



MA34000 Series

HARDWARE INSTALLATION MANUAL



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1.0 Overview of the MA34000

The MA34000 is an integrated motor/driver package heavy duty NEMA34 mounting package. The MA34000 contains all the control elements necessary for operation and speed control. This series incorporates a single quadrant drive with closed loop velocity control via the motor's internal Hall sensors. Single switch PWM techniques are employed with a fixed frequency modulator. The frequency used is dependent on the type of output devices used and is a function of the bus voltage for the particular model. Generally, DC powered units are 25 kHz, AC powered units are 10 kHz.

There is no regenerative or dynamic braking capability. AC powered units have a bridge rectifier input, DC powered units have a single blocking diode for polarity protection. **Internal DC operating voltages are derived directly from the power bus without isolation. Consequently, especially with AC powered units, care must be taken with regard to the voltage potential between "Signal Common" and "Earth Ground".**

The user merely has to provide AC or DC power (depending on model) and external switches, a potentiometer, etc. as needed for the application.

The drive controls the load (motor) in one direction – the MA34000 series is ***NOT*** designed for instantaneous reversing. If direction needs to be changed, the motor has to come to a complete stop before the direction input can be changed.

These "standard" series of motors are available in different lengths and rated power from 165 watts (0.22 Hp) to 700 watts (0.94 Hp) at speeds of 1750 and 3450 RPM. "Special" models are also available.

The desired speed can be set via an analog signal input (0 to 5 vdc), externally connected potentiometer or pre-set fixed speed through internal resistor values.

This motor family is suited for continuous operation. This family is fully enclosed and they can deliver high protection class **IP50**. This higher power density and compact design grants the use in numerous applications at a convenient cost/performance ratio.

This motor family can be combined with planetary, spur or worm gears with a multitude of fine tuned gear ratios. Standard windings for 24 Vdc, 48 Vdc, 120 and 230 Vac are available for this drive. Special windings for adjustment of operating point to the operating voltage are available on request. Depending on the functional range of the electronic control unit, different connection alternatives are available.

2.0 Features

- Single Supply operation - 24 or 48 Vdc or Single phase 120 or 230 Vac (depending on model)
- Compact design – Driver portion (3.80 in square x 2.75 in deep).
- Convection cooled in most applications, provision for through shaft and optional fan
- PWM clock frequency 25 KHz for DC version and 10 KHz for AC version.
- Hall feedback control.
- 120 degree hall commutation.
- Internal power supply for the motor's Hall Effect sensors.
- Speed Command option, via external potentiometer **or** external 0-5 Vdc command **or** factory set.
- Direction of rotation option, via on board jumper **or** externally controlled.
- External INHIBIT (/ENABLE) input.
- Speed Monitor output (square wave output).
- Fault Protection for Locked Rotor, Undervoltage, Commutation failure, Overtemp.(optional)
- /FAULT (READY) monitor output.
- External fault reset.

3.0 Installation Instructions

3.1 Safety

Read the complete manual before attempting to install or operate the MA34000 series. By reading the manual you will become familiar with practices and procedures that allow you to operate these motor/drives safely and effectively.

As a user or person installing these integral motor/drives, you are responsible for determining the suitability of this product for the intended application. MCG is neither responsible for nor liable for indirect or consequential damage resulting from the inappropriate use of this product.

3.1.1 Safety Guidelines

Electrical shock and hazards are avoided by using normal installation procedures for electrical power equipment in an industrial environment.

- Electrical hazards can be avoided by connecting power last and disconnecting power first.
- Make sure motor case is tied to earth ground.
- Always remove power before making any connection to the drive.
- DO NOT make any connections to the internal circuitry. Connections should be made only to appropriate connectors.
- DO NOT use the ENABLE input as a safety shutdown. Always remove power to the drive for safety shutdown.
- DO NOT spin the motor without power. The motor acts like a generator and will charge up the power capacitor through the drive. Too high a speed may cause over voltage breakdown in the power internal power devices. Note that the drive having an internal power converter that operates from the high voltage will become operative.

WARNING

Voltage potential inside the drive is the same as the DC power supply or rectified AC voltage. All internal circuit should be considered "hot" when power is present.

Caution

*The Unit should be only connected up skilled personnel.
Incorrect wiring can lead to overheating, damage to the PCB or malfunction.*

For leads length in excess of 6.5 ft (2 m), the Power supply and signal leads must be cabled separately. Other leads that emit interference should be also separated.

DC Supply leads should be sized appropriately for the maximum output current of the drive and should be kept as short as possible. Long leads should be oversized to reduce voltage drop and should be twisted.

Warning

AC supply voltage will destroy the DC input drive models.

Warning

*Ensure that the power supply voltage is switched off before carrying out the electrical connection.
Otherwise overheating, destruction of the circuitry, or malfunctions could occur.*

3.2 Warranty

The MCG MA34000 has a one-year warranty against defects in material and assembly. Products that have been modified by the customer, physically mishandled or otherwise abused through mis-wiring, incorrect switch settings and so on, are exempt from the warranty plan.

3.3 Unpacking the Drive

1. Remove the drive from the shipping carton and remove all packing materials from the drive. The materials and the carton may be retained for storage or shipment of the drive.
2. Check all items against the packing list. A label located on the side of the drive identifies:
 - Model number
 - Serial number
 - Manufacturing date code

3.4 Inspection procedure

To protect your investment and ensure your rights under warranty, MCG recommends the following steps are performed upon receipt of the drive:

1. Inspect the drive for any physical damage that may have been sustained during shipment.
2. Perform procedures described in section 3.4.1 before storing or installing the servo drive
3. If you find damage, either concealed or obvious, contact your purchaser to make claim with the shipper. Contact your distributor to obtain a Return Material Authorization (RMA) number. Do this as soon as possible after you receive the drive.

3.4.1 Quick Test Process for “standard” models (process may vary for “custom” models)

A quick operational test can be performed as follows:

1. Jump connector pins 1 to 4
2. Jump connector pins 2 to 5
3. Connect AC or DC Power depending on the model
4. Motor should run in CW direction with speed approx 10% above model’s rated speed.

3.5 Mechanical Installation

Install the MA34000 onto a firm base by inserting screws into the four holes in the mounting surface located in the front of the motor. See the following dimension drawings for location of mounting holes.

- The MA34000 can be mounted in any position.
- Surrounding air temperature can be from 0 C to +45 C.
- Prevent liquid from dripping onto the MA34000.
- Avoid environments that are humid or that have corrosive gas.
- Avoid locations near radioactive matter, flammable material, or by equipment that emits electromagnetic interference (EMI).
- Avoid mounting the MA34000 to a surface that experiences excessive vibration.
- Mount the drive in an enclosure providing protection to IP54, protected against dust and splashing water, or IP65, protected against water jets and dust free air.
- Allow for reasonable bend radius for cabling
- Ventilation to dissipate the heat generated by the Motor/drive
- The air should also be free of corrosive or electrically conductive contaminants.

4.0 System Connections and Wiring Diagram

The following diagram shows an installation of the MA34000 in a typical system. Your system may vary from this configuration. Typical components used with these brushless drivers include:

- Power supply
- External switches / Pot

4.1 Power Cable

- AC input models – Connect the AC to the BALCK & WHITE wires.
- DC input models – Connect the Positive side to the RED wire and the NEGITIVE side to the BLACK wire

4.1.1 Multiple Axis Power Wiring – For DC Input Models

The DC supply may be common to more than one drive. The power lead from each unit should terminate at the power supply terminals. When multiple units are installed in a single application, caution regarding grounding loops must be taken. Any time there are two or more possible current paths to a ground connection, damage can occur or noise can be introduced in the system.

The following rules apply to all multiple axis installations, regardless of the number of power supplies used.

- Never “daisy chain” any power or DC common connections.
- Use the “star” connection for each servo drive by running separate twisted power supply wires to each power connection on each drive.
- To prevent noise, do not bundle the motor leads with the power supply leads or command leads.
- The DC power supply must be located as close as possible

4.2 Signal (I/O) Cable

The MA34000 has a single plug-in connector (Molex – receptacle – 43025-1000, contacts 43030-0007) for all electrical I/O signal connections.

Fig. 1 shows the location of this connector. The mating connector (Molex – 403020-1000 – male pins 43031-0007) is supplied in the packaging of the MA34000 , but the user must attach wires to that connector.

It is also recommended that the power wires be separate from the shielded cable used for logic connections.

<u>Function</u>	<u>Wire Color</u>	<u>Connector Pin#</u>
Pot +	Red	1
Signal Common	Black	2
Pot -	Wht/Blk	3
Vc	Orange	4
Inhibit (/Enable)	Yellow	5
Direction	Green	6
/Reset	Blue	7
Ready (/Fault)	White	8
Speed Mon.	Brown	9

4.2.1 Pot +, Signal Common, Pot –, VC (PIN 1, PIN 2, PIN 3 and PIN 4)

Refer to section 4.3 for more details.

4.2.2 INHIBIT/ENABLE INPUT - PIN 5 – Setting up the Start and Stop operation

- This input is normally high, pulled up to the internal 7.5V reference (no motion or stop motion), and must be pulled low to allow operation of the MA34000.
- It can be pulled low by either connecting it via a switch to the SIGNAL COMMON (PIN 2), or by connecting it to an open collector output from a PLC or other control device whose signal common is connected to the drive signal common.

Warning

Care must be taken with regard to the voltage potential between “Signal Common” and “Earth Ground”.

4.2.3 DIRECTION INPUT- PIN 6 - Setting up the direction of rotation

- This input is normally high, pulled up to the internal 7.5V reference.
- Factory default Direction of Rotation is CW (input is high) when viewing the motor shaft (working end).
- For CCW rotation, connect the “direction = pin 6” lead to “signal common = pin 2” but **NOT WHILE THE MOTOR IS RUNNING**, or by connecting it to an open collector output from a PLC or other control device whose signal common is connected to the drive signal common.

Warning

Care must be taken with regard to the voltage potential between “Signal Common” and “Earth Ground”.

Note

It is not recommended to change direction while the MA34000 is running. It should be brought to a stop first, and then reversed.

4.2.4 FAULT RESET INPUT – PIN 7 - Resetting after a fault

- Before resetting after a fault, some effort should go into determining and clearing the reason for the fault.
 - Check for seized load.
 - Low input voltage, and, if the model is so equipped, overly high temperature.
- Cycling the power (wait 20 seconds) will re-initiate the start up process and clear any temporary faults.
- Alternatively, fault reset can be attempted by momentarily connecting the “/Reset” line to “signal common”.
- If no obvious problem can be found, there are diagnostic LEDs inside the unit. Contact the factory for assistance with this.

4.2.5 FAULT/READY OUTPUT - PIN 8 – Sensing the drive status

- The fault output is an open drain output.
- READY or (/FAULT) - this output line (open drain) will go low when the drive is experiencing a fault condition. If the drive is operational, this output can be pulled high.

Warning

Care must be taken with regard to the voltage potential between “Signal Common” and “Earth Ground”.

The fault output will switch low (output ON for a fault) to indicate at least one of the following conditions:

1. A shutdown has occurred because there is less than 90 Vac (+/- 5%) applied to the power input of the MA34000 (undervoltage lockout),
2. A shutdown has occurred because of an invalid combination of commutation sensor signals, or
3. A shutdown has occurred because of Locked rotor (stalled motor).

4.2.6 SPEED MONITOR OUTPUT – PIN 9- Sensing Motor Speed

- This line is an output for the HALL A\.
- The frequency of the Hall sensor is proportional to the motor speed.
- Motor speed in RPM can be calculated from the following equation
Motor Speed (RPM) = (Speed Sensor Output frequency (Hz) * 15)

Warning

Care must be taken with regard to the voltage potential between “Signal Common” and “Earth Ground”.

- This output FET’s Drain is pulled high to an internal 7.5V source through a 5.6k resistor and a 1k resistor is between the drain and the output connector pin. Custom configurations are possible.
- It can be connected to an external device to monitor the speed of the MA34000.
- Four pulses are produced for each revolution of the motor shaft.

4.3 SPEED CONTROL

4.3.1 For adjustable speed operation –

An external speed potentiometer can be connected to the drive.

Connect the CW end of a 100K pot to the “pot+ = pin 1” lead, the CCW end of the pot to “pot - = pin 3” and the wiper to the “Vc = pin 4”.

Since the speed pot acts as a voltage divider, the exact value is not critical, but a 100 k ohm potentiometer is recommended and will yield the appropriate voltage range. A schematic diagram for the speed signal input is shown in Fig. x.

Note:

The standard “potential” for the “pot-“ lead is “signal common”. However, if it is desired that the external speed pot be used to adjust over a relatively small range of speeds, special models can incorporate internal resistors on either “side” of the pot so as to limit its range of adjustment.

4.3.2 For full speed operation – running at system base speed

Simply connect the “pot+” lead to the “Vc” lead.

Note:

This will yield a running speed of approx. 10% above the nominal speed. In this mode, to run at the nominal speed, connect a 100k resistor from the “pot + /Vc junction” to the “signal common”.

4.3.3 For adjustable speed with analog command –

Apply positive voltage into the “Vc” lead referenced to the “signal common” lead. 5 volts yields full speed.

Note:

Internal impedance is 25k. So if, for instance, a 10 volt command is desired, install a 25k resistor in series between the command source and the “Vc” input

Warning

Care must be taken with regard to the voltage potential between “Signal Common” and “Earth Ground”.

Optional “Custom” Speed Range - This drive will be optimized at the factory for the OEM desired speed and performance.

5.0 Defective Equipment

If you are unable to correct the problem and the drive is defective, you may return the drive for repair or replacement. There are no field serviceable parts in the drive.

NOTE

To save unnecessary work and repair charges please write a note and attach to the defective drive explaining the problem.

5.1 Return Procedure

To ensure accurate processing and prompt return of any MCG products, the following procedure must be followed:

1. Call your local MCG Rep/distributor to obtain an RMA number.
2. Do not return any goods without an RMA number.
3. Goods received without any RMA number will NOT be accepted and will be returned to sender.
4. Pack the returned goods in the original shipping carton.
5. MCG is NOT responsible or liable for damage resulting from improper packaging or shipment.
6. Repaired units are shipped via UPS ground delivery. If another shipping method is desired, please indicate so on when requesting an RMA number and also indicate this information along with the return goods.
7. information along with the return goods.

NOTE

Do not attempt to return MA34000 or any other equipment without a valid RMA#. Returns received without a valid RMA# will not be accepted and will be returned to the sender.

Pack the drive in its original shipping carton. MCG, Inc. is not responsible or liable for damage resulting from improper packaging shipment.

Ship the drive to:

MCG, Inc.
1500 N. Front Street
New Ulm, MN 56073
Attn.: Repair Department RMA# _____



*Contact your local distributor or call 1-888-624-3478 (US & Canada)
For Customer Service & Technical Support*

Internet: www.mcg-net.com

Email: sales@mcg-net.com