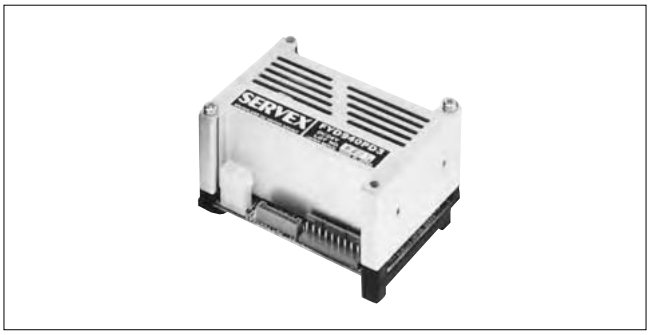
Palm mini PLUS type



■Specification

Model on motor	plain shaft type		FY6S6-D3	FY8S15-D3	FY8S25-D3	FY9S40-D3
	Pinion shaft type		FY6PF6N-D3	FY8PF15N-D3	FY8PF25N-D3	FY9PF40N-D3
Model on driver	plain shaft type		FYD66PD3	FYD815PD3	FYD825PD3	FYD940PD3
	Pinion shaft type					
Rated voltage		V(DC)	24	24	24	24
Rated output		W	6	15	25	40
Speed control range		r/min	200~2500	200~2500	200~2300	200~2000
Rated torque		mN • m	39	98	160	250
		oz • in	5.6	14	22	36
MAX. instantaneous torque 5sec		mN • m	59(1500r/min MAX.)	150(1500r/min MAX.)	200(1500r/min MAX.)	300(600r/min MAX.)
		oz • in	8.3(1500r/min MAX.)	21(1500r/min MAX.)	28(1500r/min MAX.)	43(600r/min MAX.)
Rated speed		r/min	1500	1500	1500	1500
Speed setting method			①Speed setting by external speed setter(Sold separately : model code Q-R10KB)			
			②Speed setting by external voltage supply 0~10V			
Speed setting		(r/min)/V	300±5%			
Speed variation			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			
Input and output signal		Input	RUN, BRAKE, F/R IN H : Open collector L : GND(0~0.8V)			
		Output	ALARM, SPEED OUT(PULSE OUTPUT), F/R OUT H : Open collector DC30V MAX. L : 0~0.8V 10mA MAX.			
Speed pulse		Pulse/Rotation	30	30	30	30
Current	Rated (Ave.)	A	0.7 MAX.	1.4 MAX.	2.3 MAX.	3.4 MAX.
	MAX. (Peak)		4.2 MAX.	6.6 MAX.	10 MAX.	10 MAX.
Protection			Over load protection When an exceeding torque than rated is applied to motor for more than about 5sec. Stop motor and output "L" from "ALARM".In disconnect power supply for more than 1min, In case of alarm reless.			
Others			Operation temperature 0~40˚C(no condensation) continuous duty. The motor flange surfase temp must be 80˚C MAX. (Ambient temperature 40˚C without heat sink) Motor dielectric strength Withstad for 1min. under AC500V 50Hz (Between case and coil) Motor insulation resistance 10MΩMIN. (Between case and coil DC500V tester)			

Gear ratio	Speed(r/min)		Applicable MAX. Torque for gearheads							
	at 200r/min	at 2500r/min	6H□FBN		8H□FBN		8H□FBN		9H□FBN	
			mN • m	oz • in	mN • m	oz • in	mN • m	oz • in	mN • m	oz • in
5	40	500	160	22	390	56	590	83	980	140
15	13	167	470	67	1200	170	1900	260	3000	430
25	8	100	720	100	1800	250	2800	400	4600	650
30	6.7	83	850	120	2100	290	3400	490	5500	780
50	4	50	1400	190	3100	440	5100	720	8300	1200

• □: rotation of gear head output shaft becomes reverse direction of motor's.
• Other gear ratios than the above table,are also available.

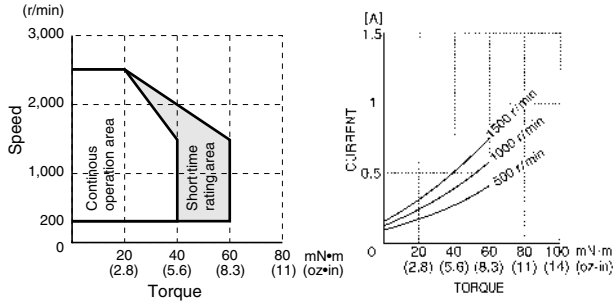
BRUSHLESS DC MOTOR & SPEED CONTROL DRIVERS

FYD Series

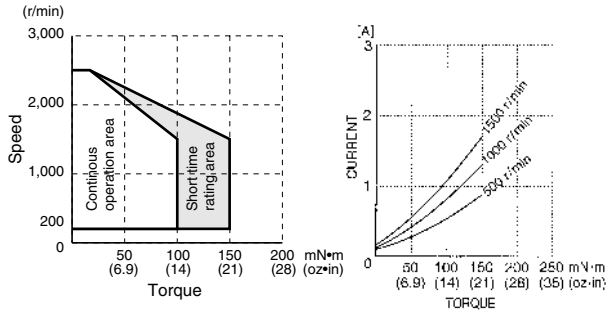
DC24V

■Torque-speed/Current (TYP.) characteristics

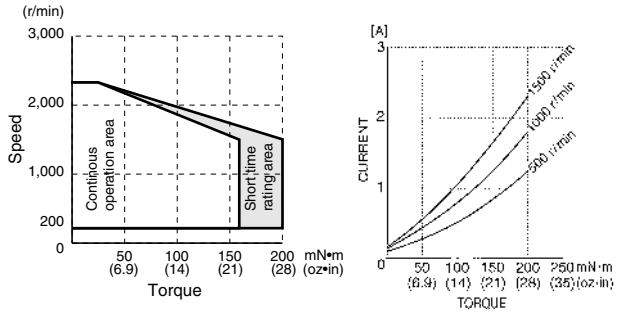
(FY6S6-D3+FYD66PD3)



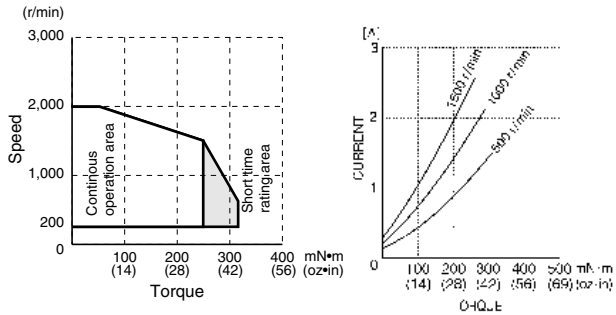
(FY8S15-D3+FYD815PD3)



(FY8S25-D3+FYD825PD3)



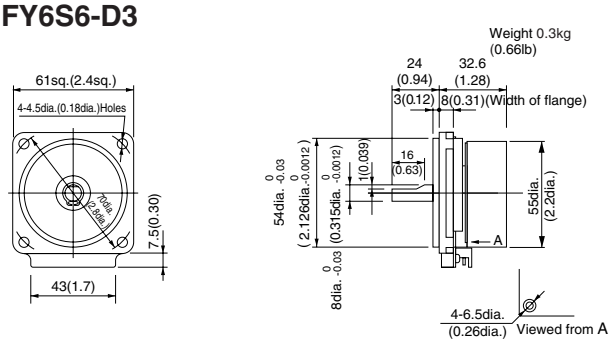
(FY9S40-D3+FYD940PD3)



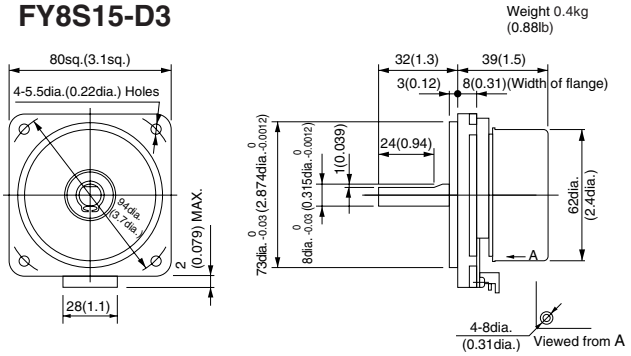
■Motor outlines(Plain shaft type)

Unit : mm (inch)

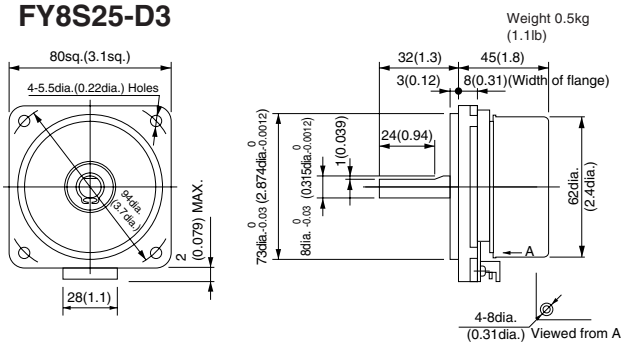
FY6S6-D3



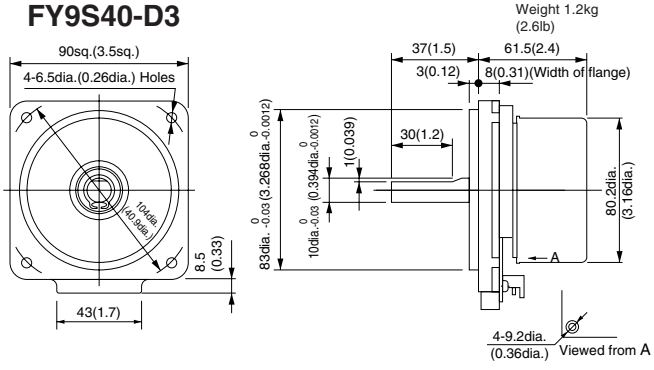
FY8S15-D3



FY8S25-D3



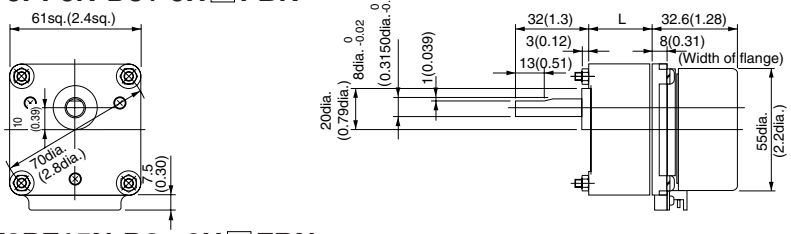
FY9S40-D3



■Motor (Pinion shaft type)+ Gear head outlines

Unit : mm (inch)

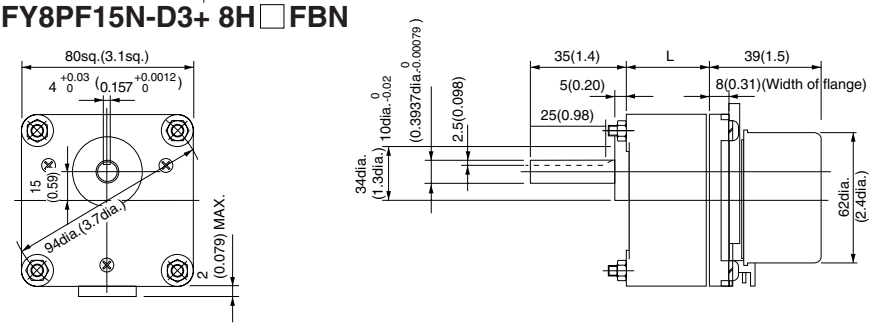
FY6PF6N-D3+ 6H□FBN



L(Gear head length)•Weight•Screw(Accessory)

Gear ratio	Lmm(in.)	Weight Kg(lb)	Screw
1/5~1/15	32(1.3)	0.4(0.88)	M4X50(2.0)
1/25~1/50	42(1.7)	0.4(0.88)	M4X60(2.4)

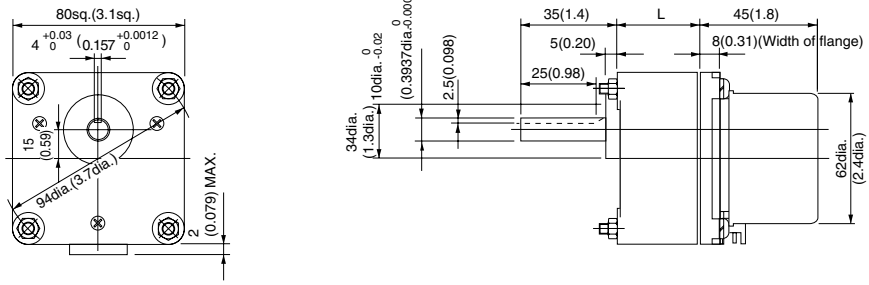
FY8PF15N-D3+ 8H□FBN



L(Gear head length)•Weight•Screw(Accessory)

Gear ratio	Lmm(in.)	Weight Kg(lb)	Screw
1/5~1/15	30(1.2)	0.5(1.1)	M5X50(2)
1/25~1/50	40(1.6)	0.6(1.3)	M5X60(2.4)

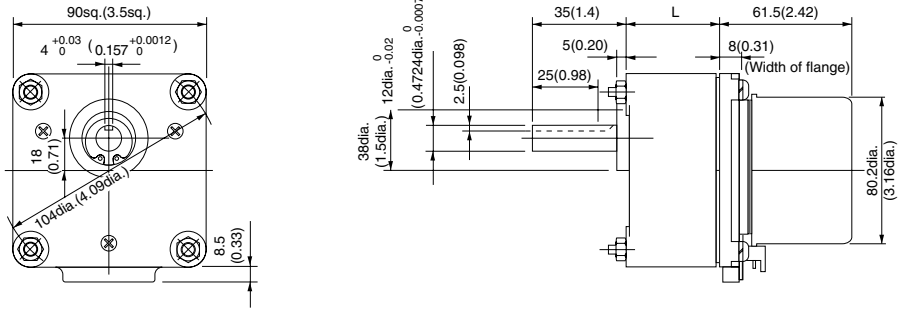
FY8PF25N-D3+ 8H□FBN



L(Gear head length)•Weight•Screw(Accessory)

Gear ratio	Lmm(in.)	Weight Kg(lb)	Screw
1/5~1/15	30(1.2)	0.5(1.1)	M5X50(2)
1/25~1/50	40(1.6)	0.6(1.3)	M5X60(2.4)

FY9PF40N-D3+ 9H□FBN



L(Gear head length)•Weight•Screw(Accessory)

Gear ratio	Lmm(in.)	Weight Kg(lb)	Screw
1/5~1/15	42(1.7)	0.8(1.8)	M6X50(2.4)
1/25~1/50	60(2.4)	0.9(2.0)	M6X60(3.1)

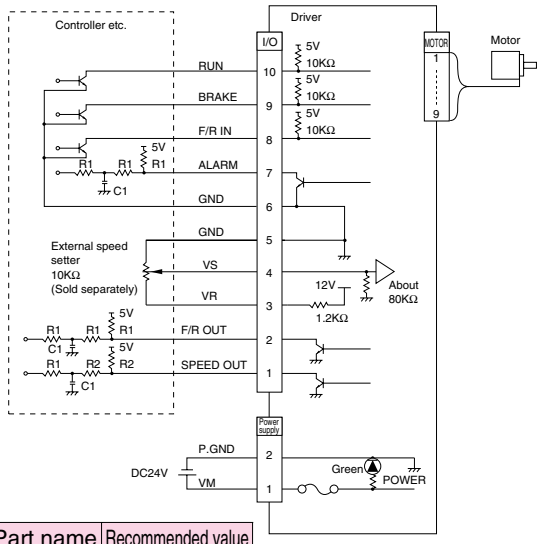
NOTE

For prevention of oil leaking, combination use a packing (rubber) sold separately between gear head and motor.

Model on packing(rubber)
6H□FBN : H6packing(rubber)
8H□FBN : H8packing(rubber)
9H□FBN : H9packing(rubber)

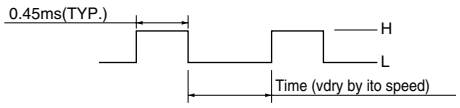
■Input & output terminals and wiring diagram

Item	Pin No.	Symbol	Input or Output	Function	Standard • Condition
Power supply	1	VM	Input	Power supply positive for driver	DV24V±10%
	2	P.GND	–	Power supply GND for driver	
I/O	1	SPEED OUT	Output	30 Pulse/Revolution *3	*1 H : Open collector DC30V MAX. L : 0~0.8V 10mA MAX.
	2	F/R OUT	Output	H : CCW L : CW (Viewed from motor output shaft end)	
	3	VR	Output	Power supply positive for external speed setter	
	4	VS	Input	Speed setting signal positive	0~10V
	5	GND	–	Speed setting signal GND	
	6	GND	–	GND for I/O Signal	
	7	ALARM	Output	H : Normal operation L : Protective function operates	Same as *1
	8	F/R IN	Input	H : CCW L : CW (Viewed from motor output shaft side)	*2 H : Open collector L : 0~0.8V
	9	BRAKE	Input	H : Brake releases L : Brake operates	H : Open collector L : 0~0.8V During the operation of "BRAKE", "RUN" signal shoud be "L".
	10	RUN	Input	H : Motor stops L : Motor rotates	Same as *2



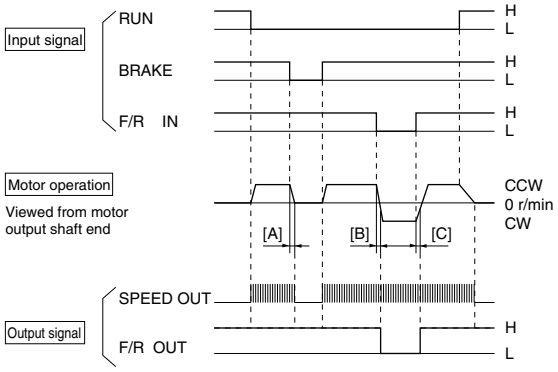
Part name	Recommended value
R1	4.7KΩ
R2	1KΩ
C1	0.01μF

*3 "SPEED OUT" signal is shown below.



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 (ALARM, F/R OUT, SPEED OUT) should be removed by a filter as shown in figure above.
Setting of filter constant should be done by confirming the noise level vefering 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 speed out, setting should be done with attention to filter constant because pulse width is narrow.

■Control sequence



[Notes for BRAKE Operation & Rotation change]
(1)During the brake is operating (period [A] left). to change direction of rotation, switch signal of "F/R IN", only after the brake signal was changed to non*operational condition ("L"→"H").
(2)During the direction of rotation changing (period [B] & [C] left), you need the brake to operate, let it operate only when the both direction of rotation setting signal ("F/R IN") and direction monitor signal ("F/R OUT") is the same,
(3)When actual motor speed is higher than the setting (by signal input value of (VS)), any of signal switching on "F/R IN" and BRAKE ("H"→"L") must not be made.
(4)During the brake is operating set the "RUN" signal at "L" all the time.
WARNING:
Notes above must be following without fail, and reminded all the time. But if not follow to (1), (2) & (4), it may cause abnormal/dangerous motor operation, and not follow to (3), it may cause FIRE or system damage.
Electrical shock : By the load condition, the terminal voltage (VM) is raised up to 30 VDC, during switching BRAKE and/or Rotation direction.
(Braking Operation : At higher speed : reverse rotation brake first, then short circuit brake. But at slower speed : short circuit brake only.)
[Notes on "F/R OUT"]
During the motor is in stop, the "F/R OUT" is held at the same signal as previously outputting. This means ; if the motor stopped once, but the rotation reversed by Cogging torque or by the Load, then the "F/R OUT" is held at reversed signal. Also note that "F/R OUT" signal will delay by 0~5pulses of "SPEED OUT" from the motor rotation switched.

■Speed setting

Fig.1 Speed setting by external speed setter

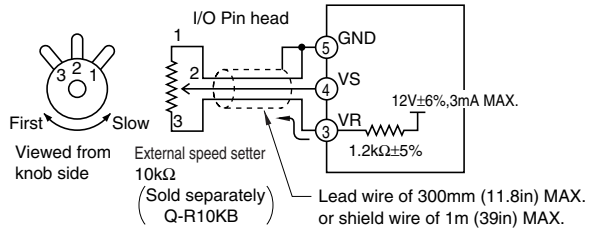
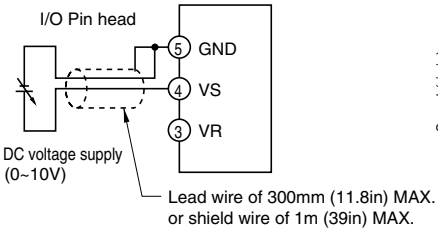
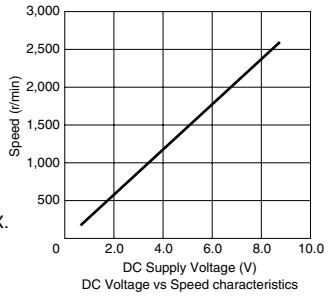


Fig.2 Speed setting by external voltage supply





DC Voltage vs Speed characteristics

Item	Setting Method
Speed setting by external speed setter (sold separately)	Connect as shown in Fig.1 and set 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.

By these mothed, it is possible to set a speed at outside of Speed range. But it must be out of aur product warranty.

■Protection

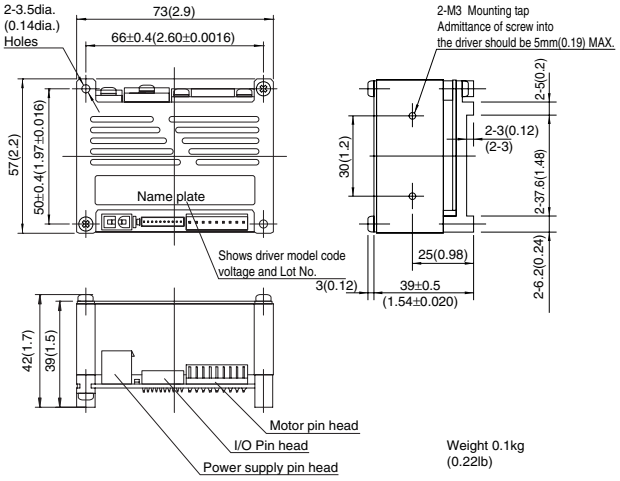
Item	Protection		Alarm Release
	Setting	Action	
Overload Protection	When the load exceeding rated torque is applied to motor for more than about 5 sec.	Motor is stopped, and "ALARM" outputs "L".	Disconnect power supply for more than 1 minute.

Do not measure/judge by this operation whether the motor is overloaded or not.

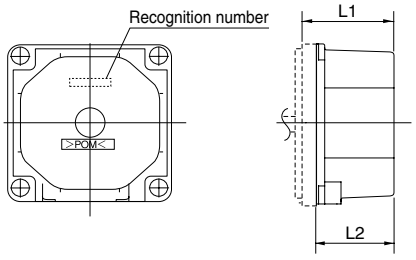
■Driver outline

Unit : mm (inch)

FYD66PD3, FYD815PD3, FYD825PD3, FYD940PD3



■Rotor cover (Sold separately)

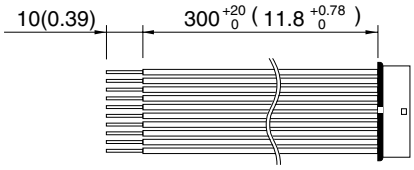


Model on rotor cover	L1mm (in)	L2mm (in)	Recognition number	Accessory washer nominal diameter	Adapting motor		
F-RC630	37 (1.5)	30.4 (1.20)	AD09877	M4	6W	Plain shaft type	FY6S6-D3
						Pinion shaft type	FY6PF6N-D3
F-RC837	43.5 (1.71)	37 (1.5)	AD09768	M5	15W	Plain shaft type	FY8S15-D3
						Pinion shaft type	FY8PF15N-D3
F-RC844	50 (2.0)	43.5 (1.71)	AD09904	M5	25W	Plain shaft type	FY8S25-D3
						Pinion shaft type	FY8PF25N-D3
F-RC961	67.5 (2.66)	61 (2.40)	AD09903	M6	40W	Plain shaft type	FY9S40-D3
						Pinion shaft type	FY9PF40N-D3

■Accessory

Unit : mm (inch)

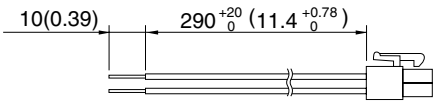
I/O cable



Connection guide

Pin No.	Name	Lead wire color	Lead wire
1	SPEED OUT	Brown	UL3265 AWG28
2	F/R OUT	Red	
3	VR	Orange	
4	VS	Yellow	
5	GND	Green	
6	GND	Blue	
7	ALARM	Purple	
8	F/R IN	Gray	
9	BRAKE	White	
10	RUN	Black	

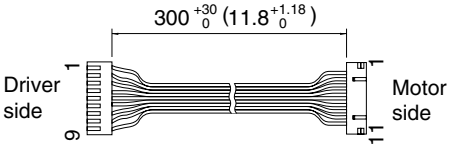
Power supply cable



Connection guide

Pin No.	Name	Lead wire color	Lead wire
1	VM	Red	UL1430 AWG22
2	P. GND	Black	

Motor cable



Connection guide

Motor side connector Pin No.	Driver side connector Pin No.	Name	Lead wire color	Lead wire
1	1	Coil U	Brown	UL1007 AWG24
2	–	–	–	–
3	2	Coil V	Red	UL1007 AWG24
4	–	–	–	–
5	3	Coil W	Orange	UL1007 AWG24
6	4	–	Yellow	
7	5	HW	Green	
8	6	HV	Blue	
9	7	HU	Purple	
10	8	GND	Gray	
11	9	12V	White	

■Connector model code

Item	Driver or motor side	Pin head model code on driver or motor	Connector model code on cable		Maker
			Housing	Contact (reel)	
I/O connection	DriverB	B10B-ZR(LF)(SN)	ZHR-10	SZH-002T-P0.5	JST
Power supply connection	Driver	5566-02A	5557-02R	5556T	MOLEX
Motor connection	Driver	IL-G-9P-S3T2-E	IL-G-9S-S3C2	IL-G-C2-SC10000	JAE
	Motor	IL-G-11P-S3L2-E	IL-G-11S-S3C2	IL-G-C2-SC-1000	

■Motor/Driver/Cable/Rotor cover model code table Unit : mm (inch)

		Motor model code	Driver model code	Power supply cable model code	Motor cable model code	I/O Cable model code	Rotor cover model code
FY series	Palm mini PLUS driver	FY6S6-D3	FYD66PD3	FED-CNSL03 300 (11.8)	FED-CNML03 300 (11.8)	FED-CNPL03 300 (11.8)	F-RC630
		FY6PF6N-D3	FYD66PD3	FED-CNSL03 300 (11.8)	FED-CNML03 300 (11.8)	FED-CNPL03 300 (11.8)	F-RC630
		FY8S15-D3	FYD815PD3	FED-CNSL03 300 (11.8)	FED-CNML03 300 (11.8)	FED-CNPL03 300 (11.8)	F-RC837
		FY8PF15N-D3	FYD815PD3	FED-CNSL03 300 (11.8)	FED-CNML03 300 (11.8)	FED-CNPL03 300 (11.8)	F-RC837
		FY8S25-D3	FYD825PD3	FED-CNSL03 300 (11.8)	FED-CNML03 300 (11.8)	FED-CNPL03 300 (11.8)	F-RC844
		FY8PF25N-D3	FYD825PD3	FED-CNSL03 300 (11.8)	FED-CNML03 300 (11.8)	FED-CNPL03 300 (11.8)	F-RC844
		FY9S40-D3	FYD940PD3	FED-CNSL03 300 (11.8)	FED-CNML03 300 (11.8)	FED-CNPL03 300 (11.8)	F-RC961
		FY9PF40N-D3	FYD940PD3	FED-CNSL03 300 (11.8)	FED-CNML03 300 (11.8)	FED-CNPL03 300 (11.8)	F-RC961

NOTE)Cable types for FYD series are the same as FED series, because they are used in commonly.

BRUSHLESS DC MOTOR & SPEED CONTROL DRIVERS

FHD Series

DC24V (20, 40W) DC48V (60W)

■Distinguishing Features

1. Motors are designed small and high performance
   - We recently released a special magnetic circuit design motor. This motor design is smaller and has a higher performance than conventional FED, FYD series motors.
   - Flange size of this series is 61mm sq. (2.4 in sq.). However flange size of 40W & 60W types are 80mm sq. (3.1 in sq.)
2. Compact design Driver
   - "Palm Mini R" Type is the smallest. (20W, 40W only)
   - "Palm Mini PLUS" Type is small. (20W, 40W only)
   - "J - Book" Type is (60W only)
   - High power type is a circuit-board and superconducting type. (20W, 40W)
3. Wide Ranged Speed Control (60W only)
   - Wide range (200r/min-2500r/min 60W:65r/min-2500r/min), stepless speed control.
   - Very steady characteristics (Feed back control employed).
4. Speed pulse output
   - Speed pulse output can be used for speed monitoring, simplified position control...
   - "Palm Mini R" Type: 42 pulse/revolution
   - "Palm Mini PLUS" Type: 42 pulse/revolution
   - "J - Book" Type: 42 pulse/revolution
   - "High power simple" Type: 7 pulse/revolution output is available for speed monitoring and simplified position control are possible.
5. Direction of rotation signal output
   - Direction of rotation can be monitored by this signal.
6. Alarming
   - At an over-load condition, the motor stops and an alarm signal is output.

■Model Code

Model on set FHD **6** **P** **20** PF - D3
① ② ③ ④ ⑤ ⑥

①Series name
②Motor flange dimensions
6 : 61×61mm (2.4×2.4 in.)
③Driver type
P: Palm mini PLUS type
J: J - Book type
④Motor output
20: 20W
40: 40W
60: 60W
⑤Motor output shaft type
S : Plain shaft
PF: Pinion shaft
PE : Pinion shaft
⑥Power supply voltage
D3: DC24V
D5: DC48V

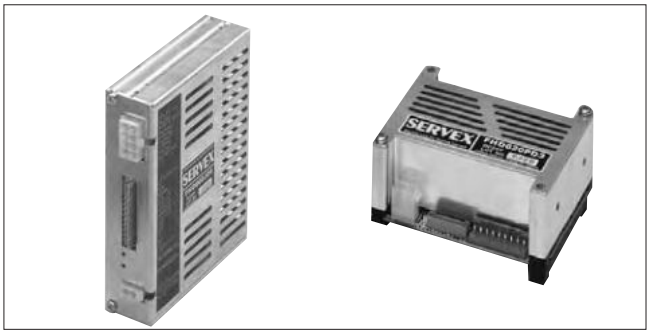
Model on motor FH **6** **PF** **20** H - D3
① ② ③ ④ ⑤ ⑥

①Series name
②Motor flange dimensions
6: 61×61mm (2.4×2.4 in.)
③Motor output shaft type
S: Plain shaft
PF: Pinion shaft
PE:
④Motor output
20: 20W
40: 40W
⑤Adapting Driver type
H: High power simple type driver
R: Palm mini R type driver
⑥Power supply voltage
D3: DC24V

Model on driver FHD 6 20 H D3
① ② ③ ④ ⑤

①Series name
②Adapting motor flange dimensions
6: 61×61mm (2.4×2.4 in.)
③Motor output
20: 20W
40: 40W
④Driver type
H: High power simple type driver
R: Palm mini R type driver
(Holding torque can be generated)
⑤Power supply voltage
D3: DC24V

Palm mini PLUS type
J-Book type



■Specification

Model on set			FHD6P20S-D3	FHD6P40S-D3	FHD6J60S-D5
	Plain shaft type				
	Pinion shaft type		FHD6P20PF-D3	FHD6P40PE-D3	FHD6J60PE-D5
Rated voltage		V (DC)	24	24	48
Rated output		W	20	40	60
Speed control range		r/min	200~2500	200~2500	65~2500
Rated torque		mN • m	98	200	290
		oz • in	14	28	42
MAX. instantaneous torque (in 5sec.)		mN • m	150 (2000r/min MAX.)	290 (500r/min MAX.)	440 (1500r/min MAX.)
		oz • in	21 (2000r/min MAX.)	42 (500r/min MAX.)	62 (1500r/min MAX.)
Rated speed		r/min	2000	2000	2000
Speed setting method			①Speed setting by external speed setter (Sold separately: model code Q-R10KB)		
			②Speed setting by external voltage supply 0~10V		
Speed setting		(r/min)/V	300±5%		
Speed variation			Against load ±1% 0~rated torque at rated voltage and speed		
			Against voltage ±1% Rated voltage ±10% at rated speed, no load		
			Against temperature ±3% 20±20˚C at rated voltage and speed, no load		
Input and output signal		Input	RUN, BRAKE, F/R IN, ALARM RST (Only 60W) H: Open collector L: GND (0~0.8V)		
		Output	ALARM, SPEED OUT (PULSE OUTPUT), F/R OUT Open collector output DC30V MAX. 10mA MAX.		
Speed pulse		Pulse/Revolution	42	42	42
Current	Rated (Ave.)	A	1.8 MAX.	3.1 MAX.	2.3 MAX.
	MAX. (Peak)		9 MAX.	10 MAX.	10 MAX.
Protection functions			Over load protection When an exceeding torque than rated is applied to motor for more than about 5 sec., Stop motor and outputs "L" from "ALARM" (20W, 40W) or "ALARM OUT" (60W). To release alarm : Palm Mini PLUS type: Disconnect power supply for more than 1min J-Book type: Input "L" to "ALARM RST" for more than 1sec. Do not measure/ judge by this operation whether the motor is overloaded or not.		
Others			Operation temperature: 0~40˚C (no condensation) continuous duty. The motor flange surface temp. must be 80˚C MAX. (Ambient temperature 40˚C without heat sink) Motor dielectric strength: Withstand for 1min. under AC500V 50Hz (Between case and coil) Motor insulation resistance: 10MΩMIN. (20W, 40W) 100MΩMIN. (60W) (Between case and coil by DC500V tester)		

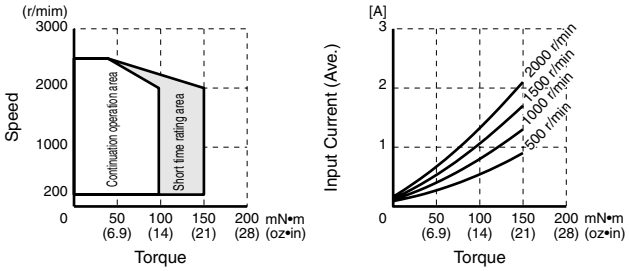
End of production

Gear ratio	Speed (r/min)		Applicable MAX. Torque for gearheads					
	at 200r/min	at 2000r/min	6H□EBN		8F□EBN			
			mN • m	oz • in	mN • m	oz • in	mN • m	oz • in
5	40	400	390	56	780	110	1200	170
10	20	200	780	110	1600	220	2400	330
25(25.44)	8	80	1700	250	3600	510	5500	780
50(49.6)	4	40	3500	500	7000	1000	10600	1500

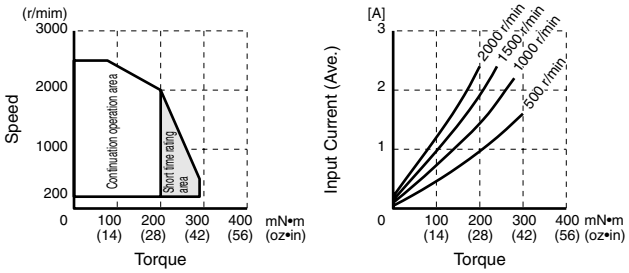
• □: rotation of gear head output shaft becomes reverse direction of motors.
• In case of 8F□EBN value in ( ) should be used as gear ratio.

■Torque Speed/Current (TYP.) Characteristics

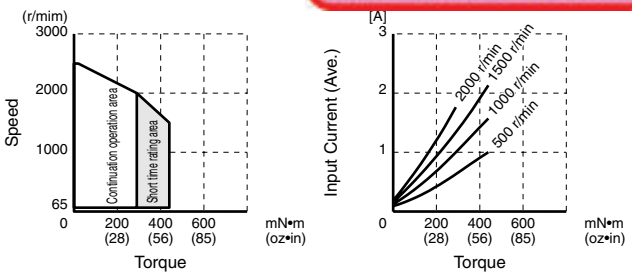
FHD6P20S(PF)-D3



FHD6P40S(PE)-D3

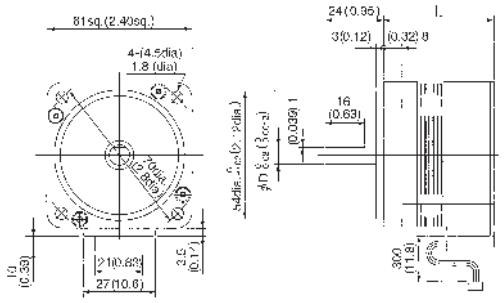


FHD6J60S(PE)-D5 End of production



■Motor outlines (Plain shaft type)

Unit: mm (inch)



	Model	L	D:dia	Weight	
				Kg	(lb)
①	FHD6P20S-D3	46 (18.1)	8 (0.3150)	0.5	1.1
②	FHD6P40S-D3	60 (2.36)	8 (0.3150)	0.7	1.5
③	FHD6J60S-D5	60 (2.36)	10 (0.3937)	0.7	1.5

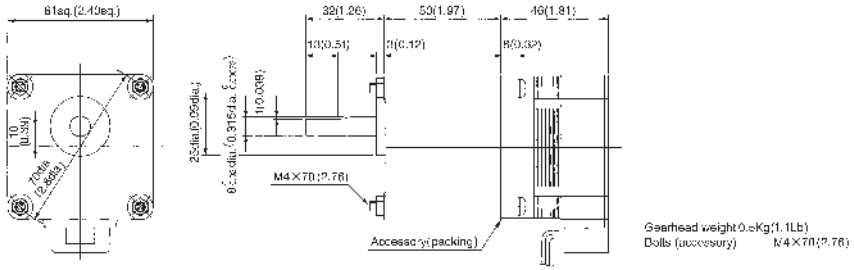
Connection guide

	Symbol	20 / 40W		60W		Remark
		① ② PIN #	Lead wire color	③ PIN #	Lead wire color	
Motor connector	Coil U	1	Brown	3	Brown	
	Coil V	2	Red	4	Red	
	Coil W	3	Orange	8	Orange	
	–	4	–		–	
	HW	5	Green	7	Green	Open collector
	HV	6	Blue	6	Blue	Open collector
	HU	7	Purple	5	Purple	Open collector
	GND	8	Gray	1	Gray	
	12V	9	White	2	White	

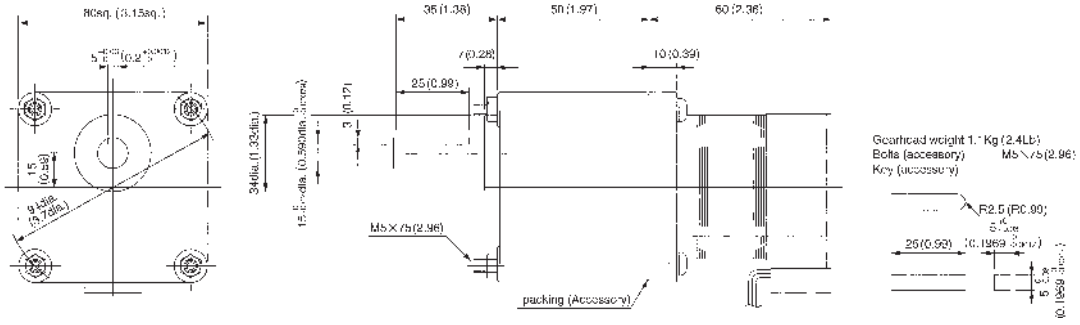
■Motor (Pinion shaft type) + Gear head outlines

FHD6P20PF-D3+6H□EBN

Unit: mm (inch)



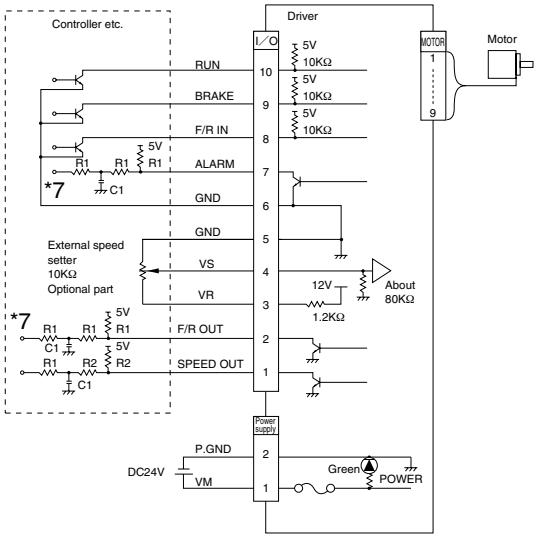
FHD6P40PE-D3+8F□EBN
FHD6J60PE-D5+8F□EBN



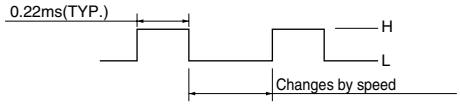
■Input & output terminals and wiring diagram

FHD6P20S(PF)-D3
FHD6P40S(PE)-D3

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	SPEED OUT	Output	42 Pulse/Revolution *3	*1 H: Open collector DC30V MAX. L: 0~0.8V 10mA MAX.
	2	F/R OUT	Output	H: CCW L: CW (Viewed from motor output shaft side)	
	3	VR	Output	Power supply positive for external speed setter	
	4	VS	Input	Speed setting signal positive	0~10V
	5	GND	–	Speed setting signal GND	
	6	GND	–	GND for I/O Signal	
	7	ALARM OUT	Output	H: Normal operation L: Alarm output	Same as *1
	8	F/R IN	Input	H: CCW L: CW (Viewed from motor output shaft side)	*2 H: Open L: 0~0.8V
	9	BRAKE	Input	H: BRAKE Deactivated L: BRAKE activated	H: Open collector L: 0~0.8V During the operation of "BRAKE", "RUN" signal be "L".
	10	RUN	Input	H: Stop L: Start	Same as *2



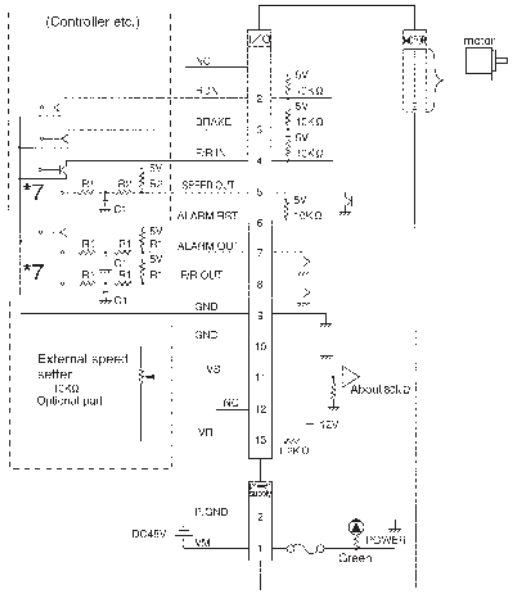
*3 "SPEED OUT" signal is shown below.



FHD6J60S(PE)-D5

End of production

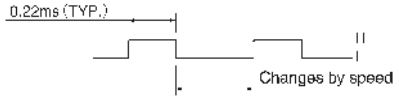
Item	Pin No.	Symbol	Input or Output	Function	Standard • Condition
Power supply	1	VM	Input	Power supply positive for driver	DC48V±10%
	2	P.GND	–	Power supply GND for driver	
I/O	1	NC	–		
	2	RUN	Input	H: Stop L: Start	*4 H: Open L: 0~0.8V
	3	BRAKE	Input	H: BRAKE Deactivated L: BRAKE activated	
	4	F/R IN	Input	H: CCW L: CW (Viewed from motor output shaft side)	
	5	SPEED OUT	Output	42 [Pulse/Revolution] *6	Same as *5
	6	ALARM RST	Input	H: Normal operation L: Reset	Same as *4
	7	ALARM OUT	Output	H: Normal operation L: Alarm output	*5 H: Open collector DC30V MAX. L: 0~0.8V, 10mA MAX.
	8	F/R OUT	Output	H: CCW L: CW (Viewed from motor output shaft side)	
	9	GND	–	GND for I/O Signal	
	10	GND	–	Speed Setting Signal GND	0~10V
	11	VS	Input	Speed Setting Signal Positive	
	12	NC	–	Not Connected	
	13	VR	Output	Power Supply Positive for External Speed Setter	



*8

Part name	Recommended value
R1	4.7KΩ
R2	1KΩ
C1	0.01μF

*6 "SPEED OUT" signal is shown below.



note

① When input signal is H, input signals (RUN, BRAKE, F/R IN, and ALARM RST (60 W Only)) should be input by open collector. If you input 5 V, it will cause the operation to malfunction.

② Noise of output signals ("ALARM" (20W, 40W) "ALARM OUT" (60W)), "F/R OUT", "SPEED OUT") should be removed by a filter as shown in figure above. (*7)
Setting of filter constant should be done by confirming the noise level referring to the recommended constant. (*8)
The signal delays if the resistance and/or capacitor is large, However, this is a good way to control the noise. Especially for speed out, setting should be done with attention to filter constant because pulse width is narrow.

■Speed setting

Fig.1 Speed setting by external speed setter

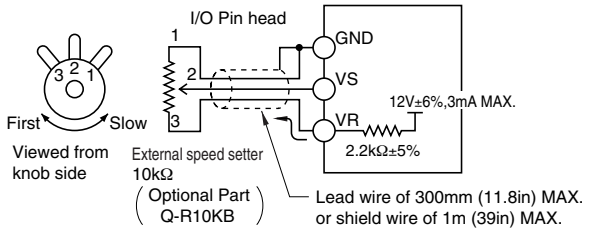
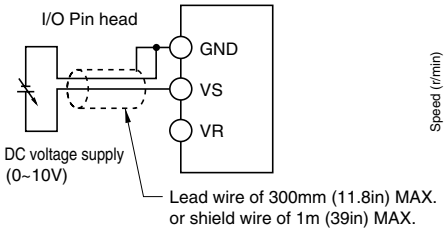
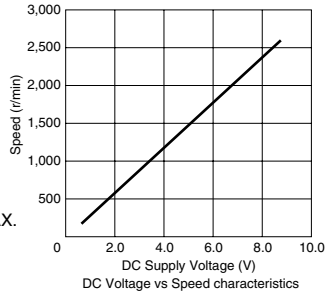


Fig.2 Speed setting by external voltage supply





DC Voltage vs Speed characteristics

I/O Pin head Pin No.

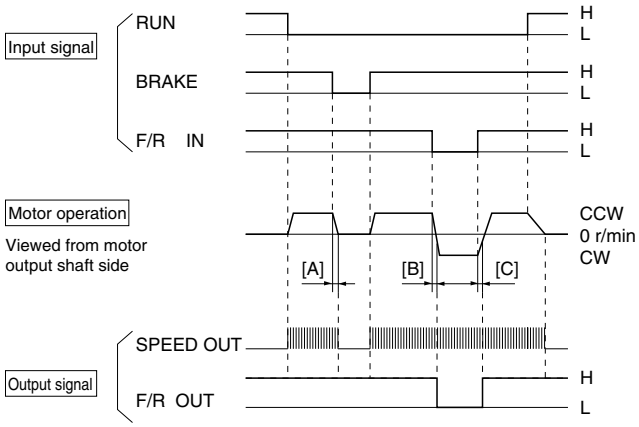
	FHD6P20S (PF)-D3 FHD6P40S (PE)-D3	FHD6J60S(PE)-D5
GND	5	10
VS	4	11
VR	3	13

Should be used within specified speed control range, although the speed could be set at out of the speed range.

Item	Setting Method
Speed setting by external speed setter (Optional Part)	Connect as shown in Fig.1 and set by external speed setter. Use variable resistor 10[KΩ] as an external speed setter.
Speed setting by external voltage supply	Connect as shown in Fig.2 and set speed by external voltage supply.

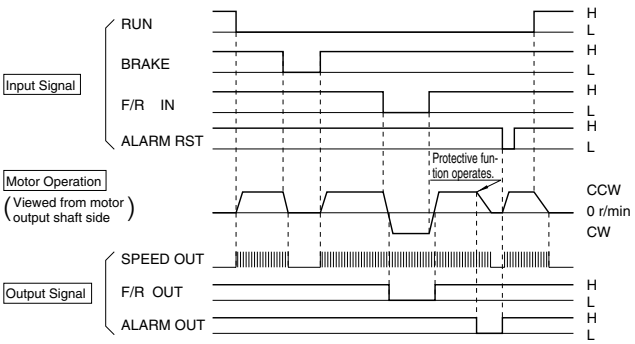
By these function, it is possible to set a speed at outside of Speed control range. But it must be out of our product warranty.

■Control sequence



[Notes for BRAKE Operation & Rotation change]
(1) Do not change (period [A] left) the "F/R IN" signal while the "BRAKE" is activated. "F/R IN" signal should be changed after "BRAKE" is deactivated.
(2) During the direction of rotation changing (period [B] & [C] left), you need the brake to operate, let it operate only when the both direction of rotation setting signal ("F/R IN") and direction monitor signal ("F/R OUT") is the same,
(3) When actual motor speed is higher than the setting (by signal input value of "VS"), any switching of the "F/R IN" and "BRAKE" ("H→"L") must not be made.
(4) During the brake is operating, set the "RUN" signal at "L" all the time.
WARNING:
In case of different way of use from (1), (2), (3) and (4), (1), (2), and (4) may be the cause of the incorrect operation and (3) may be the cause of the fire or the breakdown.
Electrical shock: By the load condition, the terminal voltage (VM) is raised up to 30 VDC, during switching BRAKE and/or Rotation direction.
(Braking Operation: At higher speed: reverse rotation brake first, then short circuit brake. But at slower speed: short circuit brake only.)
[Notes on "F/R OUT"] (20,40W only)
During the motor is in stop, the "F/R OUT" is held at the same signal as previously outputting. This means ; if the motor stopped once, but the rotation reversed by Cogging torque or by the Load, then the "F/R OUT" is held at reversed signal. Also note that "F/R OUT" signal will delay by 0~5pulses of "SPEED OUT" from the motor rotation switched.

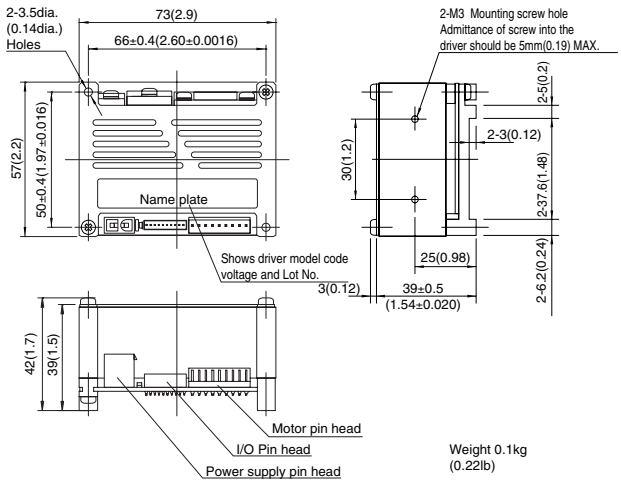
FHD6J60S(PE)-D5



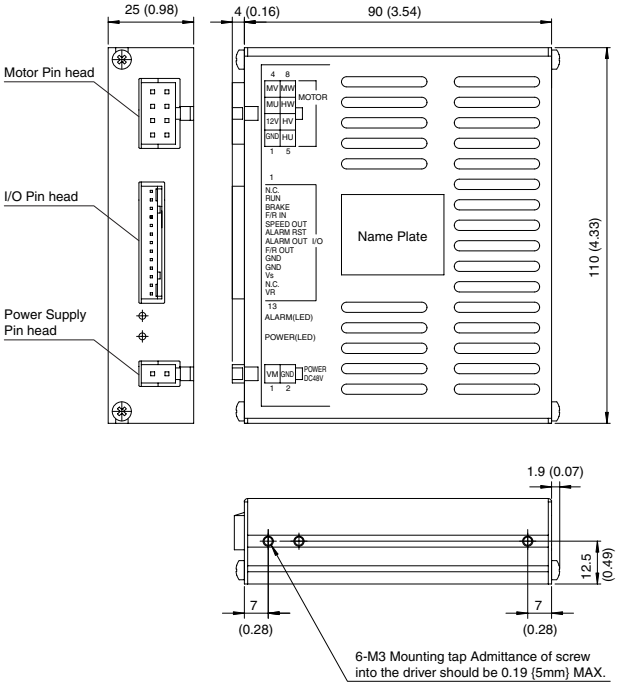
[Notes for "F/R OUT"] (60W only)
In case that motor is not running, "F/R OUT" holds the signal which has been output until motor stops. But according to the condition of use, there may be a case that motor runs reversely by cogging torque, load etc. After it stops. Be careful that in such case "F/R OUT" reverses and holds that condition.
[Notes for "ALARM RST"] (60W only)
Operation should be done by "H". If operated by "L", overload protective function will not work.

■Driver outline Unit: mm (inch)

FHD6P20S(PF)-D3
FHD6P40S(PE)-D3

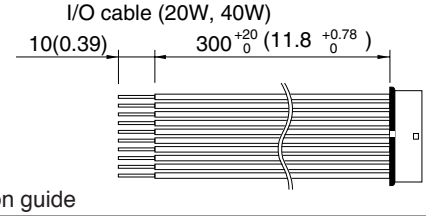


FHD6J60S(PE)-D5 End of production



■Accessory Unit: mm (inch)

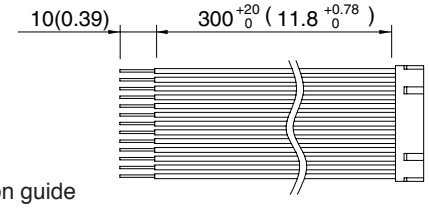
I/O cable (20W, 40W)



Connection guide

Pin No.	Name	Lead wire color	Lead wire
1	SPEED OUT	Brown	UL3265 AWG28
2	F/R OUT	Red	
3	VR	Orange	
4	VS	Yellow	
5	GND	Green	
6	GND	Blue	
7	ALARM	Purple	
8	F/R IN	Gray	
9	BRAKE	White	
10	RUN	Black	

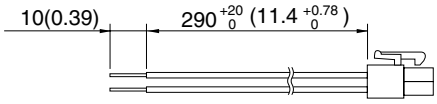
I/O cable



Connection guide

Pin No.	Name	Lead wire color	Lead wire
1	NC	Brown	UL1007 AWG26
2	RUN	Red	
3	BRAKE	Orange	
4	F/R IN	Yellow	
5	SPEED OUT	Green	
6	ALARM RST	Blue	
7	ALARM OUT	Purple	
8	F/R OUT	Gray	
9	GND	White	
10	GND	Black	
11	VS	Brown	
12	NC	Red	
13	VR	Orange	

Power supply cable (20W, 40W, 60W)



Connection guide

Pin No.	Name	Lead wire color	Lead wire
1	VM	Red	UL1430 AWG22
2	P. GND	Black	

■Connector model code

Output	Item	Pin head model code on drive	Connector model code on cable		Maker
			Housing	Contact (chained)	
20W 40W	I/O connection	B10B-ZR(LF)(SN)	ZHR-10	SZH-002T-P0.5	JST
	Power supply connection	5566-02A	5557-02R	5556T	MOLEX
	Motor connection	IL-G-9P-S3T2-SA	IL-G-9S-S3C2-SA	IL-G-C2-SC10000	JAE
60W	I/O connection	IL-G-13P-S3L2-SA	IL-G-13S-S3C2-SA	IL-G-C2-SC-10000	JAE
	Power supply connection	5569-02A1	5557-02R	5556T	MOLEX
	Motor connection	5569-08A1	5557-08R	5556T	MOLEX

■Protection

Protection function	Protection		Alarm Release
	Setting	Operation	
Overload Protection	When the load exceeds the rated torque for more than 5 seconds, the driver will cause the motor to stop and "ALARM" will output "L".	Motor is stepped and "ALARM" outputs "L"	Cool down the driver fully, and input "L" into "ALARM RST" until "ALARM OUT" changes to "H". Or disconnect power supply for more than 1 minute.

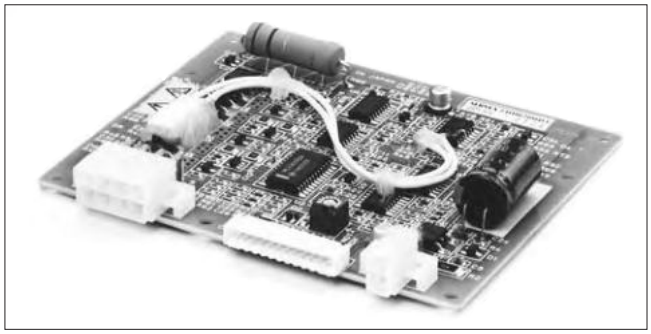
Do not use this function to determine whether or not the load exceeds the rated torque. Please make sure to check the load is lower than the rated torque before use.

■Motor/Driver/Cable/ model code table **Unit: mm (inch)**

		Motor driver set model code	Motor model code	Driver model code	Power supply cable model code	I/O Cable model code
FHD series	Palm mini PLUS / J-Book driver	FHD6P20S-D3	FH6S20-D3	FHD620PD3	FED-CNSL03 300 (11.8)	FED-CNPL03 300 (11.8)
		FHD6P20PF-D3	FH6PF20N-D3	FHD620PD3	FED-CNSL03 300 (11.8)	FED-CNPL03 300 (11.8)
		FHD6P40S-D3	FH6S40-D3	FHD640PD3	FED-CNSL03 300 (11.8)	FED-CNPL03 300 (11.8)
		FHD6P40PE-D3	FH6PE40N-D3	FHD640PD3	FED-CNSL03 300 (11.8)	FED-CNPL03 300 (11.8)
		FHD6J60S-D5	FH6S60J-D5	FHD660JD5	FED-CNSL03 300 (11.8)	FED-CNIL03 300 (11.8)
		FHD6J60PE-D5	FH6PE60J-D5	FHD660JD5	FED-CNSL03 300 (11.8)	FED-CNIL03 300 (11.8)

NOTE) Cable types for FHD series are the same as FED series, because they are used in commonly.

High power simple type



■Specification

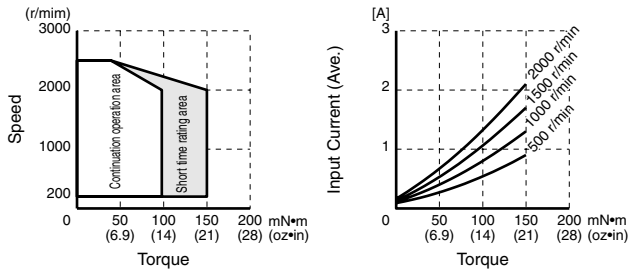
Model on motor	Plain shaft type		FH6S20H-D3	FH6S40H-D3
	Pinion shaft type		FH6PF20H-D3	FH6PE40H-D3
Model on driver			FHD620HD3	FHD640HD3
Rated voltage		V (DC)	24	24
Rated output		W	20	40
Speed control range		r/min	200~2500	200~2500
Rated torque		mN • m	98	200
		oz • in	14	28
MAX. instantaneous torque (in 5sec.)		mN • m	150 (2000r/min MAX.)	290 (500r/min MAX.)
		oz • in	21 (2000r/min MAX.)	42 (500r/min MAX.)
Rated speed		r/min	2000	2000
Speed setting method			①Speed setting by external speed setter (Sold separately: model code Q-R10KB)	
			②Speed setting by external voltage supply 0~10V	
Speed setting		(r/min)/V	300±5%	
Speed variation			Against load ±1% 0~rated torque at rated voltage and speed	
			Against voltage ±1% Rated voltage ±10% at rated speed, no load	
			Against temperature ±3% 20±20˚C at rated voltage and speed, no load	
Input and output signal		Input	RUN, BRAKE, F/R IN, ALARM RST H: Open collector L: GND (0~0.8V)	
		Output	ALARM, HU OUT, HV OUT Open collector output DC30V MAX. 10mA MAX.	
Speed pulse		Pulse/Revolution	7	7
Current	Rated (Ave.)	A	1.8 MAX.	3.1 MAX.
	MAX. (Peak)		7 MAX.	10 MAX.
Protection functions			Over load protection When an exceeding torque than rated is applied to motor for more than about 5 sec., Stop motor and outputs "L" from "ALARM" (20W, 40W) "ALARM OUT". To release alarm: Input "L" in the ALARM RST or Turn off the power supply more than 1 min. period.	
Others			Operation temperature: 0~40˚C (no condensation) continuous duty. The motor flange surface temp. must be 80˚C MAX. (Ambient temperature 40˚C without heat sink) Motor dielectric strength: Withstand for 1min. under AC500V 50Hz (Between case and coil) Motor insulation resistance: 10MΩMIN. (20W, 40W) (Between case and coil by DC500V tester)	

Gear ratio	Speed (r/min)		Applicable MAX. Torque for gearheads			
	at 200r/min	at 2000r/min	6H□EBN		8F□EBN	
			mN • m	oz • in	mN • m	oz • in
5	40	400	390	56	780	110
10	20	200	780	110	1600	220
25 (25.44)	8	80	1700	240	3600	510
50 (49.6)	4	40	3500	500	7000	990

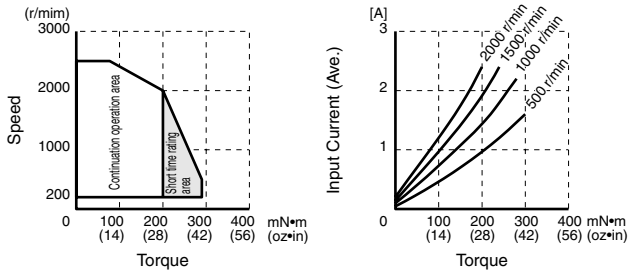
- Although the rotation speed range in the high-speed area expands more than that shown in the above table, the allowable torque may decrease. Refer to the torque rotation speed graph.
- ▭: rotation of gear head output shaft becomes reverse direction of motors.
- In case of 8F□EBN value in ( ) should be used as gear ratio.

■Torque Speed/Current (TYP.) Characteristics

FH6S(PF)20H-D3+FHD620HD3

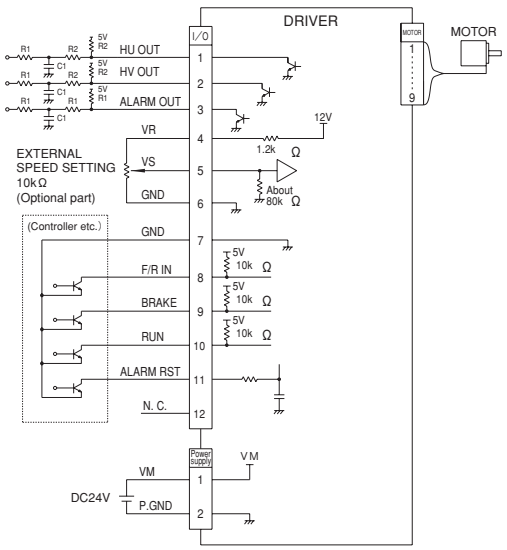


FH6S(PE)40H-D3+FHD640HD3



■Input & output terminals and wiring diagram

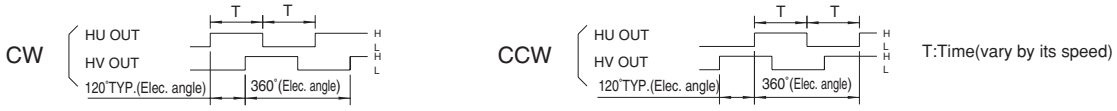
Item	Pin No.	Read Wire Color	Symbol	Input or Output	Function	Standard • Condition
Power supply	1	Red	VM	Input	Power supply positive for driver	DC24 V±10%
	2	Black	P.GND	–	Power supply GND for driver	
I/O	1	Brown	HU OUT	Output	7 Pulse/Revolution ※1	H: Open collector DC30V MAX. L: 0~0.8 V, 10 mA MAX.
	2	Red	HV OUT	Output		
	3	Orange	ALARM OUT	Output	H: Normal operation L: Alarm output	
	4	Yellow	VR	Output	Power supply positive for external speed setter	
	5	Green	VS	Input	Speed setting signal positive	0~10 V
	6	Blue	GND	–	Speed setting signal GND	
	7	Purple	GND	–	GND for I/O Signal	
	8	Gray	F/R IN	Input	H: CCW L: CW (Viewed from motor output shaft side)	H: Open collector L: 0~0.8 V
	9	White	BRAKE ※2	Input	H: BRAKE Deactivated L: BRAKE activated	
	10	Black	RUN	Input	H: Stop L: Start	
	11	Brown	ALARM RST ※3	Input	H: Normal operation L: Reset	
	12	Red	N.C.	–	Not used	Must be operated in the open state.



Part name	Recommended value
R1	4.7KΩ
R2	1KΩ
C1	0.01μF

*1 "HU OUT" signal and "HV OUT" signal are shown below.

Motor rotation (viewed from motor output shaft side)



※ 2 • Brake specification: Short brake between terminals
• "BRAKE has priority over "RUN".
• During rotation direction switching operation, "BRAKE" terminal voltage may reduce due to internal processing.

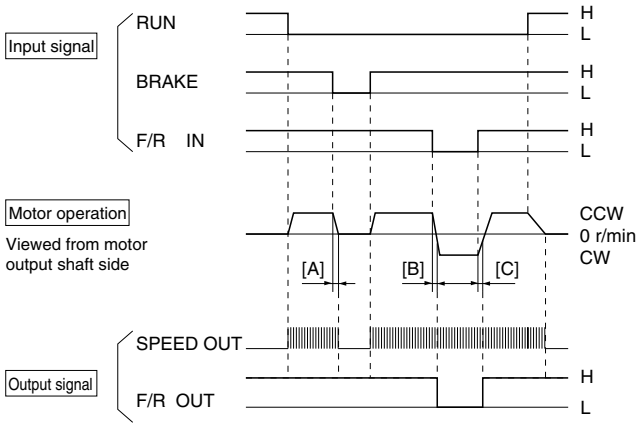
※ 3 In case of "L", the overload protection function is canceled. If overload operation is performed in this state, the motor may burn out.

■Protection

Protection function	Protection		Alarm Release
	Setting	Operation	
Overload Protection	When the load exceeds the rated torque for more than 5 seconds, the driver will cause the motor to stop and "ALARM" will output "L".	Motor is stepped and "ALARM" outputs "L"	Cool down the driver fully, and input "L" into "ALARM RST" until "ALARM OUT" changes to "H". Or disconnect power supply for more than 1 minute.

Do not use this function to determine whether or not the load exceeds the rated torque. Please make sure to check the load is lower than the rated torque before use. When the overload protection function is canceled ("ALARM RST" is in the "L" state) and temperature rises rapidly due to motor restraint, the motor may burn out. Make sure to set "ALARM RST" to "H" before operating the motor.

■Control sequence



[Notes for BRAKE Operation & Rotation change]
(1) Do not change (period [A] left) the "F/R IN" signal while the "BRAKE" is activated. "F/R IN" signal should be changed after "BRAKE" is deactivated.
(2) During the direction of rotation changing (period [B] & [C] left), you need the brake to operate, let it operate only when the both direction of rotation setting signal ("F/R IN") and direction monitor signal ("F/R OUT") is the same,
(3) When actual motor speed is higher than the setting (by signal input value of "VS"), any switching of the "F/R IN" and "BRAKE" ("H→"L") must not be made.
(4) During the brake is operating, set the "RUN" signal at "L" all the time.
WARNING:
In case of different way of use from (1), (2), (3) and (4), (1), (2), and (4) may be the cause of the incorrect operation and (3) may be the cause of the fire or the breakdown.
Electrical shock: By the load condition, the terminal voltage (VM) is raised up to 30 VDC, during switching BRAKE and/or Rotation direction.
(Braking Operation: At higher speed: reverse rotation brake first, then short circuit brake. But at slower speed: short circuit brake only.)
[Notes on "F/R OUT"] (20,40W only)
During the motor is in stop, the "F/R OUT" is held at the same signal as previously outputting. This means ; if the motor stopped once, but the rotation reversed by Cogging torque or by the Load, then the "F/R OUT" is held at reversed signal. Also note that "F/R OUT" signal will delay by 0~5pulses of "SPEED OUT" from the motor rotation switched.

■Speed setting

Fig.1 Speed setting by external speed setter

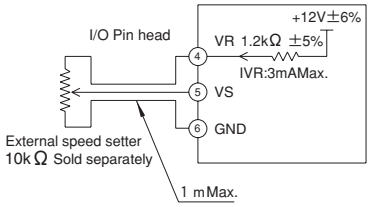
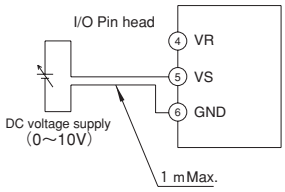
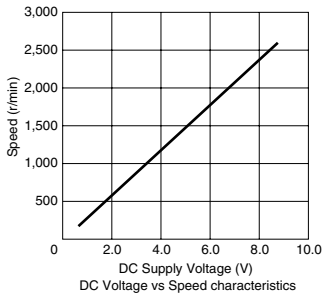


Fig.2 Speed setting by external voltage supply



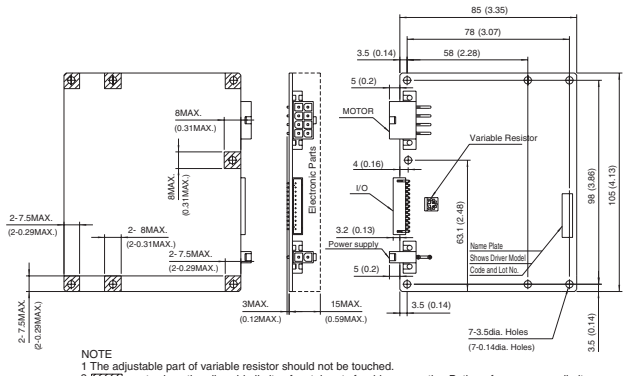


DC Voltage vs Speed characteristics

Item	Setting Method
Speed setting by external speed setter (Optional Part)	Connect as shown in Fig.1 and set by external speed setter. Use variable resistor 10[KΩ] as an external speed setter.
Speed setting by external voltage supply	Connect as shown in Fig.2 and set speed by external voltage supply.

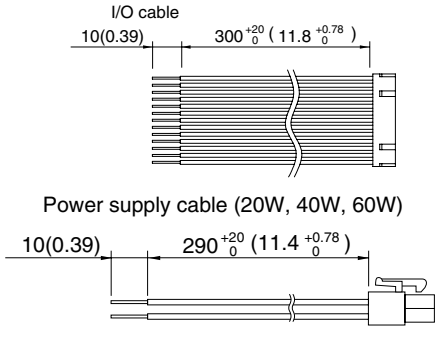
By these function, it is possible to set a speed at outside of Speed control range. But it must be out of our product warranty.

■Driver outline Unit: mm (inch)



NOTE
1 The adjustable part of variable resistor should not be touched.
2 ▨ parts show the allowable limits of metal parts for driver mounting.Both surface are same limit.

■Accessory Unit: mm (inch)



■Connector model code

Item	Pin head model code on drive	Connector model code on cable		Maker
		Housing	Contact (chained)	
I/O connection	53325-1210	51090-1200	50212-8000	MOLEX
Power supply connection	5566-02A	5557-02R	5556T	
Motor connection	5569-08A1	5557-08R	5556T	