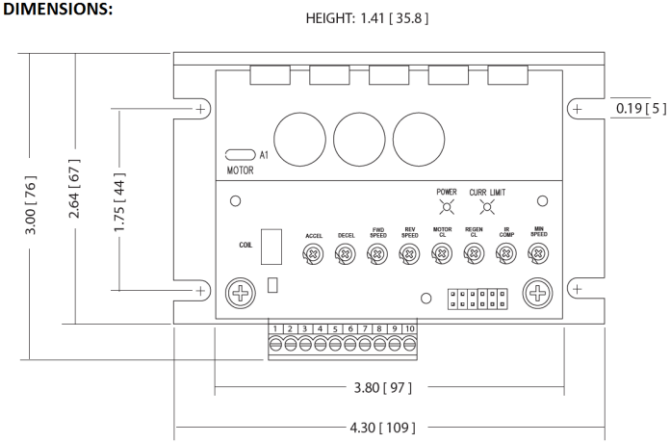
# Model Number: MMP 15A-12.24V

**DIMENSIONS:**




ALL DIMENSIONS IN INCHES [ MILLIMETERS]

**SPECIFICATIONS:**

| | |
|---|---|
| DC Input Voltage (VDC) | 8-32 |
| DC Output Voltage (VDC) | 0-95% of input |
| Continuous Current (A) | 15 |
| 1 Minute Peak Current (A) | 30 |
| Analog Input Voltage Range (VDC) | 0-5 |
| Input Impedance (Ohm) | >100K |
| Ambient Temperature(°C) | 0-55 |

**DESCRIPTION:**

The MMP 15A-12.24V is a PWM regenerative DC drive.
It can brake and/or reverse on-the-fly with no mechanical switches. The drive's regenerative properties allow energy from the motor to be applied back to the battery, thus extending battery life. This control features a daughter card with trim pots to calibrate settings. The drive's microprocessor allows the flexibility to add custom routines or functions for OEMs.

**Speed Control/System Usage Guidelines**

**When installing a motor, gearmotor, motor control or servo amplifier, universally accepted engineering practices should always be observed. Please feel free to refer to MMP's General Tips webpage for general information regarding proper motor, gearmotor, motor control and servo amplifier usage, to help ensure proper performance, and complete satisfaction with your application.**

**STEP ONE: WIRE DRIVE**

A: Connect speed potentiometer (10 k Ohm included) to pins 1, 2, and 3. Pin 1 is the 5 VDC (CW side of speed pot), pin 2 is the input (wiper of speed pot), and pin 3 is the common (CCW side of speed pot). In place of a speed pot to control speed, a 0-5 VDC analog signal can be applied to pins 2 and 3 to control speed. Note that common pins 3, 6, 8, and 10 are at the same electrical potential as the battery (or power supply) negative connected to NEG.

B: Connect optional enable switch to pins 4 and 6. A jumper wire can be used if no enable switch is desired. A NPN open collector output can also be used to control the enable. Close the enable to run, open the enable to coast to a stop.

C: Connect optional direction switch to pins 5 and 6. A NPN open collector output can also be used to control the direction. Close the direction switch to reverse on-the-fly. Leave pins 5 and 6 open if reversing is not required.

D: Connect optional forward inhibit switch to pins 7 and 8 and/or another optional reverse inhibit switch to pins 9 and 10. A NPN open collector can also be used for each of these connections. Open the inhibit to regenerative brake to a stop, close to run. The inhibit inputs also work great for end of travel limit switch inputs to the drive. Activating the reverse inhibit while the motor is in forward direction will have no effect on operation, and vice versa. Pins 7 and 9 can be tied together to create one inhibit, independent of direction. Jumper wires can be used if no inhibit switches are desired.

E: Connect DC motor armature to A1 and A2.

F: Connect DC supply voltage to POS (positive) and NEG (negative). Note polarity, hooking up backwards will cause damage to the drive.
The drive is auto-ranging, meaning there are no voltage switches that need to be preset.

G: Optional. Connect electro-mechanical DC brake to the two terminals labeled COIL on the top board. Polarity does not matter. The voltage to the COIL output is removed after a short delay once the enable input is opened, inhibit input is opened, or speed pot is set to zero. The voltage is reapplied to the COIL output once the drive has that run command reapplied.

For Advanced Wiring Schematics, Please see Page 2.

**STEP TWO: CALIBRATION**

The MMP 15A-12.24V is tested and calibrated at the factory.
Adjusting trim pots may be necessary to fine tune the drive to your motor and application.

**ACCEL:** Sets the time required to ramp up to a set speed. Turning the trim-pot clockwise adds more time.

**DECEL:** Sets the time required to ramp down to a set speed. Turning the Trim-pot clockwise adds more time.

**FWD MAX SPD:** Sets the maximum forward voltage to the motor when the speed pot or external reference signal is set to maximum. Turning the trim-pot clockwise adds more voltage.

**REV MAX SPD:** Sets the maximum reverse voltage to the motor when the speed pot or external reference signal is set to a maximum. Turning the trim pot clockwise adds more voltage.

**MOTOR CL:** Sets the maximum amount of current the motor can draw while running. Turning the trim-pot clockwise allows more current.

**REGEN CL:** Sets the maximum amount of braking current to the motor. Turning the trim-pot clockwise allows more current.

**IR COMP:** Determines the degree to which motor speed is held constant as the motor load changes. It is factory set for optimum motor regulation. Too high (clockwise) of a setting may cause motor oscillation.

**MIN SPEED:** Sets the minimum voltage to the motor when the speed pot or external reference signal is set to a minimum.

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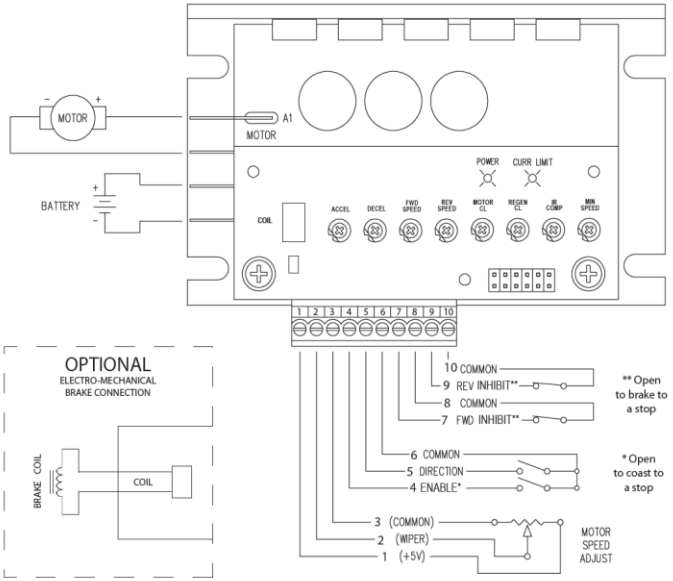
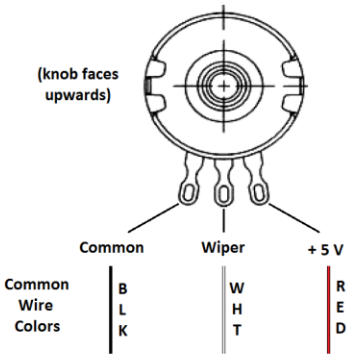
**ADVANCED WIRING:**

# MMP 15A-12.24V

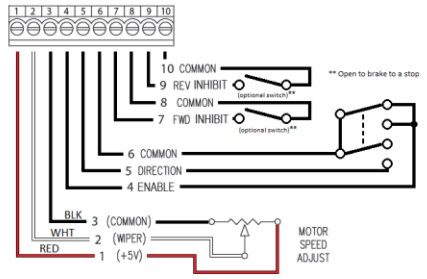



## Potentiometer Wiring Basics

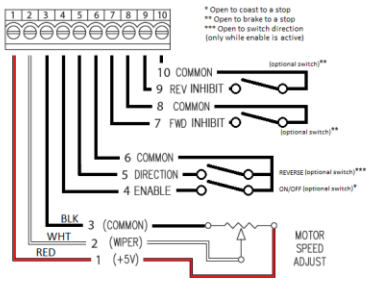



| Position | Wiring Scheme | | | | | |
|---|---|---|---|---|---|---|
| | +5V - Wiper | | Wiper - Common | | +5V - Common | |
| | RED | WHT | WHT | BLK | RED | BLK |
| Full CCW | 10 kΩ | | 0 kΩ | | 10 kΩ | |
| Full CW | 0 kΩ | | 10 kΩ | | 10 kΩ | |
| %Range (CCW – CW) | 0%-100% | | 100%-0% | | N/A | |
| Jumping Simulates | 100% POT | | 0% POT | | N/A | |

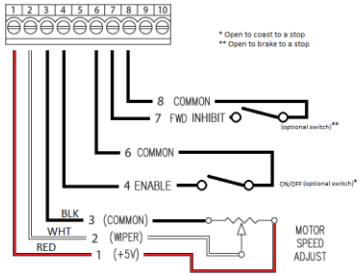
### BI-DIRECTIONAL : DPDT SWITCH



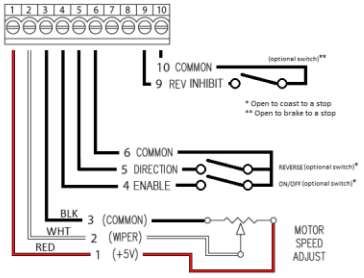

### BI DIRECTIONAL : SINGLE POLE SWITCHES




### FORWARD ONLY




### REVERSE ONLY

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## Drive Connections and Features

Power supply connection

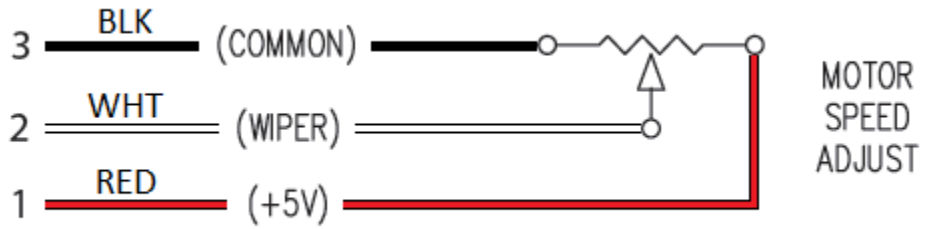
The input connections to the power supply are polarized. Ensure the connections are properly observed. WARNING : irreversible damage to the drive will result if the voltage source polarity is flipped and/or not direct current voltage.

Motor connection

The motor connection is polarized. If the motor leads are reversed this will simply reverse the direction of the motor; no damage to the drive will result.

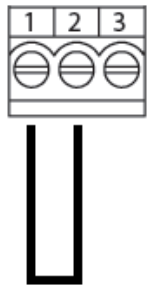
Potentiometer connection

Wire the potentiometer leads to the pin numbers as shown below. Consult the spec sheet for more details.




Connection without a Potentiometer

To run the control at 100% output without a potentiometer connect the +5V (Pin 1) and wiper (Pin 2) together with a short, proper gauge wire as shown below. Leave pin 3 open. This simulates zero resistance, 100% potentiometer output.



Inhibit and enable connections

The inhibit connections are pin connections that are required to run a motor in the direction as shown on the diagram. An optional switch can be installed to give the user the option to brake the motor as quickly as possible.

The enable function must be connected to run a motor in both directions. When disconnected the motor coasts to a stop.

Brake connections

Brake terminals are not polarized; regardless of how the brake is connected it will function properly and cause no damage to the speed control.

Potentiometer setting descriptions (MMP Default Setting)

**ACCEL (CCW/0%)**–Controls the rate of change in motor acceleration. The lower (CCW) the potentiometer is set the faster the motor will accelerate to its command speed.

**DECEL (CCW/0%)**–Controls the rate of change in motor deceleration. The lower (CCW) the potentiometer is set the faster the motor will decelerate to its command speed.

**FWD SPEED (CW/100%)**–Sets the maximum speed the motor is allowed to run while forward speed is engaged in the drive. The higher (CW) the potentiometer is set the higher the speed limit is set.

**REV SPEED (CW/100%)**–Sets the maximum speed the motor is allowed to run while forward speed is engaged in the drive. The higher (CW) the potentiometer is set the higher the speed limit is set.

**MOTOR CL (MID/50%)**–Determines the maximum current the motor can draw while under load. Purpose of this limit to prevent overload in the event the motor becomes stalled. A higher (CW) setting on this potentiometer will result in a higher current limit.

**REGEN CL (MID/50%)**–Determines the maximum current the drive will absorb from regeneration braking. The higher (CW) the potentiometer setting the higher the current limit will be.

**IR COMP (CCW/0%)**–Sends a voltage boost to the motor under load to keep the no load and under load motor speeds as close as possible. If set too high or too low the motor may shake and vibrate. A higher (CW) setting increases the current limit the motor may receive.

**MIN SPEED (CCW/0%)**–Sets the minimum speed the motor may run while the potentiometer is at full CCW position. The higher (CW) the potentiometer setting the higher the minimum speed.

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## Common Issues of Drive Operation

**The drive is powered up and the motor does not run.** Always check the following to ensure the motor is properly connected and drive properly set up.

- **Input Line Power** : Ensure you are receiving power to the drive. If possible, measure the voltage between the L1 and L2 terminals.
- **Motor Functionality** : Run the motor without the servo amplifier, try another motor that is known to function properly, or connect a different power source to the amplifier.
- **Control Signal** : Ensure the drive is receiving a command signal, whether this is from the potentiometer or an external source. Also check that the signal varies as expected.
- **Enable/Inhibit** : Ensure the enable terminal and the inhibit pins of the motor direction are closed.
- **Trim Pots** : Check that the trim pots are all set properly for your specific application. Consult the potentiometer setting descriptions section of this document for further details.

**The drive continues to blow fuses or trip breakers.** Potential causes of this issue include:

- **Motor Grounding :** Ensure the motor has not become grounded to earth. To check this place an ohmmeter between the motor leads and the earth ground. The resistance should be in the MΩ to open levels.
- **Speed Command Signal** : If an external signal is being used ensure the signal is isolated or that the drive has input isolation.
- **Overloading** : Drives that are operated at the current limit for excessive durations can cause the drive to fail. Ensure motor current is monitored to prevent overload as much as possible.

**The motor runs at full speed regardless of potentiometer setting.**

- **Speed Command Signal** : Check that the command signal is not set to maximum. For the potentiometer, ensure proper wiring and that there are no open or shorted terminals or leads.
- **Min speed setting** : Check the MIN SPEED potentiometer settings.

**The motor displays unexpected oscillation or vibration.**

- **IR Comp** : If the IR COMP trim pot is set too high this can cause oscillation. Turn the potentiometer CCW until the oscillation stops.
- **Speed Command Signal** : Ensure the command signal is stable and not susceptible to electrical noise or rapid fluctuations.
- **Change in load** : If the load on the motor changes constantly then this can cause the motor to not run smooth even with IR Comp present. Remove the load from the motor temporarily to verify normal operation.
- **Motor brushes** : Check the brushes and commutator for excessive or uneven wear. If necessary blow out any brush dust. For more information consult the **Commutator Wear Guide** and **Brush Dust Cleaning** documents on our website.
- **Max speed**: Ensure you are not exceeding the maximum voltage of the motor winding. Doing so can cause the motor armature to become unstable.

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**The motor stalls and shows a lack of power.** Ensure the motor you are using is properly sized for your application. If the motor is undersized excessive current may be drawn, causing the motor to stall or the drive to overload. Check Current Limit Pot settings.

**The motor runs opposite of expected direction.** Swap the leads of your DC motor connected to the drive to opposite polarity. WARNING : Do not reverse the drive source leads as this can cause severe, irreversible damage to the drive.