

FY-S	BRUSHLESS DC MOTORS & DRIVERS	00-10-25
SERVEX	FYD SERIES (Simple TYPE)	SALES DOCUMENT

1 Application

This is the document on Servex series brushless DC motor and driver suitable for it. And we would like to ask you to understand that in case of improvement, specifications and/or parts may be changed without notice.

2 Model Code

		6W Type	15W Type
Model on Set (Motor and Driver)	Straight Shaft Type	FYD6S6S-D3	FYD8S15S-D3
	Pinion Shaft Type	FYD6S6PF-D3	FYD8S15PF-D3
Model on Motor	Straight Shaft Type	FY6S6-D3	FY8S15-D3
	Pinion Shaft Type	FY6PF6N-D3	FY8PF15N-D3
Model on Driver	Straight Shaft Type	FYD66SD3	FYD815SD3
	Pinion Shaft Type		

In this series, motors and drivers are sold separately. Please refer to the Model code on set. Option

		6W Type	15W Type
Model on Rotor cover (Recognition No.)	Straight Shaft Type	F-RC630	F-RC837
	Pinion Shaft Type	(AD09877)	(AD09768)

3 Specification

- (1) Motor and driver, motor and rotor cover should be used by the combination as indicated in the above table.
 - (2) Motor output shaft should not be rotated by an external force more than speed control range.
 - (3) It should be used so that the temperature of motor flange would be 80°C MAX. (Ambient temperature 40°C without heat sink)
 - (4) The adjustable part of variable resistor should not be touched.
 - (5) The electronic parts should not be touched.
 - (6) In case of reusing the rotor cover once used, please confirm that mounted rotor cover should not be loose.
 - (7) Specified plain washer should be used for rotor cover mounting.
 - (8) In case of handling the motor, don't hold rotor or rotor cover.
 - (9) Don't hold cable for the handling of motor and driver.
- If it is used differently from above (1)-(9), it may cause fire, failure or unusual action.



Caution

3-1 Specification

Item	Specification		Standard condition
	6W Type	15W Type	
Rated Voltage [V]	DC24		
Rated Speed [r/min]	1500		
Speed Control Range [r/min]	200~2500		Rated voltage
Time Rating	Continuous		
Rated Torque [mN·m] / {kgf·cm}	39 / {0.4}	98 / {1}	Rated Voltage and Speed
Rated Output [W]	6	15	Rated Voltage and Speed
Power Supply Current	Rated Current (Ave.) [A]	0.7 MAX. / 1.4 MAX.	Rated Voltage, Speed and Torque
	Max. Current (Peak) [A]	2.8 MAX. / 5 MAX.	Start
Direction of Rotation	Both Directions		
Speed Setting rate [(r/min)/V]	300±5%		SPEED/VS(speed setting signal)
Speed Variation Rate	Against Load [%]	±1	0 ~ Rated Torque at Rated Voltage and Speed
	Against Voltage [%]	±1	DC24V±10% at Rated Speed · No Load
	Against Temperature [%]	±3	20±20°C at Rated Voltage and Speed · No Load
Motor Insulation Class	E class		
Motor Insulation Resistance	10MΩ MIN.		Between Case and Coil, DC500V Megger
Motor Dielectric Strength	Withstand for 1 minute under AC 500V(50Hz)		Between Case and Coil

3-2 Environmental Condition

Item	Specification	Standard Condition
Temperature Range for Operation [°C]	0 ~ 40	No condensation
Humidity Range for Operation [%]	15 ~ 85	No condensation
Temperature Range for Storage [°C]	-10 ~ 60	No condensation
Humidity Range for Storage [%]	15 ~ 85	No condensation

Environment

- Must be in-door. ● Do not expose to direct sun-shine. ● Avoid splash of water and oil.
- Avoid dust and dirt. ● Avoid inflammable and corrosive gases and powderdust.
- Prevent external vibration and shock/impact to the product.
- Do not enclose the product for good cooling.

3-3 Dimension

Item		Model Code	Outline Document No.
Model on Motor	6W Type	Straight Shaft Type	FY6S6-D3
		Pinion Shaft Type	FY6PF6N-D3
	15W Type	Straight Shaft Type	FY8S15-D3
		Pinion Shaft Type	FY8PF15N-D3
Model on Driver	6W Type	FYD66SD3	K900000005
	15W Type	FYD815SD3	
Model on Rotor cover	6W Type	F-RC630	K900000008 1/4
	15W Type	F-RC837	K900000008 2/4

4 Connector Model Code

4-1 Driver

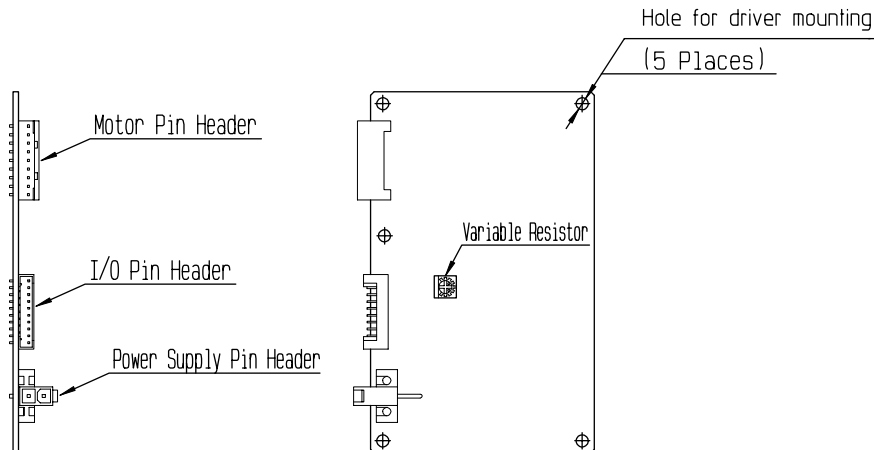
Connector and pin head model code of driver is described in the document of driver outline.

4-2 Motor

Connector and pin head model code of motor is described in the document of motor outline.

5 Driver

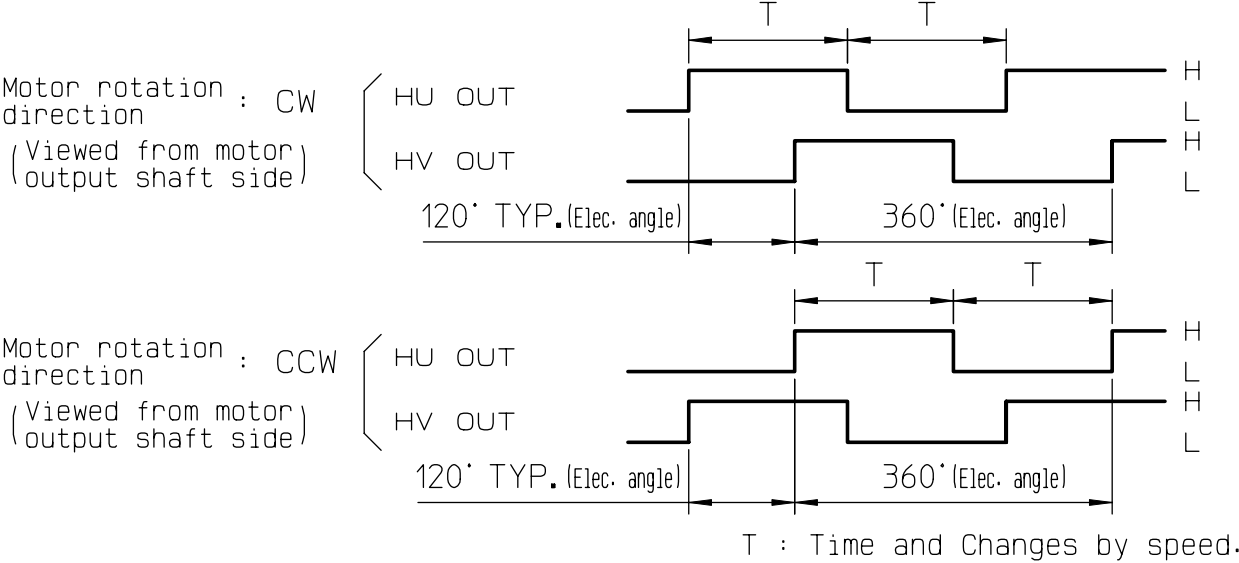
5-1 Name of Component Parts



5-2 Input and Output Function

Item	Pin No.	Symbol	Input or Output	Function	Standard Condition
Power Supply	1	VM	Input	Power Supply Positive for Driver	DC24V±10%
	2	P. GND	—	Power Supply GND for Driver	
I/O	1	HU OUT	Output	5 [pulse/rotation] (Hall Signal) ※1	H:Open Collector DC30V MAX. L:0~0.8V 10mA MAX.
	2	HV OUT	Output		
	3	ALARM OUT	Output	H : Normal Operation L : Protective Function Operates	
	4	VR	Output	Power Supply Positive for External Speed Setter	
	5	VS	Input	Speed Setting Signal Positive	0~10V
	6	GND	—	Speed Setting Signal GND	
	7	GND	—	GND for I/O Signal	
	8	F/R IN	Input	H : CCW (Viewed from motor) L : CW (output shaft side)	H:Open Collector L:0~0.8V
	9	BRAKE	Input	H : Brake releases L : Brake operates	
	10	RUN	Input	H : Motor stops L : Motor rotates	
Motor	1	MU	Output	Coil U-Phase Output	
	2	MV	Output	Coil V-Phase Output	
	3	MW	Output	Coil W-Phase Output	
	4	N. C	—	Not Connected	
	5	HW	Input	Hall Signal	
	6	HV	Input		
	7	HU	Input		
	8	GND	—	Power Supply GND for Hall Sensor	
	9	VH(12V)	Output	Power Supply Positive for Hall Sensor	

※1 "HU OUT" signal and "HV OUT" signal are as shown below.



5-3 Speed Setting

Item	Setting Method
Speed Setting by External Speed Setter (Sold Separately)	Connect as shown in Fig.1 and set speed by external speed setter. Use variable resistor 10[kΩ] as external speed setter.
Speed Setting by External Voltage Supply	Connect as shown in Fig.2 and set speed by external voltage supply.

This function makes it possible to set the out of speed range. But the effective range is within the "SPEED CONTROL RANGE" of motor only.

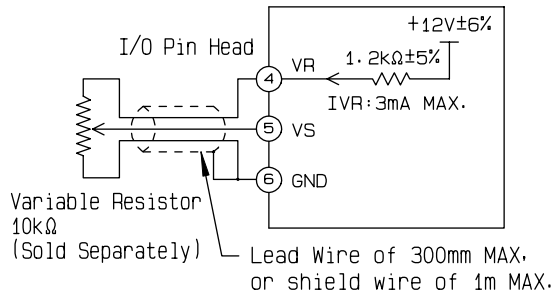


Fig. 1. Speed Setting by External Speed Setter

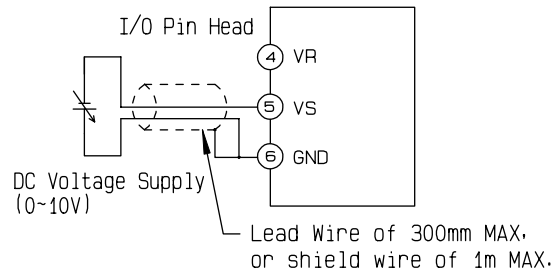
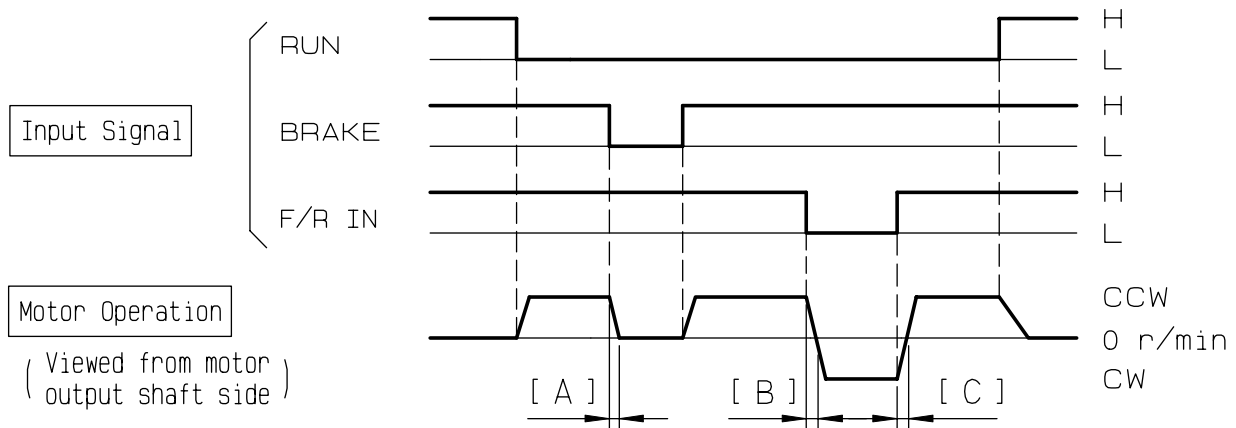


Fig. 2. Speed Setting by External Voltage Supply

5-4 Control Sequence



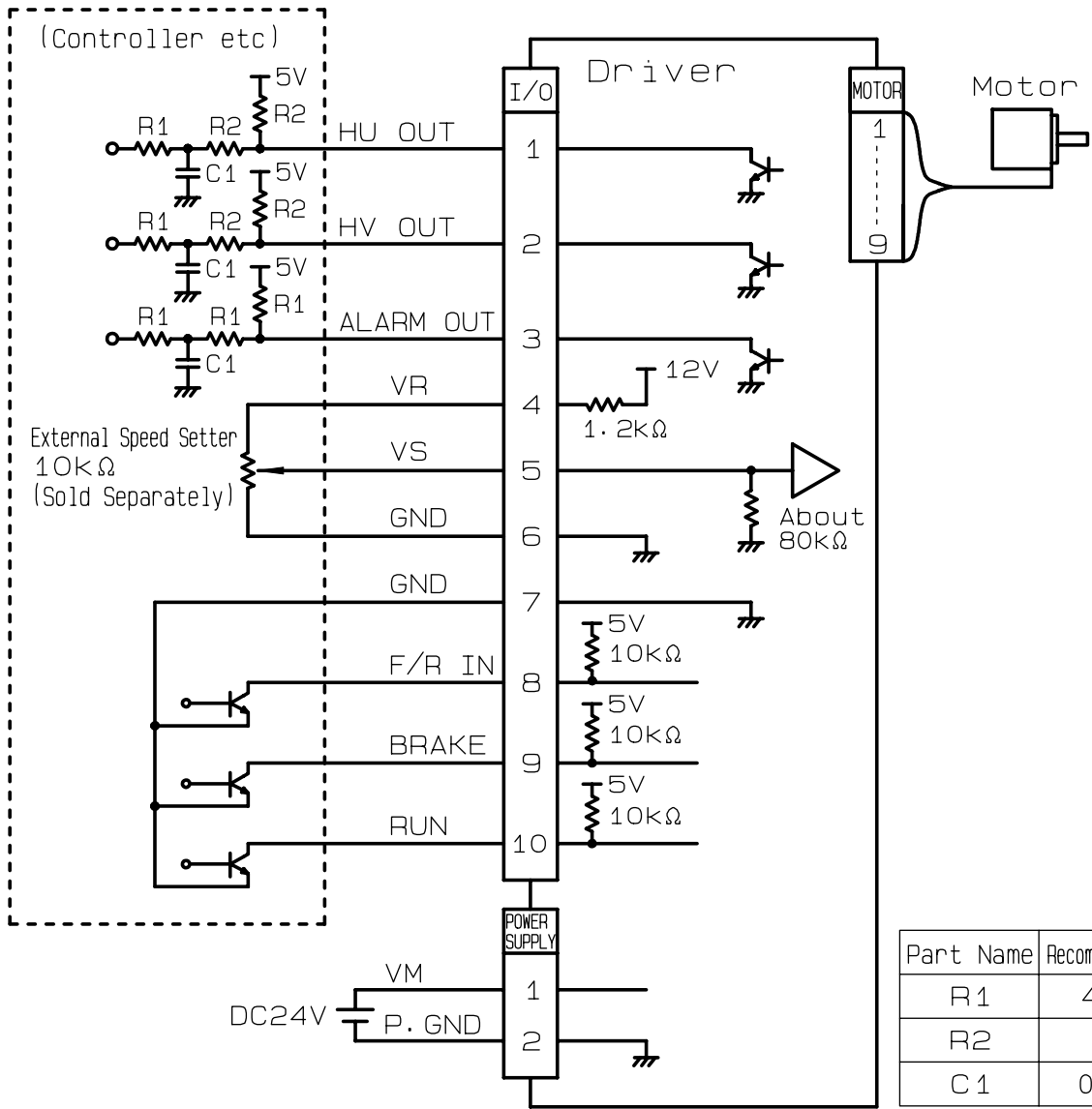
[Notes for "BRAKE" operation and during the rotation direction changing]

"BRAKE" (Above[A]period) should be operated, within the "SPEED CONTROL RANGE".

If it is used differently from above, it may cause fire or failure. Also, be careful that "VM" terminal voltage happens to rise up to about 30V according to the condition of use during the rotation direction changing (Above[B]and[C]periods).

(Brake operation : Short brake.)

5-5 Input And Output Circuit Construction and Wiring Diagram Motor



Part Name	Recommended Value
R1	4.7kΩ
R2	1kΩ
C1	0.01μF

When input signal is H, input signals (RUN, BRAKE, F/R IN) should be input by open collector. If 5V is input, it will become the cause of wrong operation. Noise of output signals (HU OUT, HV OUT, ALARM OUT) should be removed by a filter as shown in figure above. Setting of filter constant should be done by confirming the noise level referring to the recommended constant. At this time, be careful that signal delays if the values of resistance and/or capacitor are big though it becomes better to kill noise. Specially, for HU OUT and HV OUT, setting should be done with attention to filter constant because pulse width is narrow at high speed.

5-6 Protective function

Item	Protective Function		Alarm Release
	Setting	Operation	
OverLoad Protection	When the load more than rated torque is applied to motor for more than about 5 sec.	Stop motor and output 'L' from "ALARM OUT"	Disconnect power supply for more than 1 minute.

Be careful that whether this function operates or does not operate can not be the standard whether the load is more than rating or less than rating.

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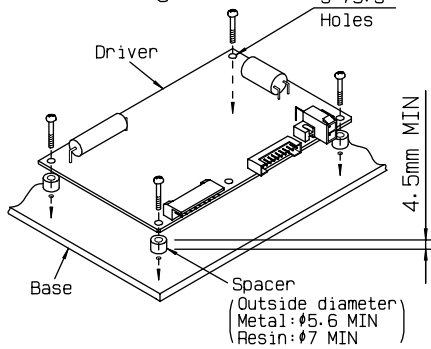
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6 Mounting

6-1 Driver mounting

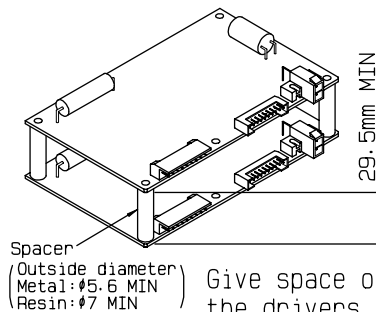
Driver should be mounted according to sketches below:

(1) Mounting



Give space of 4.5mm MIN. in case of mounting the driver to the base.

(2) Spacing



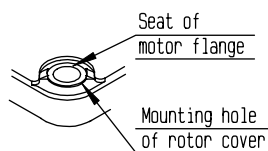
Give space of 29.5mm MIN. between the drivers in case of mounting the drivers of two or more for the purpose of cooling.

6-2 Motor mounting

- (1) Motor may be mounted both ways of shaft horizontal and vertical. For shaft horizontal, leads exit downward is recommendable to avoid water getting inside of motor.
- (2) Alignment of motor output shaft and load shaft should be kept in best condition. If it is not good enough, it may cause vibration, abnormally short bearing life and/or shaft break by fatigue. To use a flexible coupling is one of the solutions.
- (3) Do not give any impact to the motor output the shaft, when you mount a coupling, a timing pulley or a gear on to the shaft. It may become a cause of motor damage.

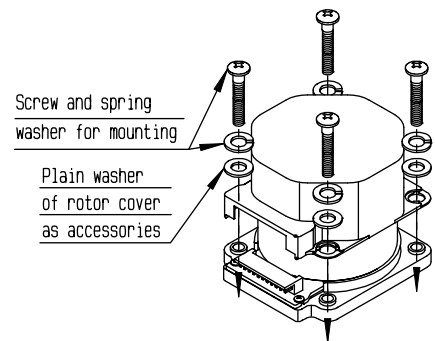
6-3 Rotor cover mounting

- (1) Pay attention to the direction of rotor cover and set rotor cover to motor flange by fitting the holes.
- (2) After confirming that the mounting holes of motor flange and rotor cover are fitted, place the plain washers of accessories and fasten the motor with screws.

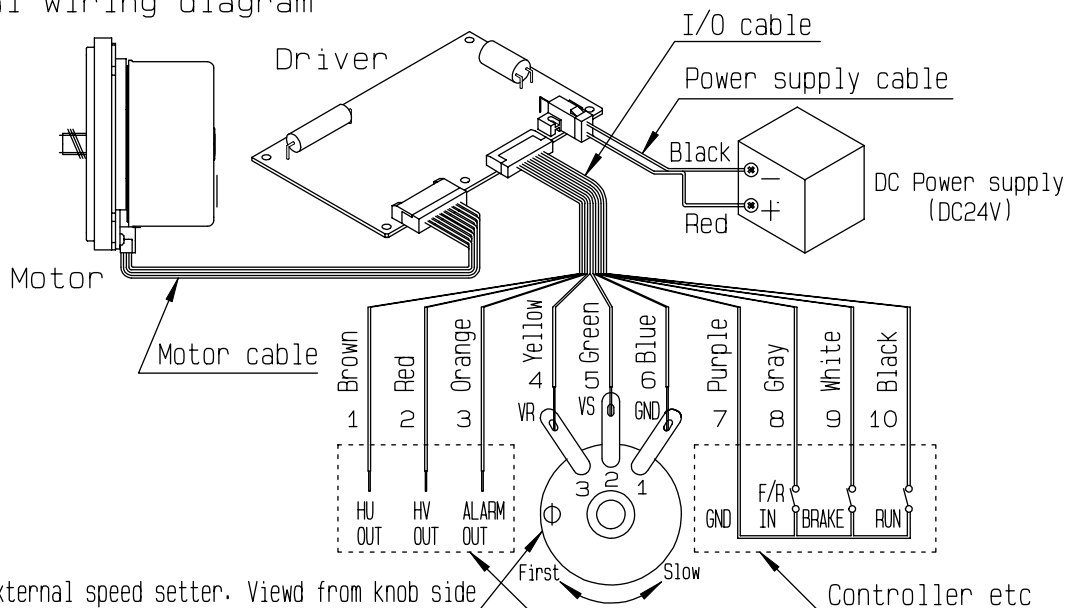


*Table applicable screws and spring washer for mounting

Model on rotor cover	Nominal diameter
F-RC630	M4
F-RC837	M5



7 Actual wiring diagram



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K900000083

