Smart Geared motor

DSEM-7024-50-D 24VDC brushless

GEARED EC MOTOR

- The gear train of the smart motor is a 3K epicyclic gear train.
- Compactness : Disk shape
- Gear Ratio : Up to 2,500
- Multi-pole motor design for optimum power density (14-pole)
- Hollow shaft
- Digital(PWM) speed control
- Current limit
- Blockage protection : Detect a motor lock if motor shaft is blocked for longer than 3 sec.
- Alarm output funtion at time of error
- FG out

Nominal data	Reduction Ratio	Exact Reduction Ratio	Rated Tolerance Torque	Max. Momentary Tolerance Torque	Torque Transfer Effisiency	Backlash	Torque Constant	No Load Speed	No Load Current	* Noise	Length L1	Length L2	Mass
Model			N.m	N.m	%	min	N.m/A	RPM	A	dB	mm	mm	Kg
DSEM-7024-50-D	1/50	5/252	10	90	81	10	5	40	0.35	50	46	19	0.7
DSEM-7024-102-D	1/102	5/512	20	90	81	10	10	20	0.35	55	46	19	0.7

*Condition of measurement : DC24V, Rad.30[cm], With no load, Fix on sponge

| Characteristics		DSEM-7024-50-D
Interface		
1 Input		BRAKE, DIRECTION, PWM(5V), GND
2 Output		ALARM, 1FG
Protective function		
1 Current limit	A	3.5
2 Thermal shutdown (IC temperature/design specification.)	℃	160±10
3 Motor lock protection	sec	3
Ambient condition		
1 Operation condition- Dry bulb temp	℃	-10~50
2 Operation condition- Relative humidity	%	0~85
3 Storage condition - Dry bulb temp	℃	-10~60
4 Storage condition - Relative humidity	%	10~90
Mechanical characteristics		
1 Stator Length	mm	10
2 Stator Diameter	Ø	68
3 Shaft Diameter	Ø	43
4 Rotational Direction		CW/CCW
Other Specifications		
1 Number of pole pairs		14
2 Number of phases		3
3 Weight of motor	g	767
4. Protection class		IP40
5. Insulation class		F

Features

Smart 3K geared motor

3K epicyclic gear train has a large gear ratio (up to 2500) comparing with 3K paradox epicyclic gear train.

3K epicyclic gear train has a simple structure and the same structure regardless gear ratio.

3K epicyclic gear train is compact and has a large torque density.
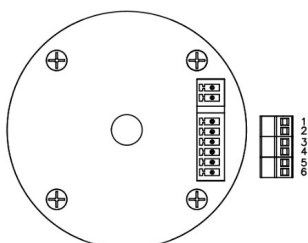
Wiring diagram
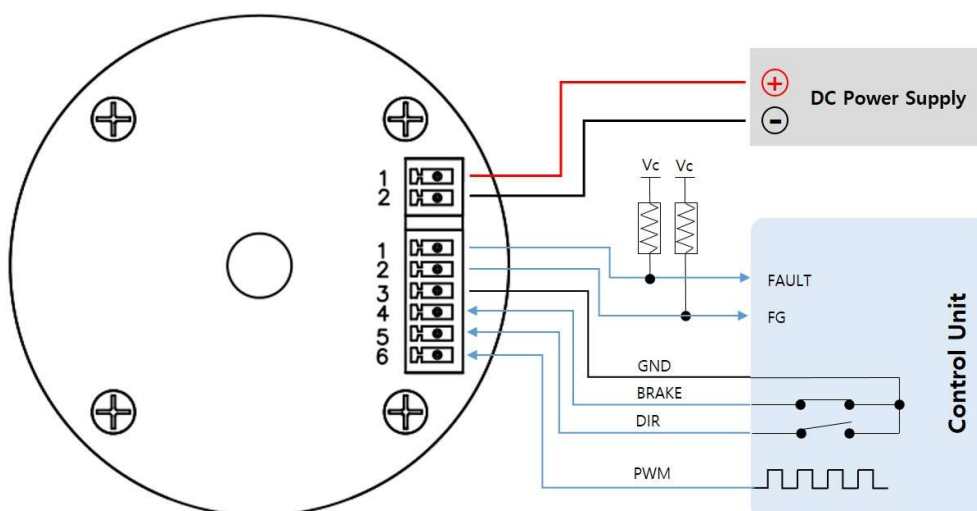
Pin configuration

Power
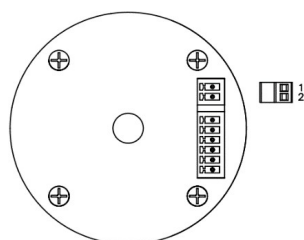
PIN	DESCRIPTION / NOTES	I/O
1 +Vm	DC power input	I
2 GND	Power ground	Power GND

Signal

PIN	DESCRIPTION / NOTES	I/O
1 ALARM	Fault out (LED red)	O
2 FG	1FG signal out	O
3 GND	Signal ground	Signal GND
4 BRAKE	Brake active/not active	I
5 DIRECTION	Direction of rotation	I
6 PWM	Set value speed reference : PWM input	I

Terminals

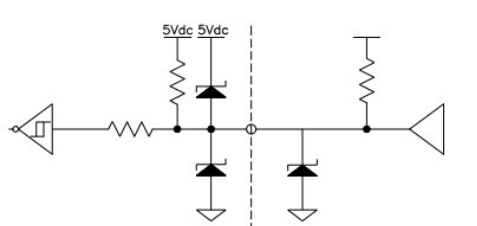| **Power**	Male header PCB : ECH350R-2P, 1 row, Pitch : 3.5 mm
	Suitable plug : EC350V-2P
	Suitable for wire cross section : AWG#22 UL1007
Signal I/O	Male header (PCB) : ECH350R-6P, 1 row, Pitch : 3.5 mm
	Suitable plug : EC350V-6P
	Suitable for wire cross section : AWG#26 UL1007

Inputs and outputs

PWM

Set value speed

You should connect a Schottky Barrier Diode between each signal line to ground to prevent IC from damage.
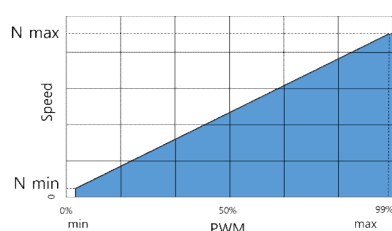
Input voltage range	High(1) : 3.3 to 5 V or Input OPEN	Motor OFF
	Low(0) : 0 to 0.8 V or Input to GND	Motor ON
Frequency	PWM frequency range is 25kHz (between 20 ~ 30 [kHz])	
Set value input	Speed setting for speed control via PWM duty 0~99%	
Interface		

Control input brake <BLK>

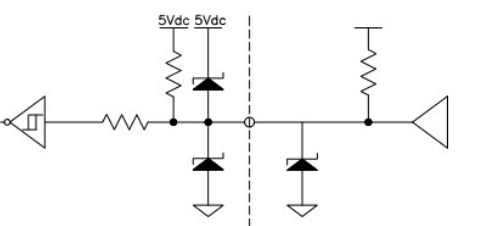The motor shaft slows down in an uncontrolled fashion to a standstill by short-circuiting the motor windings.

Input voltage range	High(1) : 3.3 to 5 V or Input OPEN	Brake function active
	Low(0) : 0 to 0.8 V or Input to GND	Brake function not active
Interface		

Control input rotation <Direction>

When the level changes, motors shaft slows down in an uncontrolled fashion to a standstill by short-circuiting the motor windings, and accelerates in the opposite direction, until the nominal speed reaches again.

Change CW/CCW input signal after motor had stopped completely.
If you change the CW/CCW signal during motor running, there is a danger of the damage of electronic parts inside motor.

Input voltage range	High(1) : 3.3 to 5 V or Input OPEN	Counter-clockwise rotation
	Low(0) : 0 to 0.8 V or Input to GND	Clockwise rotation
Interface		

FG out

1FG is put into toggle-operation in which the logic reverses every time when excitation phase is switched by hall input.
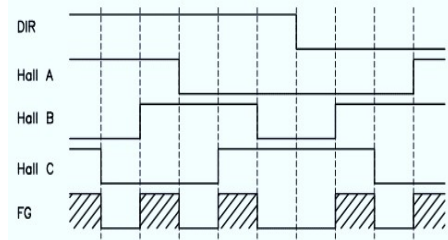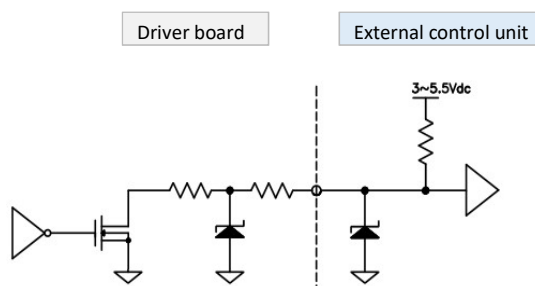

Open Drain

$VFG(SAT) = 0.45$ VDC
$IFG = 2mA$
$IFG(leak) = 50 \ \mu A$
$VFG = 5.5$ VDC

Alarm out

Driver fault output.
Output N-ch FET turns on and becomes high during low-voltage, over-current,
motor lock detection, thermal shutdown, and during power-up reset.
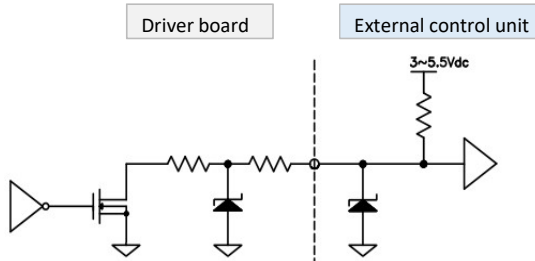
Open Drain

$VFG(SAT) = 0.45$ VDC
$IFG = 2mA$
$IFG(leak) = 50 \ \mu A$
$VFG = 5.5$ VDC

You need to pull up for 1FG terminal, so that the terminal is open-drain output

Motor protection

No	Specification	Note
1 Current limit	3.5 [A] Typ	
2 Thermal shutdown	160±10 [℃]	When the IC reaches the defined temperature, the motor current automatically cuts off. There is no guarantee of proper operation when thermal shutdown motor is reused.
3 Motor lock detection	3 sec	When the motor locks, the motor current automatically cuts off within the defined time. The motor restarts by power supply reset.

Control sequence timing chart

DIR	CW		CCW	
PWM				
MOTOR SPEED	SLOW	FAST	SLOW	FAST
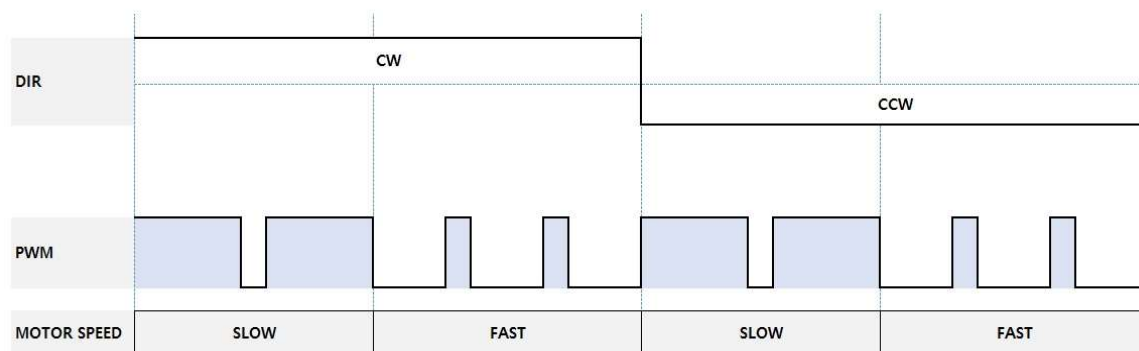
Product safety

1. Locked motor

No burning after locked rotor condition at rated voltage by using a specified drive circuit.

2. Circuit Protect

This motor does not have the protect circuit for over voltage and wrong connection.
So, don't apply to surge voltage such as over rated voltage and wrong connection.

Dimension Drawing

Dimensions in [mm]

9−M3 DP7 P.C.D. ø62
3−M3 DP7 P.C.D. ø32
ø44
(L1)
(L2)
ø40⁺⁰₋₀.₀₃
1
ø70
4−ø3 DP2.0 P.C.D. ø58.5