

## Smart EC motor

DSEM-7024-A, 24V brushless, built in analog DRV, 40watt



SMART EC MOTOR

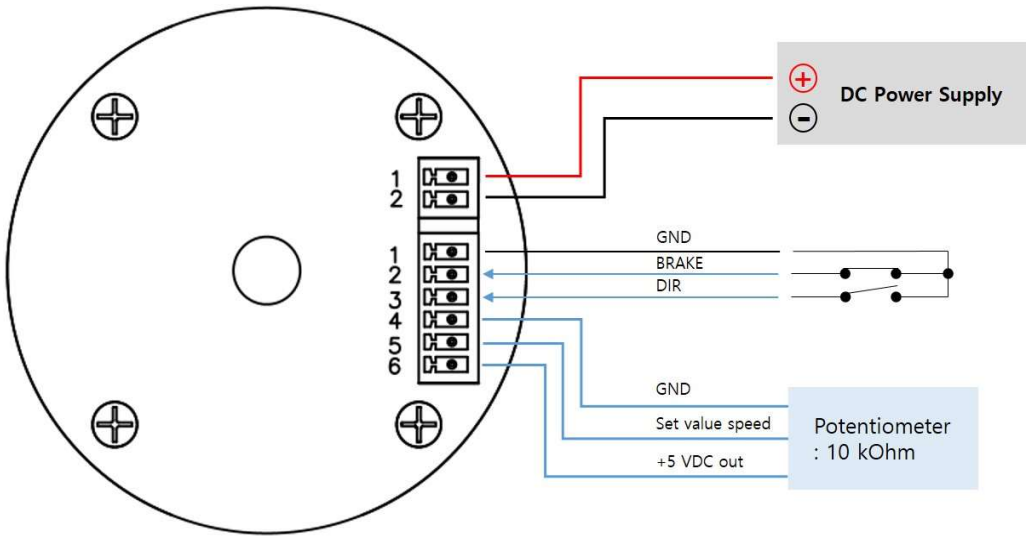
- Hollow shaft
- Disk shape of compact structure
- Hall sensor commutation
- Analog (5V or potentiometer) speed control
- Brake, Direction input
- Current limit
- Blockage protection : Detect a motor lock if motor shaft is blocked for longer than 3 sec.

## 3 Phase 14 poles sensor motor

## Part numbers

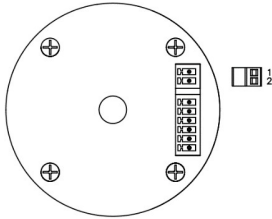
| Motor data  |                   | DSEM-7012-A                  | DSEM-7024-A |  |  |
|---|-------------------|------------------------------|-------------|--|--|
| <b>Rated Specifications</b>                               |                   |                              |             |  |  |
| 1 Nominal Voltage   | V                 | 12                           | 24          |  |  |
| 2 Current   | A                 | 2.1                          | 2.2         |  |  |
| 3 Power   | W                 | 20                           | 40          |  |  |
| 4 Speed   | RPM               | 1300                         | 1730        |  |  |
| 5 Torque  | Nm                | 0.15                         | 0.22        |  |  |
| <b>Electrical Specifications</b>                          |                   |                              |             |  |  |
| 1 Operating Voltage                                       | V                 | 12                           | 24          |  |  |
| 2 Maximum output Power                                    | W                 | 48                           | 96          |  |  |
| 3 Maximum Efficiency                                      | %                 | 80                           | 76          |  |  |
| 4 No Load Speed   | RPM               | 1490                         | 2070        |  |  |
| 5 No Load Current   | A                 | 0.45                         | 0.25        |  |  |
| 6 Torque Constant   | mN.m/A            | 168                          | 110         |  |  |
| 7 Back EMF Constant                                       | mV/RPM            | 7.67                         | 11.5        |  |  |
| 8 Coil Resistance   | Ω                 | 0.62                         | 1.2         |  |  |
| <b>Interface</b>  |                   |                              |             |  |  |
| 1 Input   |                   | BRAKE, DIRECTION, SPEED, GND |             |  |  |
| 2 Output  |                   | +5 VDC                       |             |  |  |
| <b>Characteristics</b>                                    |                   |                              |             |  |  |
| <b>Ambient condition</b>                                  |                   |                              |             |  |  |
| 1 Operation condition - Dry bulb temp                     | °C                | -10~50                       | -10~50      |  |  |
| 2 Operation condition - Relative humidity                 | %                 | 0~85                         | 0~85        |  |  |
| 3 Storage condition - Dry bulb temp                       | °C                | -10~60                       | -10~60      |  |  |
| 4 Storage condition - Relative humidity                   | %                 | 10~90                        | 10~90       |  |  |
| <b>Mechanical characteristics</b>                         |                   |                              |             |  |  |
| 1 Stator Length   | mm                | 10                           | 10          |  |  |
| 2 Stator Diameter   | Ø                 | 68                           | 68          |  |  |
| 3 Shaft Diameter  | Ø                 | 43                           | 43          |  |  |
| 4 Weight  | Kg                |                              |             |  |  |
| 5 Rotor Inertia   | g•cm <sup>2</sup> | 356                          | 356         |  |  |
| 6 Mechanical Time Constant                                | m.s               | 0.78                         | 3.3         |  |  |
| 7 Rotational Direction                                    |                   | CW/CCW                       | CW/CCW      |  |  |
| <b>Other Specifications</b>                               |                   |                              |             |  |  |
| 1 Number of pole pairs                                    |                   | 14                           | 14          |  |  |
| 2 Number of phases  |                   | 3                            | 3           |  |  |
| 3 Weight of motor   | g                 | 381                          | 381         |  |  |
| 4. Protection class                                       |                   | IP40                         | IP40        |  |  |
| 5. Insulation class                                       |                   | F                            | F           |  |  |
| 6. Noise (Rad.30[cm] DC24V, No load)                      | dB(A) Max.        | 40                           | 45          |  |  |
| <b>Maximum permissive Temperature</b>                     |                   |                              |             |  |  |
| 1 Coil  | °C                | 120                          | 120         |  |  |
| 2 Main IC   | °C                | 100                          | 100         |  |  |
| 3 MOSFET  | °C                | 110                          | 110         |  |  |
| 4 Bearing   | °C                | 90                           | 90          |  |  |
| <b>Protective function</b>                                |                   |                              |             |  |  |
| 1 Current limit   | A                 | 3                            | 3.5         |  |  |
| 2 Thermal shutdown (IC temperature/design specification.) | °C                | 160±10                       | 160±10      |  |  |
| 3 Motor lock protection                                   | sec               | 3                            | 3           |  |  |

Wiring diagram

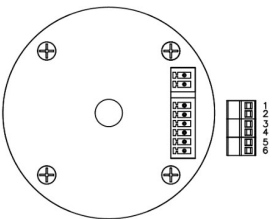


Pin configuration

Power



Signal



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

| PIN         | DESCRIPTION / NOTES                      | I/O           |
|-------------|--|---------------|
| 1 GND       | Ground                                   | Signal GND    |
| 2 BRAKE     | Brake active/not active                  | I             |
| 3 DIRECTION | Direction of rotation                    | I             |
| 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

Signal I/O

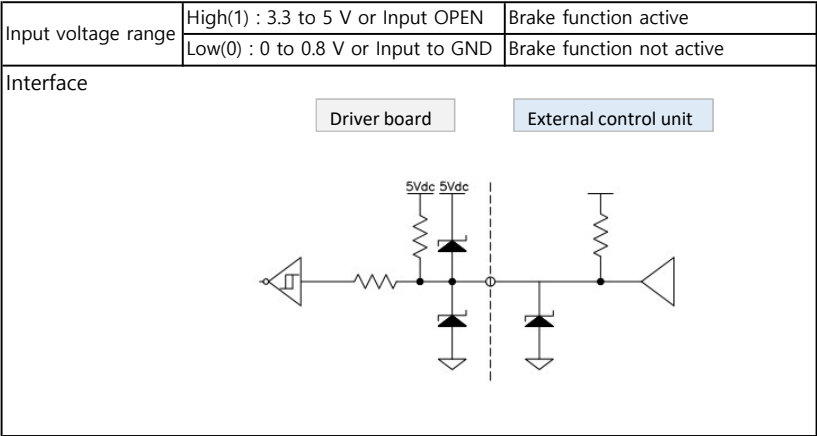
|   |
|---|
| Male header PCB : ECH350R-2P, 1 row, Pitch : 3.5 mm<br>Suitable plug : EC350V-2P<br>Suitable for wire cross section : AWG#22 UL1007   |
| Male header (PCB) : ECH350R-6P, 1 row, Pitch : 3.5 mm<br>Suitable plug : EC350V-6P<br>Suitable for wire cross section : AWG#26 UL1007 |

Inputs and outputs

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.

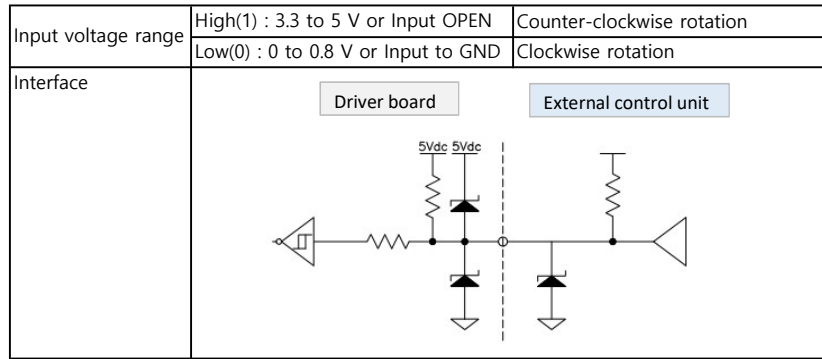


**Control input rotation <Direction>**

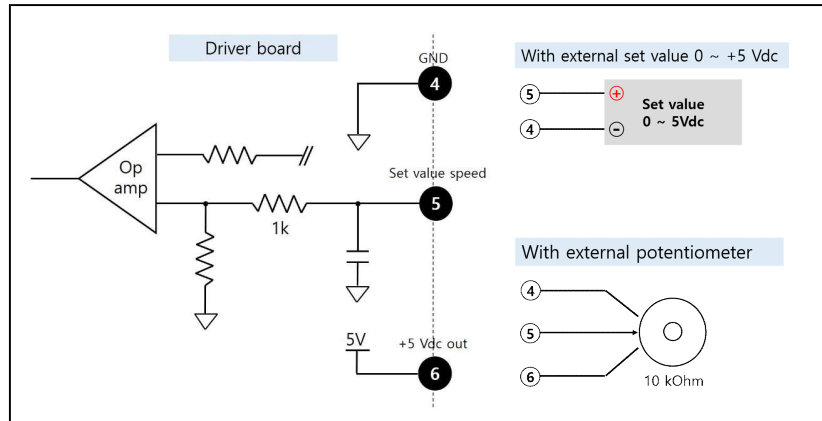
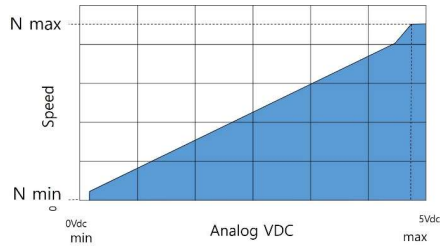
When the level changes, motors shaft slows down in an uncontrolled fashion to a standstill by short-circuiting the motor windings, and accelerates in the opposite direction, until the nominal speed reaches again.

Change CW/CCW input signal after motor had stopped completely.

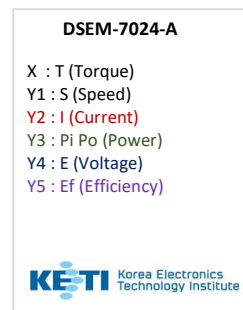
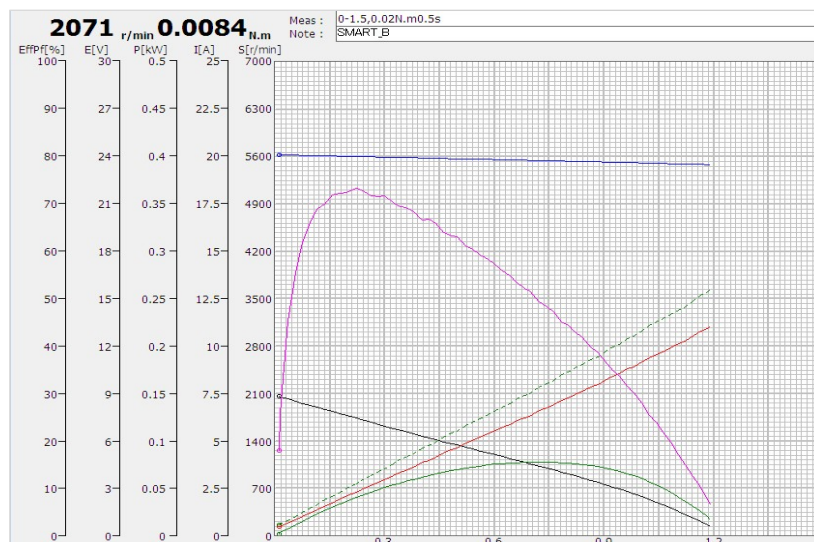
If you change the CW/CCW signal during motor running, there is a danger of the damage of electronic parts inside motor.

**Set value speed**

Speed control

**Driver protection**

| No                     | Specification | Note   |
|------------------------|---------------|--|
| 1 Current limit        | 3.5 [A] Typ   |  |
| 2 Thermal shutdown     | 160±10 [°C]   | When the driver IC reaches the defined temperature, the motor current automatically cuts off.<br>The highest rating temperature of IC is 160 [°C]<br>Component reliability can't be ensured when motor is used in exceeded 160 [°C].<br>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.<br>The motor restarts by power supply reset.   |

**T-I, T-N curve**

This performance is the actual load test data measured by Korea Electronics Technology Institute in July, 2017.

**Product safety**

1. Locked motor
2. Circuit Protect

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

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]

