E⚡Motion INC
Ideas that move

OPERATION GUIDE: MC200/MC201
Current Limiting/Reversing Actuator Controller

The MC200 (12VDC) and MC201 (24VDC) current limiting controllers are used to limit force output of DC actuators and motors. Current is range selectable by dip switch, and fine-tuned via potentiometers independently in each direction. The controller can be used in place of, or in combination with, external limit switches.

- 12VDC (MC200) or 24VDC (MC201) versions
- Adjustable current limit or limit switch input for versatility in stop signal
- Single-button or two-button (dedicated direction) start button selectable
- Automatic motor reversing (1 button mode)
- Momentary or maintained input selectable
- Limit indicator and low voltage LED's
- Robust power and motor lugs for high-current connections
- Multi-pin connector with screw terminals for start/stop and limit switch inputs

DIP Switch Selection:

SW1	SW2	
ON	ON	1 BUTTON MOMENTARY
OFF	ON	2 BUTTON MOMENTARY
ON	OFF	1 BUTTON TOGGLE
OFF	OFF	2 BUTTON TOGGLE

Current Range Settings: Note: When SW6 is set to the OFF position, SW4 and SW5 positions are ignored.

SW4	SW5	SW6	MODE
X	X	OFF	0 TO 5A
ON	ON	ON	0 TO 10A
OFF	ON	ON	5 TO 15A
ON	OFF	ON	10 TO 20A
OFF	OFF	ON	15 TO 25A

PWR/AUX Connector:

PIN 1 (Not Used)	PIN 2 (Not Used)	PIN3 (Not Used)	PIN 4 (Not Used)	PIN 5 (Not Used)
AUX1	AUX2	12/24VDC INPUT	GND	AUX3

SIGNAL Connector:

PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9	PIN 10
"IN" SWITCH	SWITCH COMMON	"OUT" SWITCH	IGNITION	"IN" LIMIT SWITCH	"IN" LIMIT SWITCH RETURN	"OUT" LIMIT SWITCH	"OUT" LIMIT SWITCH RETURN	AUX 1	AUX 2

NOTE: AUX inputs are non-functional as of 2/1/2013
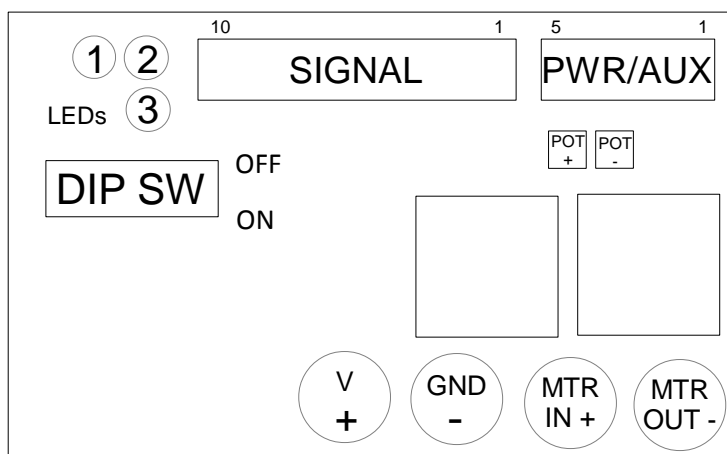
Limit Switch Enable:

SW3	MODE
ON	DISABLED
OFF	ENABLED

Current Sample Settings: (175 ms base):

SW7	SW8	MODE
OFF	OFF	+16 ms
ON	OFF	+80 ms
OFF	ON	+172 ms
ON	ON	+292 ms

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MTR+ = Drive 0 | UP | IN
MTR- = Drive 1 | DWN | OUT
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Operation:

Button Modes:

1. **1 button momentary –**
   A single button or switch is used for actuator/motor control. Holding the button will drive the motor. Releasing the button will stop the and change the direction of movement on the next button press. The direction of the drive on button press is determined by the last direction of movement, limit switch activation, and ignition. (Typically wired from SIG 1 to SIG 2 (COM))

2. **2 button momentary –**
   Two buttons or switches are used for actuator/motor control. Holding the button that is set up for an outward movement will cause the drive to move in the OUT direction. Holding the button that is set up for an inward movement will cause the drive to move in the IN direction. Releasing the button(s) will cause the motor drive to stop. (SIG 1 to COM/ SIG 2 to COM)

3. **1 button toggle -**
   A single button or switch is used for actuator/motor control. Pressing the button will drive the motor even if released. A second button press, current limit, or limit switch input will stop the motor. The next button press will change the direction of movement. The direction of the drive is determined by the last direction of movement, limit switch activation, and ignition.

4. **2 button toggle -**
   Two buttons or switches are used for actuator/motor control. Pressing the button that is set up for an outward movement will cause the drive to move in the OUT direction until a second button press, current limit, or limit switch are reached. Pressing the button that is set up for an inward movement will drive the slide-out motor in the IN direction until a second button press, current limit, or limit switch are reached.

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Limit Switches:

1. **Limit enable/disable –**
   When enabled, if the switch is triggered and the MCU pin connected to the limit switch is pulled high, movement in the direction toward the limit switch is stopped and disabled. You can still move in the opposite direction away from the triggered limit switch.

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Current Modes:

1. **0 to 5A Range –**
   When this mode is set, the potentiometers will allow tuning for current limits on each direction between 0 and 5A, in .5 amp increments.

2. **0 to 10A Range -**
   When this mode is set, the potentiometers will allow tuning for current limits on each direction between 0 and 10A, in 1 amp increments.

3. **5 to 15A Range -**
   When this mode is set, the potentiometers will allow tuning for current limits on each direction between 5 and 15A, in 1 amp increments.

4. **10 to 20A Range-**
   When this mode is set, the potentiometers will allow tuning for current limits on each direction between 10 and 20A, in 1 amp increments.

5. **15 to 25A Range-**
   When this mode is set, the potentiometers will allow tuning for current limits on each direction between 15 and 25A, in 1 amp increments.

Current sample time is extendable for applications in which a longer motor inrush condition is present.

1. +16ms—This setting extends the inrush current delay by 16ms and increases the time in which current must be over limit to 16ms.

2. +80ms—This setting extends the inrush current delay by 80ms and increases the time in which current must be over limit to 80ms.

3. +172ms—This setting extends the inrush current delay by 172ms and increases the time in which current must be over limit to 172ms.

4. +292ms—This setting extends the inrush current delay by 292ms and increases the time in which current must be over limit to 292ms.

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Fault States:

1. **Under Voltage –**
    An under voltage state occurs when supply voltage drops below   .5 VDC (MC200) or below
    1   VDC (MC201) for more than 175ms.
    When this fault is triggered, motor drives will be stopped and disabled, and the LED in position
    1 will turn on red. This fault is cleared when the voltage returns to over 9.0 VDC or 1 .5 VDC.

2. **Over current – (adjustable current limit)**
    a. **Over Limit for MTR IN:**
        An over current limit fault will occur if the current is over the set limit after 175ms (MC200)
        or 240ms (MC201) of the motor being driven in the IN direction. The MTR IN limit can be
        tuned by using the DIP switches to select a general range and then using the potentiometer
        to fine adjust within that range. When the fault is triggered, the motor in the IN direction will
        be stopped and disabled and if in 1 button mode, the direction will be changed for the next
        button press. When tripped, the LED in position 2 will turn on red. This fault is cleared
        on next button press. Note: Current sample time may be increased, see settings above.

    b. **Over Limit for MTR OUT:**
        An over current limit fault will occur if the current is over the set limit after 175ms (MC200)
        or 240ms (MC201) of the motor being driven in the OUT direction. The MTR OUT limit can be
        tuned by using the DIP switches to select a general range and then using the potentiometer
        to fine adjust within that range. When the fault is triggered, the motor in the OUT direction will
        be stopped and disabled and if in 1 button mode, the direction will be changed for the next
        button press. When tripped, the LED in position 2 will turn on red. This fault is cleared
        on next button press. Note: Current sample time may be increased, see settings above.

3. **Limit Switch –**
    a. **Limit Switch IN:**
        The motor moving in the IN direction will engage Limit Switch IN. When engaged,
        movement is disabled for the IN direction and the LED in position 3 will turn on red.
    b. **Limit Switch OUT:**
        The motor moving in the OUT direction will engage Limit Switch OUT. When engaged,
        movement is disabled for the OUT direction and the LED in position 3 will turn on green.

        NOTES:

        - Controller is designed to be used with a single motor or actuator.
        - Ignition input may be used to disable "OUT" when energized.
        - Limit switches and start/stop inputs need not be powered. Contact closure is all
          that is required, completing the circuit from the board back to the input.
        - Version 1.4 & later- In the event of a current limit being reached, the motor/
          actuator must be reversed before the original direction can be activated again.