

Hardware Manual

EC042B IDEA[®] Motor Series



Contents	Page
Revision History	2
Introduction	2
Drive Specifications	3
Engineering Drawings	3
Basic Wiring Diagram	4
Accessories	4
Digital I/O Pin Descriptions	4
Digital I/O Power Supply	4
Digital Output Wiring Examples	5
Digital Input Wiring Examples	5
Motor Power Supply Considerations	6
Motor Mounting / Installation Precautions	6
Precautions Coupling Mechanical Load To Motor	6

Revision History	
Date	Description
January 2017	Initial Version
June 2018	Updated Manual

Introduction

This manual is intended to provide basic hardware installation specifications and instructions for the AMETEK EC042B IDEA® Motor. For detailed information on the use and programming of the IDEA® Motor, please refer to the IDEA® Drive user's Manual. For detailed information on the RS485 communications command set, please refer to the IDEA® Drive Communication Manual. Manuals are available for download at www.HaydonKerkPittman.com

Models Covered by This Manual

This manual covers the following models listed in the table below:

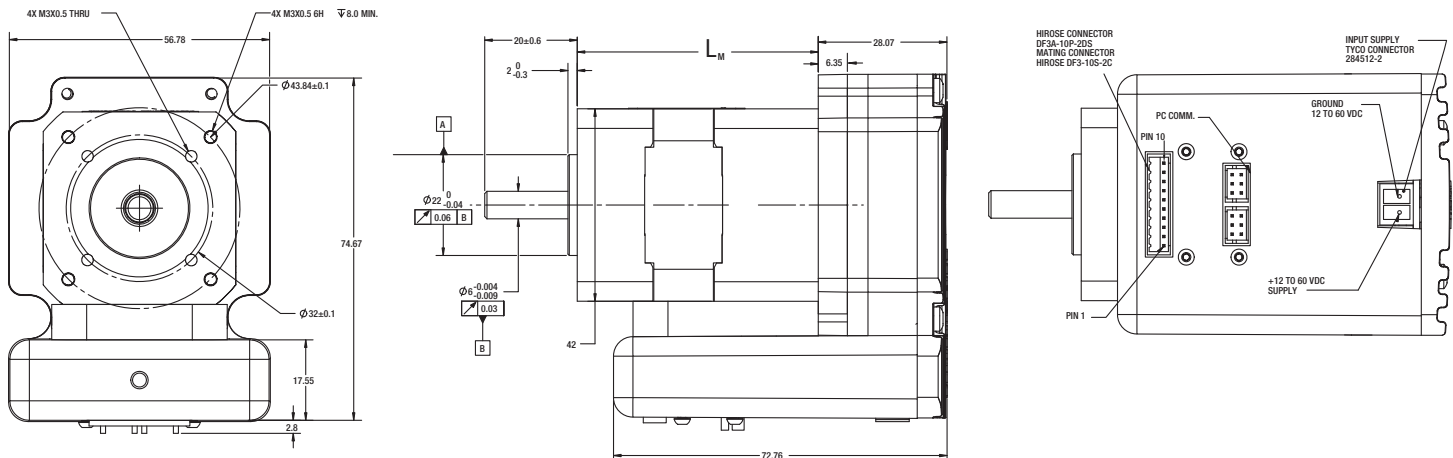
Models								
Part Number	Com Option Type	Input Voltage VDC	Motor Holding Amp*	Motor Holding Torque*		Motor Peak Amp**	Motor Peak Torque**	
EC042B-10MP-91x	RS485	12-60	1.4	0.06 Nm	8.2 oz-in	4.8	0.20 Nm	28.0 oz-in
EC042B-20MP-91x			2.7	0.12 Nm	16.0 oz-in	9.6	0.40 Nm	55.0 oz-in
EC042B-30MP-91x			3.8	0.15 Nm	21.0 oz-in	14.0	0.56 Nm	79.0 oz-in

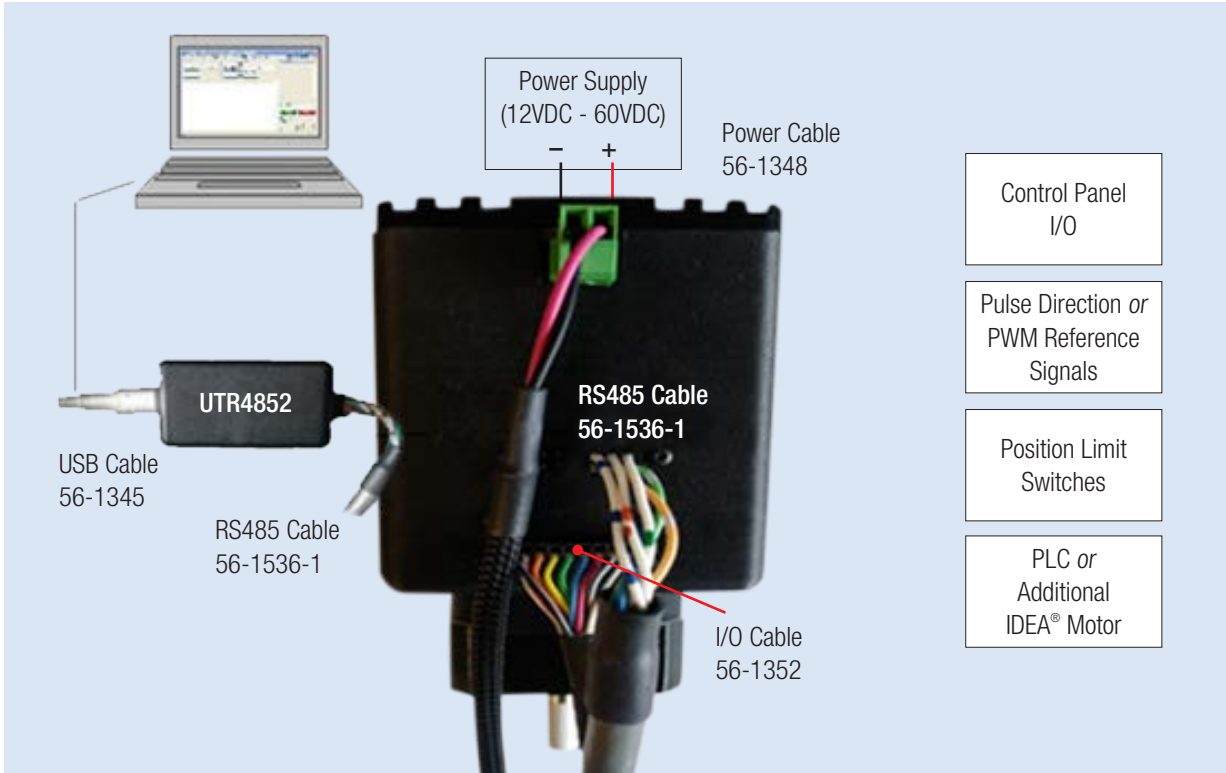
*Specified at a maximum motor case temperature of 80C

**Specified at a maximum 1 second duration and a maximum motor case temperature of 80°C

Drive Specifications	
Attribute	Value
Absolute Maximum Drive Input Voltage Range	9 – 70 VDC
Recommended Drive Input Voltage Range	12 - 60 VDC
Maximum Input Drive Current Continuous	7.0 Arms
Maximum Input Drive Current Peak	10.0 Apk (1 sec)
Motor Type	3 Phase Brushless
Commutation Type	Sinusoidal with Hall Cell Initialization
Type of Ramping	Trapezoidal S-Curve
Communications	RS485 (6 pin connector)
Digital I/O Voltage Range	5 - 24 VDC
Digital Inputs	4
Digital Sinking Outputs	4
Digital Output Maximum Sinking Current	200mA (each)
Digital Input Maximum Current	8mA (each)
Maximum Temperature	70°C (Measured at heat sink)
Program Storage Size-Type	85 Kbytes-Flash
Maximum Number of Stored Programs	85, Referenced by 10-character program names
Position counter range	64bit
Interrupt sources	4 inputs (rising, falling or both edges), internal position counter internal position error internal overcurrent duration

Engineering Drawings





Accessories

Name	Part Number
I/O Cable	56-1352
Power Cable	56-1348
USB Cable	56-1346
RS485 Cable	56-1536-1
USB to RS485 Converter	UTR4852
Motor/Drive	EC042B-x0MP-91x

Digital I/O Pin Descriptions

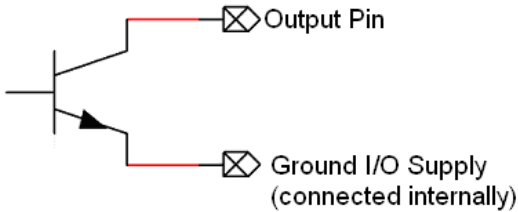
Pin Position	Description	Notes
PIN 1	GROUND I/O SUPPLY	5 to 24 VDC
PIN 2	+I/O SUPPLY	5 to 24 VDC
PIN 3	INPUT 1	
PIN 4	INPUT 2	
PIN 5	INPUT 3	
PIN 6	INPUT 4	
PIN 7	OUTPUT 1	
PIN 8	OUTPUT 2	
PIN 9	OUTPUT 3	
PIN 10	OUTPUT 4	

Digital I/O Power Supply

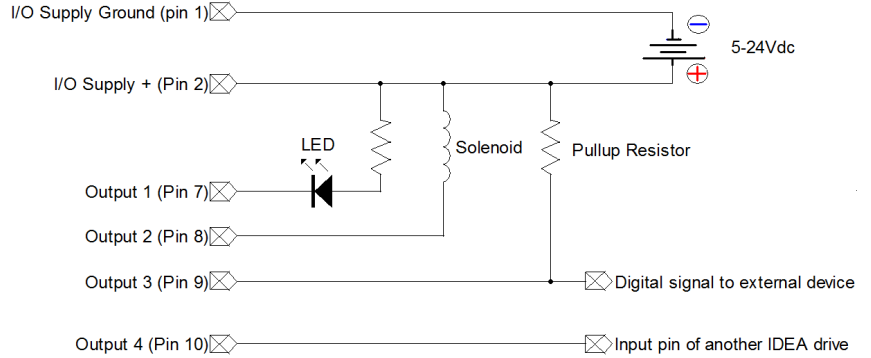
The IDEA® Drive contains four galvanically isolated inputs and four galvanically isolated open-collector outputs used for logic control. A separate power supply with a voltage range of 5.0 -24.0 VDC is necessary to power the I/O circuitry. The same power supply may be used to power both the motor and I/O circuitry if the power supply voltage is guaranteed not to exceed 24.0 VDC maximum.

Digital Output Wiring Examples

The logic control open collector outputs cannot source current but can only sink current. Therefore, the outputs require a pull-up resistor tied to the positive voltage of the I/O supply if a high-level output voltage is required.



Output low level voltage @ 16ma sink	1.0 V	max
Output sink current	200 mA	max
Output response time 0 -> 16 mA	10 msec	max

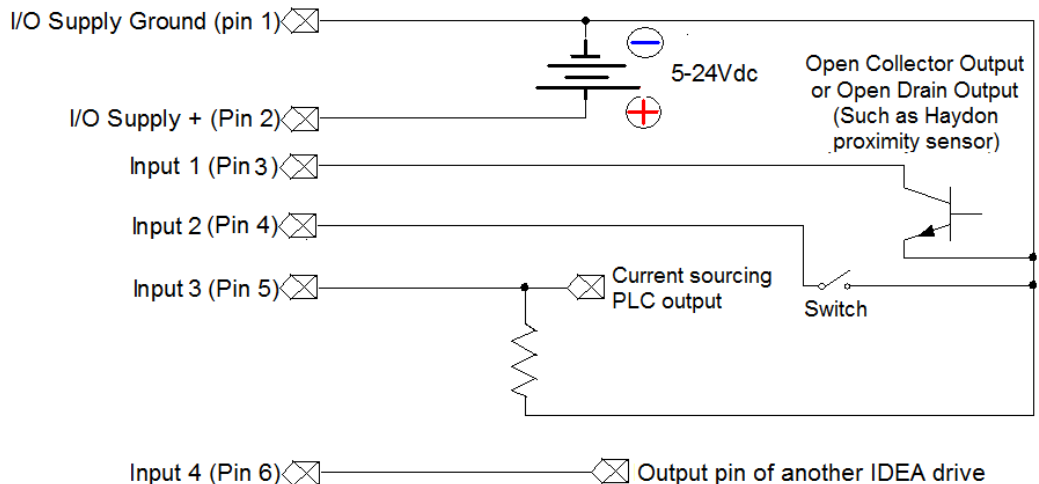
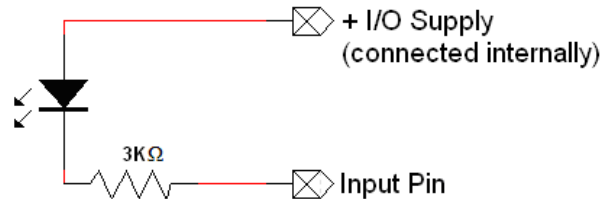


Digital Input Wiring Examples

The logic control inputs can operate from a push-pull driver (driver can source and sink current) or open collector driver (driver can only sink current). A switch or contact can also drive the input by connecting one side of contact to the drive input signal, and the other side of the contact to the I/O power supply ground. In this configuration, an open contact is logic high, and a closed contact is logic low.

When an input is connected to a mechanical switch or relay, a phenomenon called “bounce” can occur. When the switch contact closes, the switch contact may mechanically bounce for a small duration of time, resulting in an electrically noisy signal. When a switch contact is opened, electrical arcs may occur on the contact when interrupting current flow. If an input is configured as an interrupt, mechanical contact bounce or arcing may cause multiple false interrupts to occur. It is recommended solid state devices or a switch with de-bounce circuitry is used to connect to the drive inputs if input interrupts are utilized.

Input high level (leakage current)	50 uA	max
Input low level (sink current)	500 uA	min
Input response time (0 -> 8 mA sink)	1 msec	max



Motor Power Supply Considerations

The IDEA® Motor input operating voltage range extends from 12 to 60 VDC. The maximum achievable motor torque and speed are dependent on the power supply voltage and current ratings provided to the motor. In general, the motor maximum achievable rotational speed is proportional to the power supply voltage rating, and motor maximum torque is proportional to the power supply current rating. Reference the IDEA® Motor catalog page for power supply voltage and current ratings required to achieve the motor rated torque and maximum achievable speed.

A good servo power supply can accurately regulate the supplied voltage when either supplying or absorbing large peak currents for short durations. Servo motors typically require the power supply to source high peak currents to achieve sufficient motor torque to rapidly accelerate the motor. The power supply must also sink large peak currents and absorb power from the motor to brake the motor and precisely control the rate of deceleration.

Power supplies with large bulk capacitor banks tend to perform well in servo applications, since the capacitors provide a large local well of electrical charge that can naturally supply or absorb peak currents for short durations without significant disruptions to the power supply output voltage. Linear type DC power supplies typically contain large capacitor banks to sufficiently filter and smooth the AC mains rectified voltage. Small and economical switching power supplies typically contain significantly less bulk capacitance than linear supplies. Switching supplies may have reduced ability to regulate voltage when absorbing power, and may even be damaged depending on the quality and response time of the control scheme used in the switching supply to regulate the output voltage.

The amount of peak energy the supply must deliver or absorb is dependent on the mechanical inertia, the mechanical load, the peak operating velocity, and the maximum acceleration and deceleration rates. Larger inertia and velocities require more peak energy to rapidly accelerate and decelerate the motor. The power supply of choice should be tested in the system under worst case conditions to ensure voltage regulation is maintained within the input operating range of the motor, that the power supply ratings are not exceeded, and that system performance specifications are met. Reference IDEA® Drive Regeneration Protection Application Note for additional information.

Motor Mounting / Installation Precautions

- Reference the motor mechanical outline drawing for mounting bolt circle pattern dimensions located on the motor face. Avoid exceeding the mounting bolt recommended torque specified on the outline drawing when mounting the motor.
- Mount motor face onto flat smooth rigid surface. Provide good ventilation when mounting the motor inside an enclosure, providing at least 1" of clearance on all sides of the motor. Motor surface temperature may approach 100C when the motor is operated at maximum output

power, in a still air environment, mounted on a surface with poor thermal conductivity. Providing cooling to the motor such as forced air, or a thermally conductive mounting surface, will increase motor reliability and expected life.

- Consider accessibility of the electrical connectors when mounting the motor.
- Avoid mounting the motor above other system components which radiate heat.
- Avoid subjecting the motor to high vibration or mechanical shock.
- Motor is rated for IP20 classified environments. Mount motor in clean, dry, indoor environment surrounded by breathable air. Provide protection against contact with environmental contaminants such as liquids, mists, caustic vapors, condensation, salt, dust, grease, grime, etc.

Precautions Coupling Mechanical Load To Motor

- Carefully consider the load rating, maximum permissible backlash, and the tolerance to shaft-to-shaft misalignment when selecting a connecting element to couple the motor shaft to the mechanical load. Shaft to shaft misalignment may result in excessive vibration, noise, and reduced motor mechanical life.
- Consider light weight coupling components which minimize total system inertia to obtain the best system dynamic response. Select couplings with high torsional stiffness and good vibration damping to minimize mechanical settling time.
- Minimize thrust and side loads when coupling the load to the motor shaft. Mount belts and pulleys close to the motor face to minimize leverage moment arm forces on the motor shaft. Ensure belt tightening on pulleys does not exceed the maximum side load force rating of the motor. Ensure that thrust load motor ratings are not exceeded when mounting the motor in a vertical orientation.
- Consider coupling attachment durability over time. Keys and set screws may be prone to loosening when the load is subject to shock, vibration, temperature expansion cycles, or rapid changes in direction, which may result in increased slippage and backlash over time. A clamp style shaft attachment on the coupling may provide better durability for these situations.