CarouselUSA

MC3 Motion Control System

MC3 Enclosure Hardware Manual

Revised 7/30/2019

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1. Being prepared on the day of installation

As an OEM, Carousel USA is responsible for the installation of our equipment only and cannot perform electrical work during our installation process.

MC3 Installations require TWO conduits running from the control enclosure into the turntable pit.

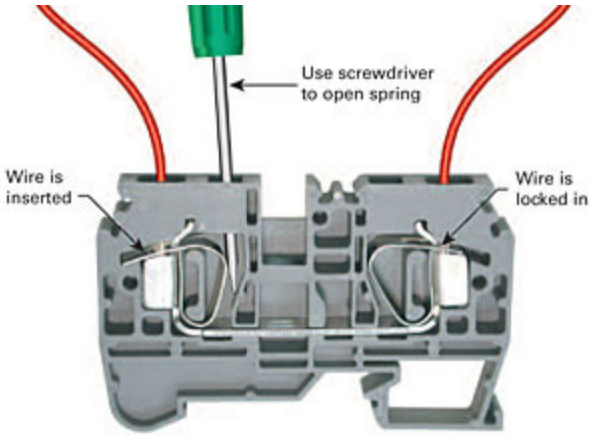
1. One conduit will be used to carry motor power.
2. One conduit will be used to carry data signals.

A. Required: Have an electrician on site during the day of installation

An electrician is required during the day of installation.

They are responsible for the following tasks:

1. Mounting the MC3 enclosure to the wall.
2. Provide incoming power into control box, including penetration of enclosure. Many installations are unique, but typically this incoming power requirement is Single phase 220V + neutral line with 8A supply.
3. Size and supply motor power wire. Typical installation uses no more than 2hp motor. The motor power 3Φ 220V is supplied from the VFD.
4. Fish the power wire from the enclosure to the turntable motor.
5. Land the power wires onto the terminal blocks or VFD.
6. Land the power wires onto the motor ensuring that the motor is wired for the appropriate voltage operation.
7. Size and supply data signal wire. Typical installation requires 5 conductors carrying 24VDC 50mA Signal. It's ultimately the responsibility of the electrician who is versed in local electric code to size the wires but we typically see that 18awg conductors more than suffice. A multiple conductor data cable has been proven to provide best performance, shielding is typically not required but may provide beneficial signal protection.
8. Fish the data wire from the MC3 enclosure to the gray plastic junction box in the turntable pit. Supply 1/2" trade size cord grip as needed.
9. Land the data wires into the MC3 enclosure and the junction box. The details that follow, and/or our technician can help identify the appropriate positions. The MC3 enclosure uses spring clamp terminal blocks. These require the use of a small flathead screwdriver to land the signal wires. See the illustration below.



B. Required: Provide controller computer

Our technician will install software on your Mac or Windows PC that is used to control the turntable. Please have a computer ready and on the network during the day of installation. Some of the software will be registered to that computer alone, so be sure to prepare a device that is intended to be used in the final installation to prevent needing to authorize at a later date.

C. Required: Provide and Run Ethernet to control panel location

The preferred way to join the MC3 system is to run an Ethernet cat5e cable from a network switch to the MC3 enclosure. This can be done on a temporary basis

D. Recommended: Provide advanced notice of camera model for photography installations

The shutter release for the camera connects to the system via a thin black cable. The end of the cable has a generic female plug. We request the model of the camera in advance so we can supply the correct end fitting at the time of installation. Otherwise we will ship the camera connector at a later date.

E. Recommended: Have an IT professional on site during the day of installation

i. Help get networking wired

The PLC needs to be physically wired into the same network on which your controlling PC is located. Run an Ethernet cable from a switch into the port located on the outside of the controller enclosure. A third party IT professional may be able to set up a wireless access point to serve as a bridge and connect the MC3 system to the network wirelessly.

ii. IP Address

With most networks the PLC will assign itself an IP address automatically upon connection. While it tries to remain fixed, the IP address of the MC3 controller can change if there is a power loss or other server interruptions. This may cause delays as manually searching for the new IP can take time.

A third party IT professional can set up the network to consistently assign an IP address to the PLC to help reduce the need for the following steps in the future. They will need to log into the router providing DHCP and pair the Mac Address of the PLC to a specific IP.

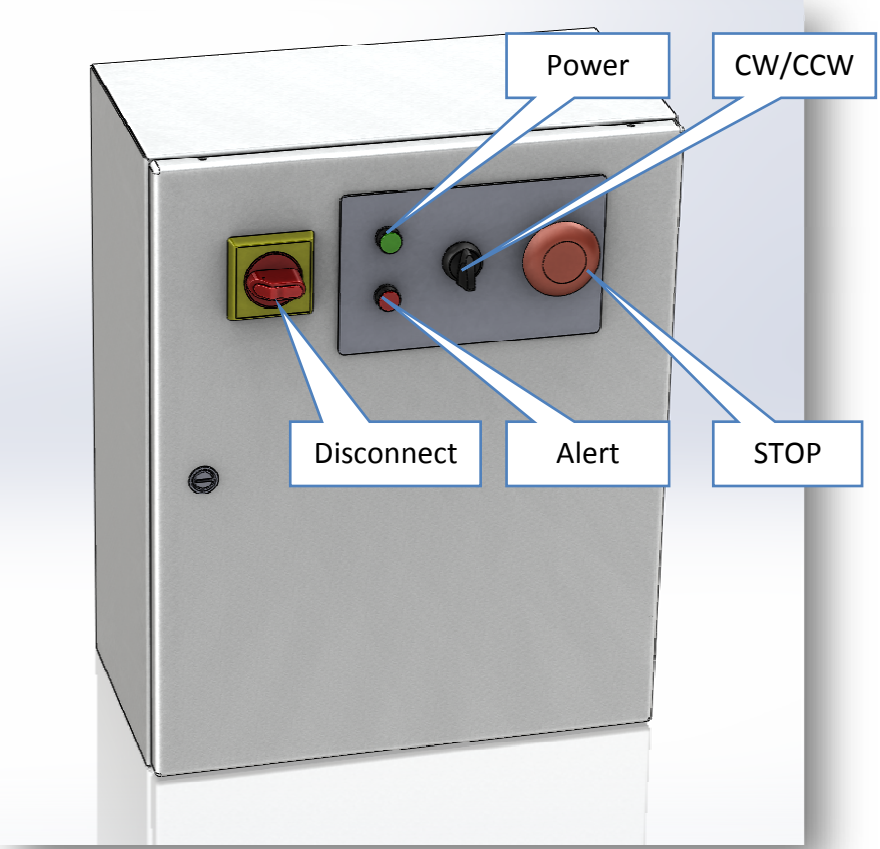
2. MC3 External Layout

The electronic equipment that drives the standard MC3 system is mounted in a light gray powder coated steel enclosure.

A. Basic Operation

Use the **CCW/CW** switch to move the turntable as desired. If constant movement is desired press **Power+CCW/CW** to latch the command. The turntable will move constantly until the **Alert** or **Stop** button is depressed.

B. Front Panel Interface



iii. Lockable Disconnect

The MC3 enclosure features a disconnect switch with multiple features.

- When it is set to the ON position, the panel is powered up and the enclosure cannot be opened.

- Or if set to the off position, the switch features a tab that can be pulled out which prevents the enclosure from opening. A padlock can be inserted through the tab to prevent users from activating the switch as well. If the tab is pushed back in the enclosure can be opened freely.
- **CAUTION, the following to be performed by authorized personnel only:** To circumvent this mechanical interlock and power up the system with the door open (Often necessary when troubleshooting), turn the system off, open the enclosure then use fingers or a tool to carefully switch the oval shaped disconnect on.

iv. Power

The device labeled power functions as both an indicator light and a pushbutton.

Illumiating Solid: The green power light illuminates solid when the low voltage system is reporting power and is booted up.

Slow Blink: The indicator will blink when the turntable is in motion.

Pushbutton: Serves as a "shift" key to alter other commands. Specifics of use are defined in the command button sections below.

v. Alert

Solid: The red alert light will illuminate solid when there is a communication fault with the VFD. Contact Carousel USA if this problem occurs.

Slow blink: VFD FAULT A slow blink indicates that the VFD has experienced a fault. This may range from insignificant to a severe problem. Contact Carousel USA if a fault is persistent and prevents proper use of the equipment. Resetting a fault is covered in the JOG command section below.

Fast blink: E-STOP ENGAGED A fast blink indicates that the E-Stop is engaged. Reset the E-Stop by twisting it clockwise and pulling out.

Pushbutton: **STOP** A momentary push of this button will trigger a stop command. The turntable will decelerate to a stop. Other than using the PC based controls, this is the preferred way to stop the turntable if there is unintended movement.

This key also serves as a "shift" key to alter other commands. Specifics of use are defined in the command button sections below.

vi. Mushroom Stop Button

The Mushroom stop button is meant to be used in a more severe stopping situation where the table should stop immediately. For "everyday" stopping, either use the digital PC controller or push the "Alert" button on the panel.

vii. CW/CCW Switch

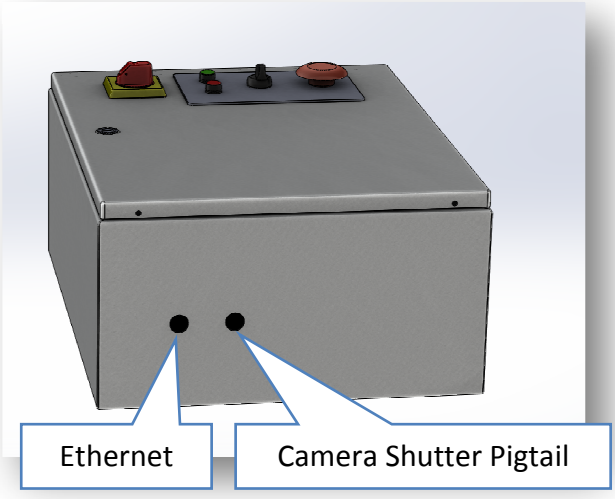
The jog device is a momentary spring to center 3 position selector switch. When in the vertical position the switch is not sending any commands to the controller. If rocked into the CW or CCW position, the table will accelerate to a preset jog speed then decelerate to a stop when released.

"Power" + CW/CCW Function: LATCHING When the "Power" button is held down, it acts as a "shift" key. Pressing and holding the button while rotating the selector CW will instruct the table to rotate CW continuously (called a latching mode). This motion can be stopped with the "Alert" pushbutton, or any other means. Shift+CCW will operate in the same manner in the opposite direction.

"Alert" + CW Function: RESET FAULT After a power fault or other minor fault, the alert pushbutton may display a slow blink. This indicates that the VFD is faulted. The system can be instructed to clear the fault by pushing and holding down ALERT + CW. A fault may indicate a serious problem so the use of this command is to be done carefully.

C. Bottom Ports

After an electrician finishes punch outs and wiring the enclosure there will be a number of other conduits (Incoming power, outgoing motor, outgoing data). However the enclosure will ship with two ports already located on the bottom.



viii. Ethernet

The ethernet port allows for communication between a PC or MAC and the MC3 system. The ideal setup is to plug the enclosure into an existing network that the operating computer has already joined (via ethernet cable or wifi). The network connection is hardwired and will operate using cat 5e cable (or better).

An IT professional may be able to use a typical off-the-shelf **network bridge** to connect the MC3 wirelessly to the network, however the setup for such a system is outside of the scope or support that Carousel USA offers.

ix. Camera Shutter Pigtail (Photography installations)

The slim black cable features a Female 2.5mm jack. A connector will plug into the jack and allow the MC3 system to control a the shutter release of the camera.

Note: *Full details for camera setup and use are included in the CUSA360 User Manual.*

3. MC3 Internal Layout

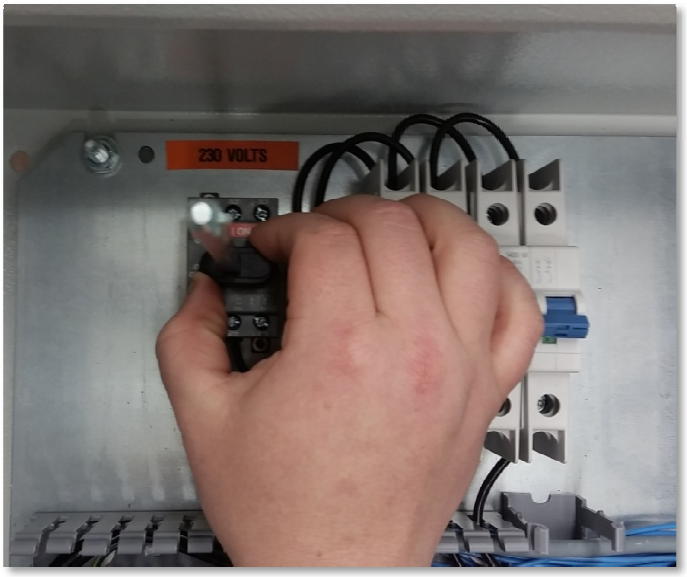
Full bill of materials and schematics are available at as requested. A representation of the terminal blocks at the bottom of the MC3 is illustrated below for reference by relevant parties.

A. Opening the enclosure

Turn Off Main Power

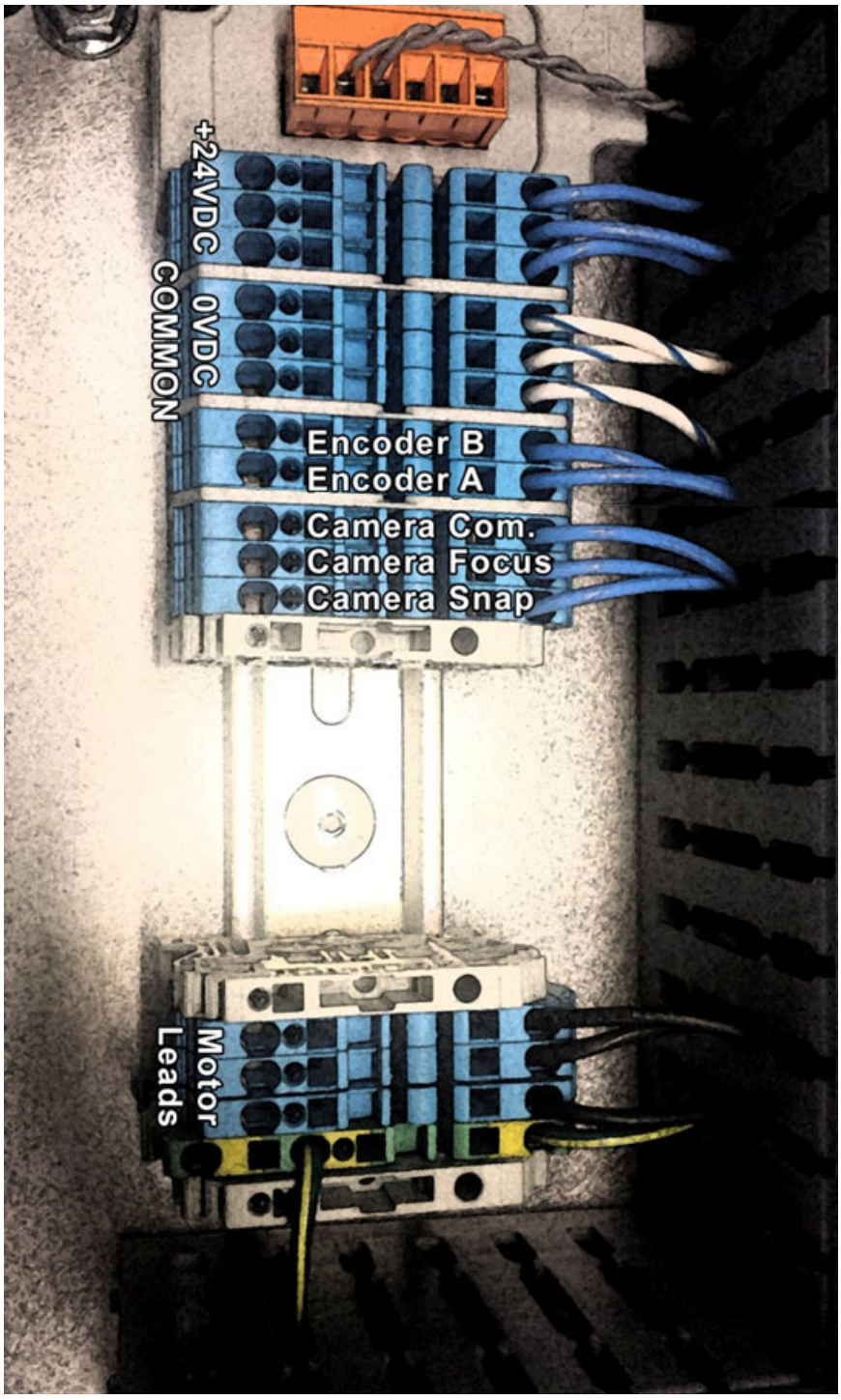
Open Control Box using flat blade screwdriver

WARNING: OPENING THE CONTROL BOX EXPOSES LIVE WIRING. ANY WORK PERFORMED INSIDE THE CONTROL BOX IS DONE AT THE USER'S OWN RISK. TO PREVENT ELECTRICAL SHOCK USE CAUTION WHENEVER WORKING NEAR EXPOSED WIRING OR CONNECTIONS.



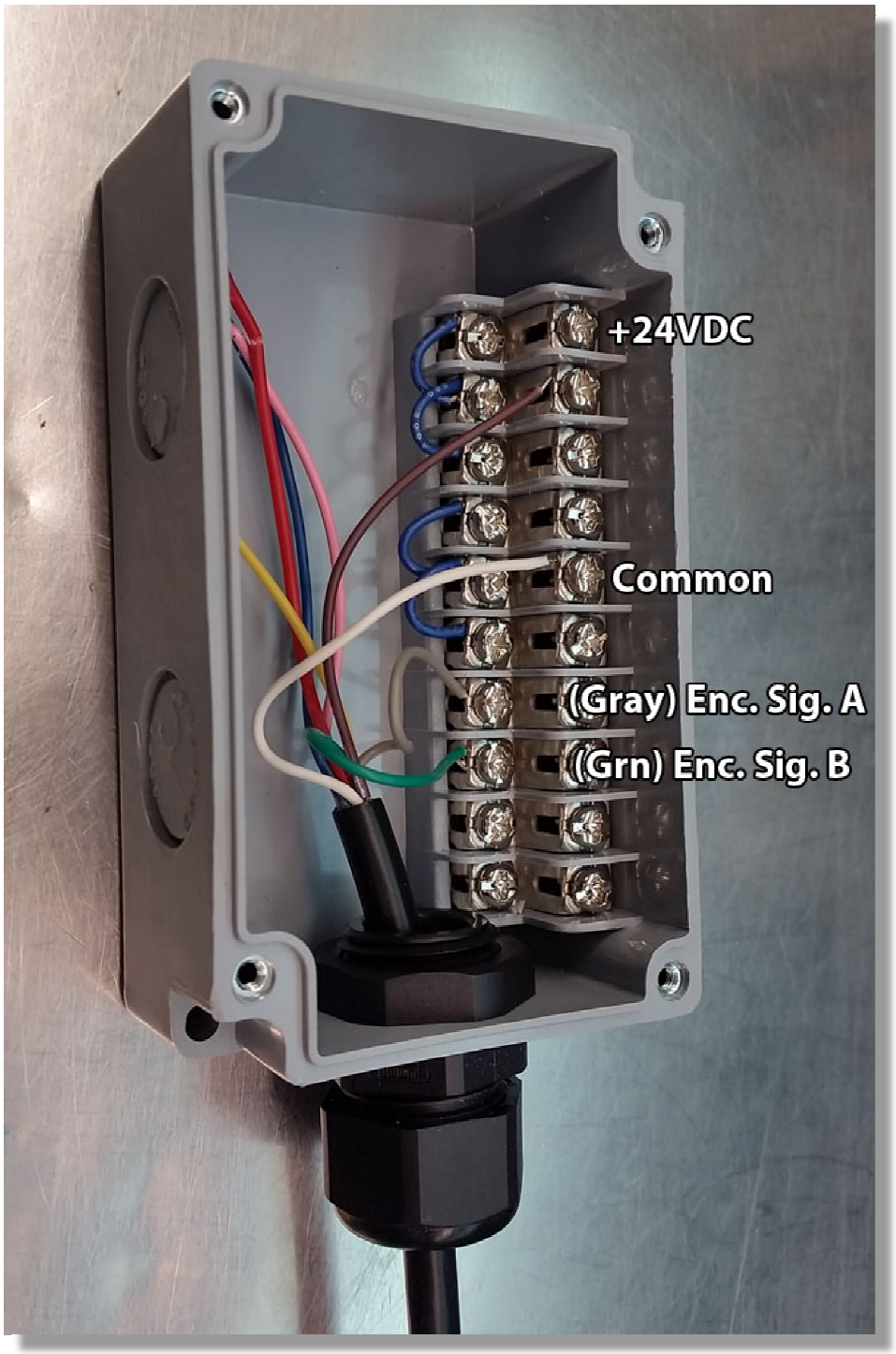
Manually turn power supply on inside control box.

B. Terminal Blocks



4. Junction Box

Full bill of materials and schematics are available at as requested. A representation of the terminal blocks inside the junction box is illustrated below for reference by relevant parties. Pay special note to the colors of the wires to determine proper wiring.



5. Troubleshooting

C. The turntable doesn't spin when I use the CW/CCW Switch.

a. If both the power and alert lights are off

Ensure the system has power. There are circuit breakers that may have tripped inside of the enclosure.

b. If both the power and alert lights are on

If there is an alert light, follow the below instructions.

c. If green is lit and red is dark:

Contact Carousel USA. *Technician Note: There may be an error related to the wiring of RS422 between the PLC and VFD, please contact Carousel USA for further assistance.*

D. The alert light is active.

a. The alert light is lit solid

There is an active fault on the VFD. Press "Alert" and rock the CW/CCW switch to attempt to clear the fault. A VFD fault may be inconsequential or indicative of a major problem. Call Carousel USA if the problem persists.

b. The alert light is blinking fast.

The e-stop is engaged. Twist and pull to release it.

E. The power is on but the "Power" light is not illuminted.

d. Is there is a "Fault" light on the PLC?

Contact Carousel USA. You will have to open the enclosure to help troubleshoot this this. *Technician note: If there is a fault the controller was fed bad information and divided by zero and resulted in a stack overflow. Use the small plastic switch below the ethernet port RUN/REM/PRG and toggle to PRG, then back to RUN, then finally back to REM. Ensure CUSA360 connectivity and double check that the calibration count is not set to zero.*

F. The CW/CCW switches operate the turntable in the wrong direction.

Contact Carousel USA. *Technician note: Operate the table using the CW/CCW commands in CUSA360. This establishes the proper motor wiring. If CUSA360 is also reversed, swap the two motor wires. If CUSA360 is working fine but the switch is reversed, swap the wires going into the switch.*

G. The enclosure door doesn't close.

There is an interlock system on the disconnect switch. Turn both the disconnect inside of the enclosure and the red handle/yellow background switch on the front panel to the OFF position. Check that the enclosure lock (operated with a coin or large flathead screwdriver is not interfering. Close the door and press down to fully close the enclosure before you engage the lock and disconnect.