# Smart Geared motor

**DSEM-7024-102-A 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-A | 1/50 | 5/252 | 10 | 90 | 81 | 10 | 5 | 40 | 0.35 | 50 | 46 | 19 | 0.7 |
| **DSEM-7024-102-A** | 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

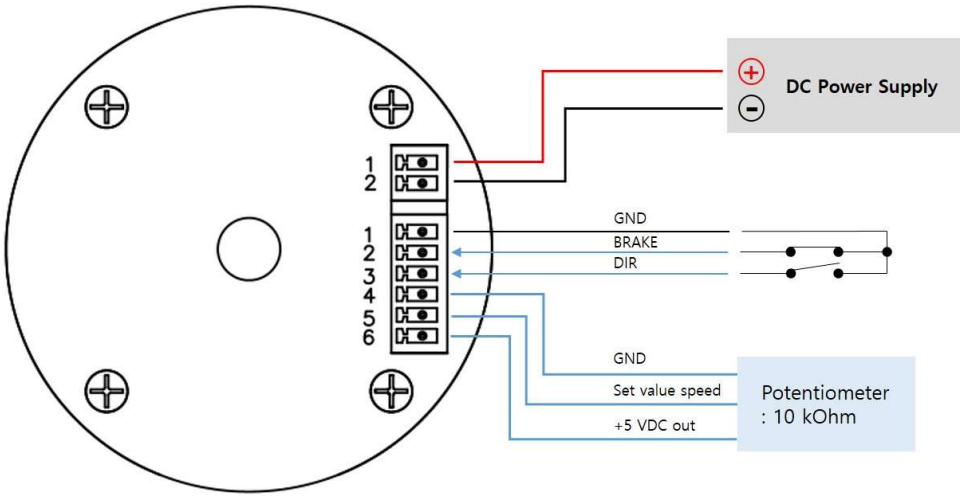
| Characteristics | | DSEM-7024-102-A |
|---|---|---|
| **Interface** | | |
| 1 Input | | BRAKE, DIRECTION, SPEED, GND |
| 2 Output | | +5 VDC |
| **Protective function** | | |
| 1 Current limit | A | 3.5 |
| 2 Thermal shutdown (IC temperature/design specification.) | ℃ | 160±10 |
| 3 Motor lock protection | 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

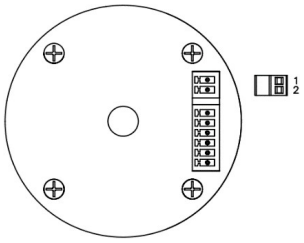
3K epicyclic gear train has a large gear ratio (up to 2500) comparing with 3K paradox epicyclic gear train.
3K epicyclic gear train has a simple structure and the same structure regardless gear ratio.
3K epicyclic gear train is compact and has a large torque density.

## Wiring diagram



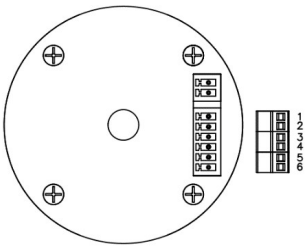

## Pin configuration

### 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 GND | Ground | Signal GND |
| 2 BRAKE | Brake active/not active | I |
| 3 DIRECTION | Direction of rotation | Signal GND |
| 4 GND | Reference ground | Reference GND |
| 5 Set speed | Set value speed reference : Analog input | I |
| 6 +5V out | +5 Vdc out | O |

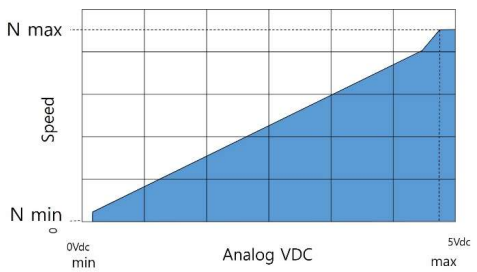
## Terminals

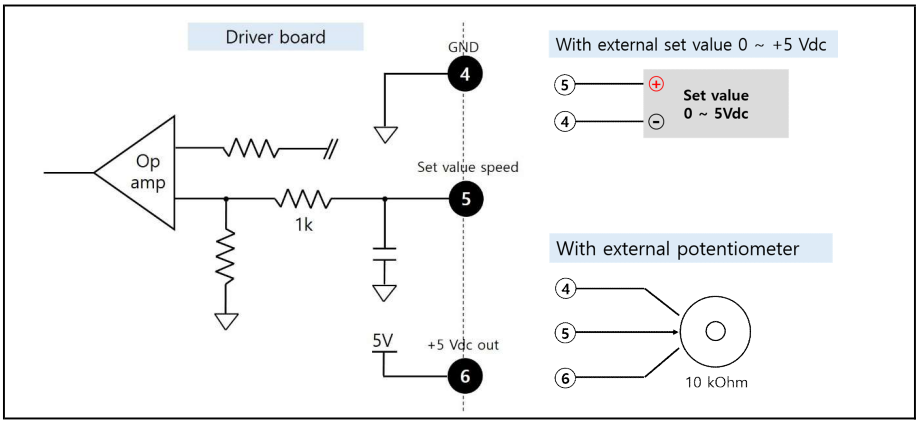
| | |
|---|---|
| **Power** | Male header PCB : ECH350R-2P, 1 row, Pitch : 3.5 mm |
| | Suitable plug : EC350V-2P |
| | Suitable for wire cross section : AWG#22 UL1007 |
| **Signal I/O** | Male header (PCB) : ECH350R-6P, 1 row, Pitch : 3.5 mm |
| | Suitable plug : EC350V-6P |
| | Suitable for wire cross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

## Inputs and outputs

### Set value speed

Speed control

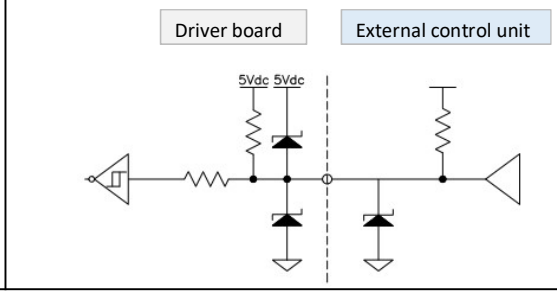


**Control input brake <BLK>**

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

You should connect a Schottky Barrier Diode between each signal line to ground to prevent IC from damage.

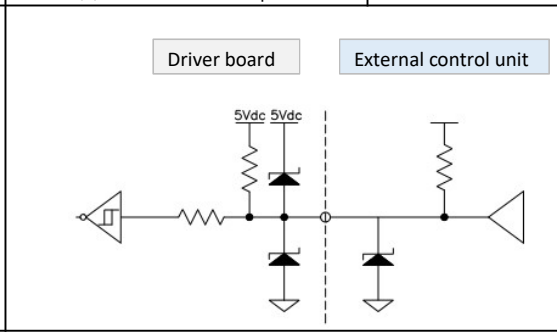
| | | |
|---|---|---|
| Input voltage range | High(1) : 3.3 to 5 V or Input OPEN | Brake function active |
| | Low(0) : 0 to 0.8 V or Input to GND | Brake function not active |
| Interface |  | |



**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 |  | |



## 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. |

## 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]**