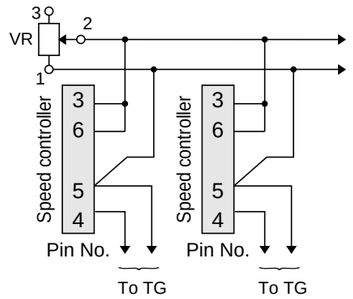
• Small signal relays SW3, SW6 and SW7 can be replaced with transistor.



14 Parallel operation through external speed changer

<Precautions>

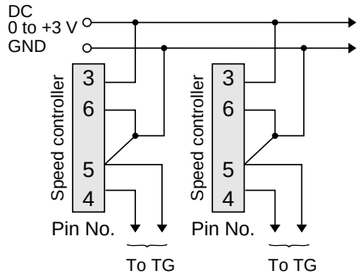
1. The resistance Rs of the external speed changer VR should be as follows:
   Rs = 20/N (kΩ)
   where, N is the number of motors.
2. For synchronous operation or ratio operation, desired revolving speeds must be set from the maximum speed control.
   Soft-start and soft-down controls and operation changeover switch must be set to the same position.
3. Wirings from the external speed changer VR should be connected to the same pins (No.5 and 6) on the controller.
4. Malfunction may occur as the number of devices operated in parallel increases.
   To secure correct operation, connect a noise filter to each unit.
5. For other electrical connections, refer to corresponding circuit/wiring diagrams.



15 Parallel operation through analog signal

<Precautions>

The input impedance of the controller is approx. 100 kΩ. The output impedance of the analog signal source should be determined based on the total input impedance of the speed controllers.



16 Soft-operation

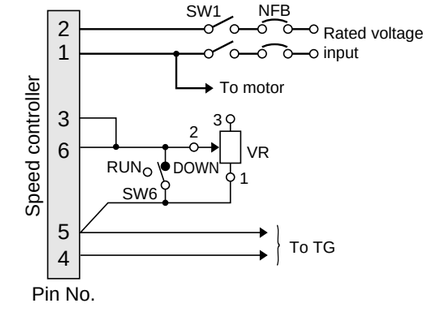
• Soft-start, soft-down

<Precautions>

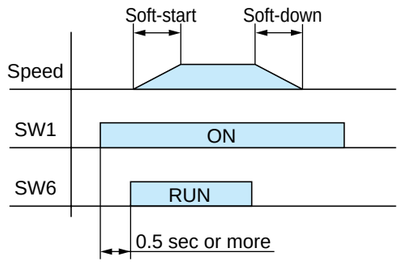
1. Power switch SW1 should be turned on approx. 0.5 sec before the operation start signal from SW6.
2. When repeating run/stop cycles, turn on/off only SW6 while keeping SW1 turned ON. In this way, the motor can be controlled by using a small signal. To stop operation for a long time, also turn off SW1.
3. Soft-start/soft-down period is the time required for the equipment to start up from stop state to full speed when the external speed changer is set at maximum value.
4. Soft-start/soft-down control, when at the full clockwise position, disables the soft-down function. As the stop signal is input, power supply to the motor is turned off immediately. However, the revolving speed gradually decreases in proportion to the inertia of the load and motor starts free-running stop sequence.
5. Soft-start/soft-down control can set maximum time length of approx. 5 seconds (Typ. at FCCW). The setting may be exceeded if the inertia of the load is too large.
6. For other electrical connections, refer to corresponding circuit/wiring diagrams.

• Soft-start and electric brake

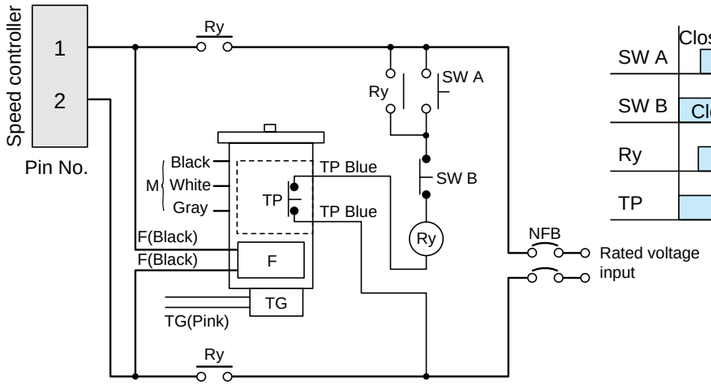
Electrical wirings are the same as for “Unidirectional rotation and electric brake” and “Normal/reverse rotation and electric brake”.
Adjust the soft-start time from the soft-start/down control.

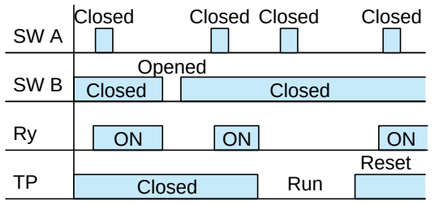


SW1	100 V supply system	5 A or more at 125 VAC
	200 V supply system	5 A or more at 250 VAC
SW6		DC10 V 10 mA



17 Wiring of cooling fan motor and motor with thermal protector





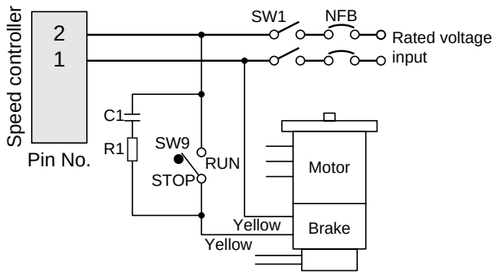
SW A		Momentary N.O. contact
SW B		Momentary N.C. contact
Ry	100 V supply system	125 VAC 5 A or more 3a contact
	200 V supply system	250 VAC 5 A or more 3a contact

<Precautions>

1. The thermal protector (TP) is an automatic reset type. To prevent hazards caused by restarting, connect the TP as shown above. Don't connect TP directly to the power supply.
2. Once the TP operates, cooling period is required before the operation can restart.
3. Connect the cooling fan motor (F) across pins 1 and 2 on the power terminal.
4. Motor (M) and tachometer generator (TG) should be connected according to corresponding wiring diagram shown later.

18 Wiring to electromagnetic brake

• Variable speed motor with electromagnetic brake should be wired as shown below.

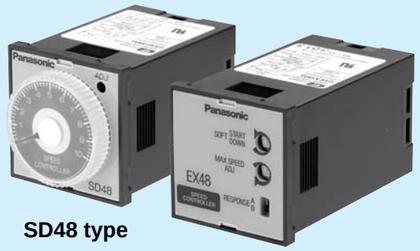


SW1	100 V supply system	5 A or more at 125 VAC
SW9	200 V supply system	5 A or more at 250 VAC
R1+C1		DV0P008 (option)

<Precautions>

1. SW9 should be switched to RUN or STOP at the same time as the other switches are switched to RUN or STOP.
   If the other switches are set to RUN while the brake is energized (SW9 in STOP position), the motor will generate heat.
2. For other wirings, refer to the corresponding circuit/wiring diagrams.
   If the application is speed change without using electric braking (page C-14), perform wiring according to “Start/stop control with small signal”.

* Please read your User's manual carefully so that you will understand the operation and safety precautions before attempting to operate the system.



SD48 type

EX48 type

• Features

- First DIN 48 size in the industry
  Compact space saving model (control panel)
  (standardized panel machining holes)
  A wide choice of options (recommended by Panasonic Electric Works Co.,Ltd.)
- Simplified and neat wiring arrangement
  Main circuit and signal inputs are isolated on the terminal block.
  Use of 8-pin terminal block requires fewer wiring connections.
- Can operate under a wide range of power supply voltage (100V→100 to 120V, 200V→200 to 240V)

• Standard specification

Characteristic \ Part No.	SD48 type						EX48 type					
	DVSD 48AL	DVSD 48BL	DVSD 48CL	DVSD 48AY	DVSD 48BY	DVSD 48CY	DVEX 48AL	DVEX 48BL	DVEX 48CL	DVEX 48AY	DVEX 48BY	DVEX 48CY
Rated voltage	100 to 120 VAC			200 to 240 VAC			100 to 120 VAC			200 to 240 VAC		
Operating voltage range	±10% (at rated voltage)						±10% (at rated voltage)					
Power frequency	50/60Hz						50/60 Hz					
Rated current	0.5 A	1.0 A	2.0 A	0.3 A	0.5 A	1.0 A	0.5 A	1.0 A	2.0 A	0.3 A	0.5 A	1.0 A
Compatible motor output *1	3 to 20 W	25 to 40 W	60 to 90 W	3 to 20 W	25 to 40 W	60 to 90 W	3 to 20 W	25 to 40 W	60 to 90 W	3 to 20 W	25 to 40 W	60 to 90 W
Speed variation	90 to 1400 r/min / 90 to 1700 r/min						Mode A (high-response mode):50 to 1400 r/min / 50 to 1700 r/min Mode B (high-response mode):90 to 1400 r/min / 90 to 1700 r/min *2					
Speed setting	Internal						External speed changer, analog voltage, maximum speed setting control					
Brake *3	Applies braking force to the motor by feeding electric braking current to the motor for 0.5 sec (typ)						Applies braking force to the motor by feeding electric braking current to the motor for 5 sec (typ) (Turns off electric braking current even within 5 sec as the motor stops.)					
Parallel operation	Not possible						Possible					
Soft-start/down	Not applicable						Variable up to 5 sec (typ) (0 to max. revolving speed)					
Operating temperature range	–10 to 50˚C						–10 to 50˚C					
Storage temperature	–20 to 60˚C						–20 to 60˚C					

*1. Applicable to Panasonic compact geared motors and variable speed motors.
*2. EX48 models are set to mode A (high-stable) upon shipment.
*3. Electric braking has no mechanical brake holding force.
To provide the holding force, use a variable speed motor with electromagnetic braking feature.

* Please read your User's manual carefully so that you will understand the operation and safety precautions before attempting to operate the system.