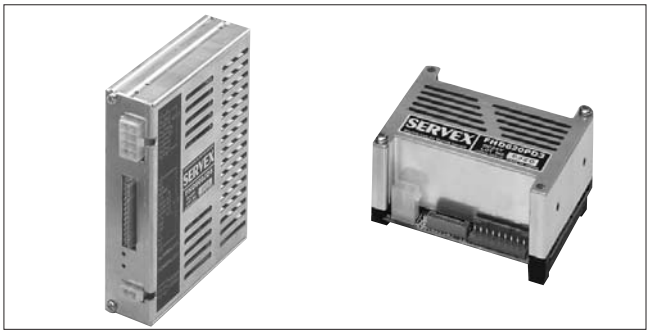
Palm mini PLUS type
J-Book type



■Specification

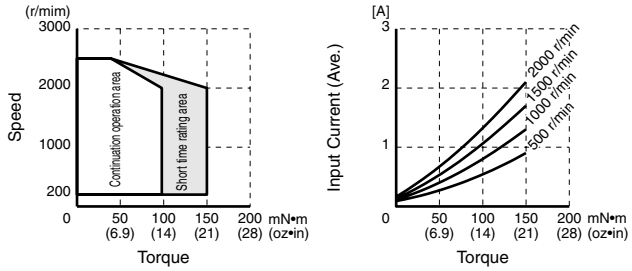
Model on set			FHD6P20S-D3	FHD6P40S-D3	FHD6J60S-D5
	Plain shaft type		FHD6P20PF-D3	FHD6P40PE-D3	FHD6J60PE-D5
Rated voltage		V (DC)	24	24	48
Rated output		W	20	40	60
Speed control range		r/min	200~2500	200~2500	65~2500
Rated torque		mN • m	98	200	290
		oz • in	14	28	42
MAX. instantaneous torque (in 5sec.)		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)		

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

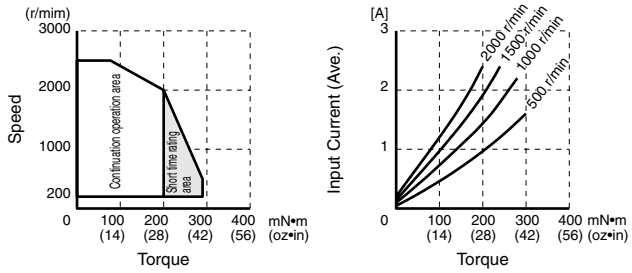
• □: rotation of gear head output shaft becomes reverse direction of motors.
• In case of 8F□EBN value in ( ) should be used as gear ratio.

■Torque Speed/Current (TYP.) Characteristics

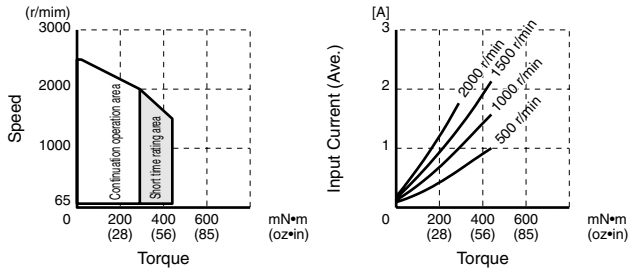
FHD6P20S(PF)-D3



FHD6P40S(PE)-D3

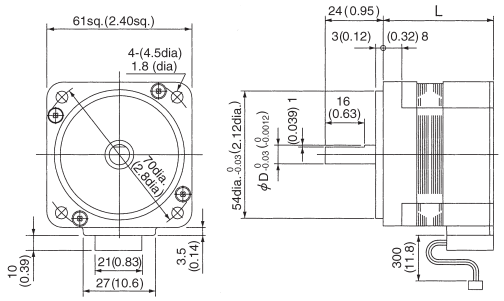


FHD6J60S(PE)-D5



■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

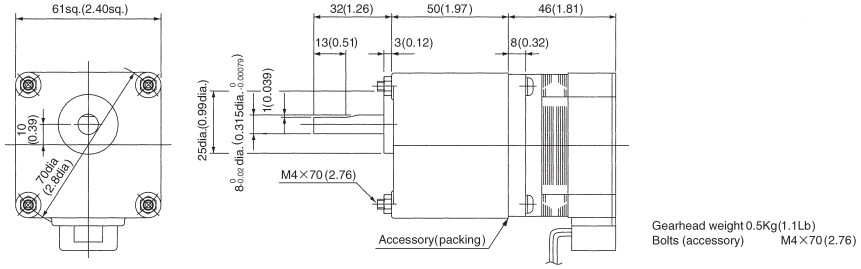
Connection guide

	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	

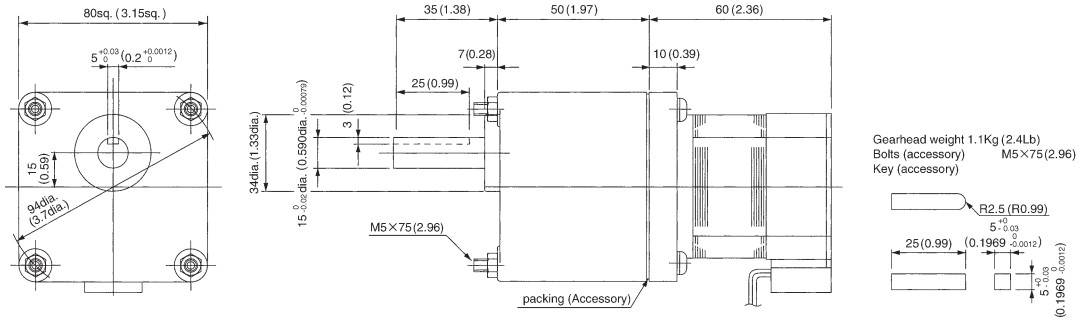
■Motor (Pinion shaft type) + Gear head outlines

FHD6P20PF-D3+6H□EBN

Unit: mm (inch)



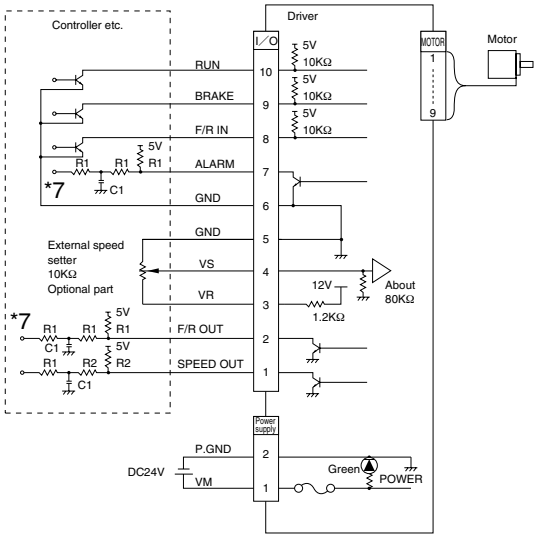
FHD6P40PE-D3+8F□EBN
FHD6J60PE-D5+8F□EBN



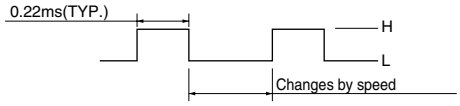
■Input & output terminals and wiring diagram

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

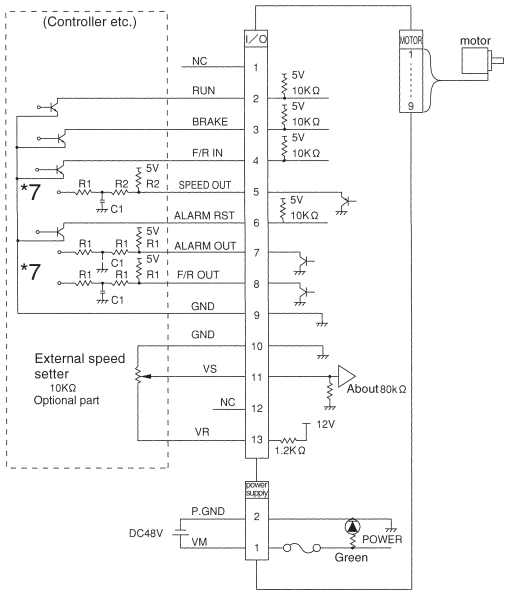


*3 "SPEED OUT" signal is shown below.



FHD6J60S(PE)-D5

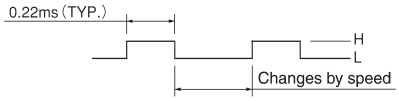
Item	Pin No.	Symbol	Input or Output	Function	Standard • Condition
Power supply	1	VM	Input	Power supply positive for driver	DC48V±10%
	2	P.GND	–	Power supply GND for driver	
I/O	1	NC	–		
	2	RUN	Input	H: Stop L: Start	*4 H: Open L: 0~0.8V
	3	BRAKE	Input	H: BRAKE Deactivated L: BRAKE activated	
	4	F/R IN	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

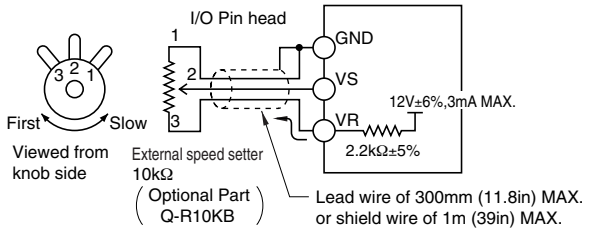
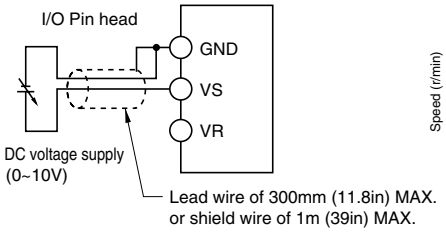
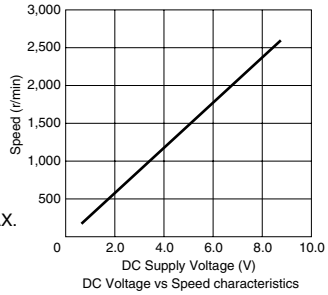


Fig.2 Speed setting by external voltage supply





DC Voltage vs Speed characteristics

I/O Pin head Pin No.

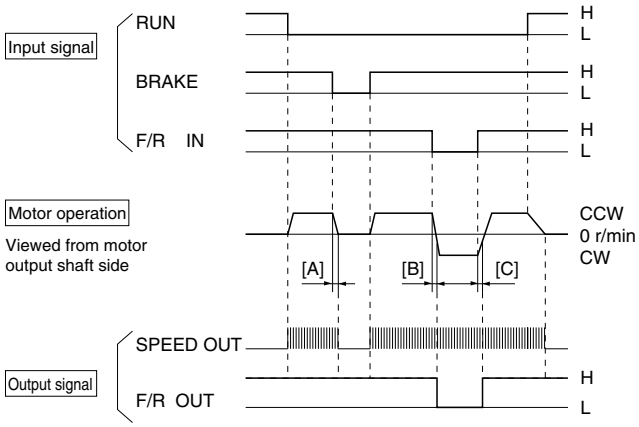
	FHD6P20S (PF)-D3 FHD6P40S (PE)-D3	FHD6J60S(PE)-D5
GND	5	10
VS	4	11
VR	3	13

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.

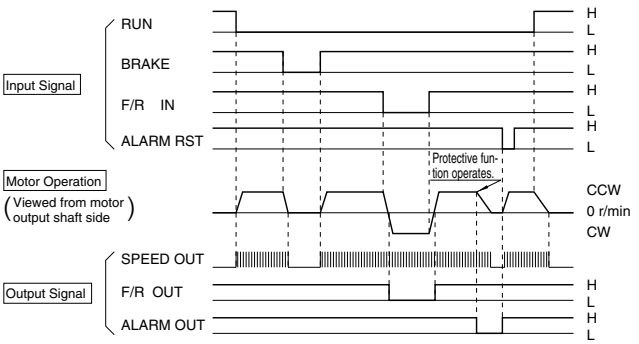
By these function, it is possible to set a speed at outside of Speed control range. But it must be out of our product warranty.

■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.

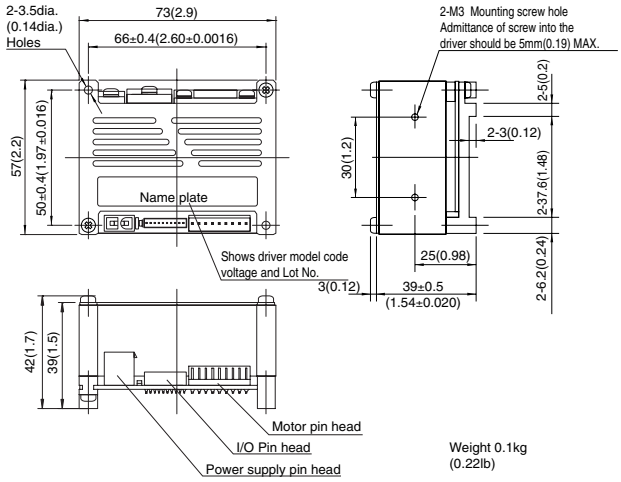
FHD6J60S(PE)-D5



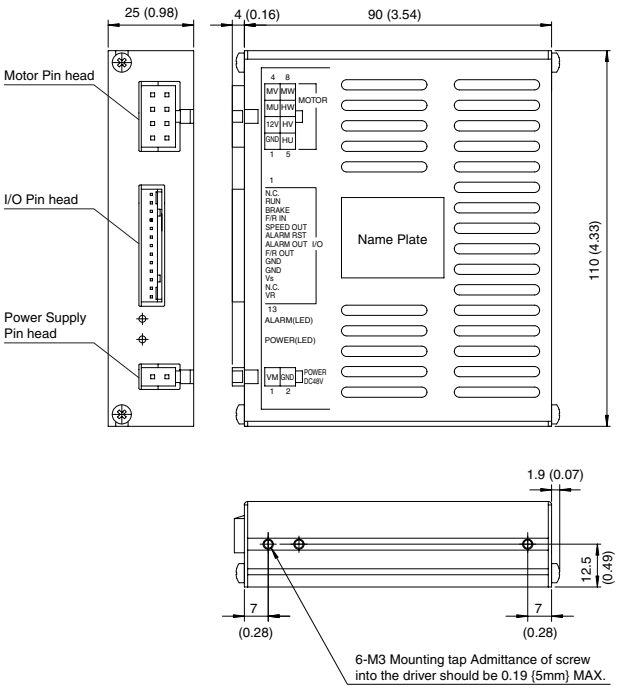
[Notes for "F/R OUT"] (60W only)
In case that motor is not running, "F/R OUT" holds the signal which has been output until motor stops. But according to the condition of use, there may be a case that motor runs reversely by cogging torque, load etc. After it stops. Be careful that in such case "F/R OUT" 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

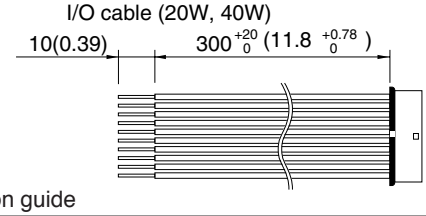


FHD6J60S(PE)-D5



■Accessory Unit: mm (inch)

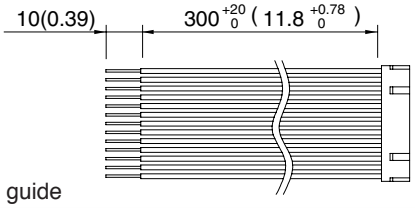
I/O cable (20W, 40W)



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	

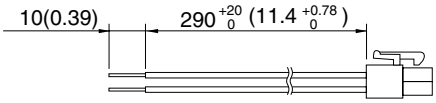
I/O cable



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	IL-Y-10P-S15T2-EF	IL-Y-10S-S15C3	IL-Y-C3-A-10000	JAE
	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)
					FED-CNSL05 500 (19.7)	FED-CNPL05 500 (19.7)
					FED-CNSL10 1000 (39.4)	FED-CNPL10 1000 (39.4)
		FHD6P20PF-D3	FH6PF20N-D3	FHD620PD3	FED-CNSL03 300 (11.8)	FED-CNPL03 300 (11.8)
					FED-CNSL05 500 (19.7)	FED-CNPL05 500 (19.7)
					FED-CNSL10 1000 (39.4)	FED-CNPL10 1000 (39.4)
		FHD6P40S-D3	FH6S40-D3	FHD640PD3	FED-CNSL03 300 (11.8)	FED-CNPL03 300 (11.8)
					FED-CNSL05 500 (19.7)	FED-CNPL05 500 (19.7)
					FED-CNSL10 1000 (39.4)	FED-CNPL10 1000 (39.4)
		FHD6P40PE-D3	FH6PE40N-D3	FHD640PD3	FED-CNSL03 300 (11.8)	FED-CNPL03 300 (11.8)
					FED-CNSL05 500 (19.7)	FED-CNPL05 500 (19.7)
					FED-CNSL10 1000 (39.4)	FED-CNPL10 1000 (39.4)
		FHD6J60S-D5	FH6S60J-D5	FHD660JD5	FED-CNSL03 300 (11.8)	FED-CNIL03 300 (11.8)
					FED-CNSL05 500 (19.7)	FED-CNIL05 500 (19.7)
					FED-CNSL10 1000 (39.4)	FED-CNIL10 1000 (39.4)
		FHD6J60PE-D5	FH6PE60J-D5	FHD660JD5	FED-CNSL03 300 (11.8)	FED-CNIL03 300 (11.8)
					FED-CNSL05 500 (19.7)	FED-CNIL05 500 (19.7)
					FED-CNSL10 1000 (39.4)	FED-CNIL10 1000 (39.4)

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