

# Installation and Operation Instructions for

# MC Extension Box

## Providing up to 12 Stages of Full Modulation Control

The MC Extension Box (MCX) increases the number of stages a Laars Modulating Control (MC) can control from 4 to 12. All logic, memory, and control algorithms reside in the MC panel. The MC panel directly controls four built-in stages. When an MCX is connected to the MC, the MC will automatically recognize eight additional stages. Any of the twelve stages can be the lead stage and automatic rotation provides even wear among all active stages.

The MCX can be equipped with up to four output cards, each of which controls a pair of stages. There are two types of output cards: 135Ω cards control up to two fully modulating 135Ω stages, and Current/Voltage cards can be programmed to control two 0-5V, 1-5V, 0-10V, 2-10V, or 4-20mA stages. To select the type of output for Current/Voltage cards, follow the directions in the MC I/O Manual (System Startup, Selecting the Output Type).

Each new stage must also be configured for its Mode (Auto, Manual, Standby, On, and Off), Ignition Start Point, and Modulation Start Point as described in the MC I/O manual (Stage Settings). All other steps and procedures to configure the MC presented in its I/O manual must be completed to insure smooth operation of a MC/MCX system.

## SECTION 1. Installation

### 1.1 Mounting the EXM

Select a location adjacent to the MC control and within the reach of the provided Panel-to-Panel cable.

Remove the MCX panel from the metal enclosure by removing the top center screw and loosening the two bottom screws. Lift the panel out.

Screw the enclosure to the surface through the mounting holes in the back of the enclosure.

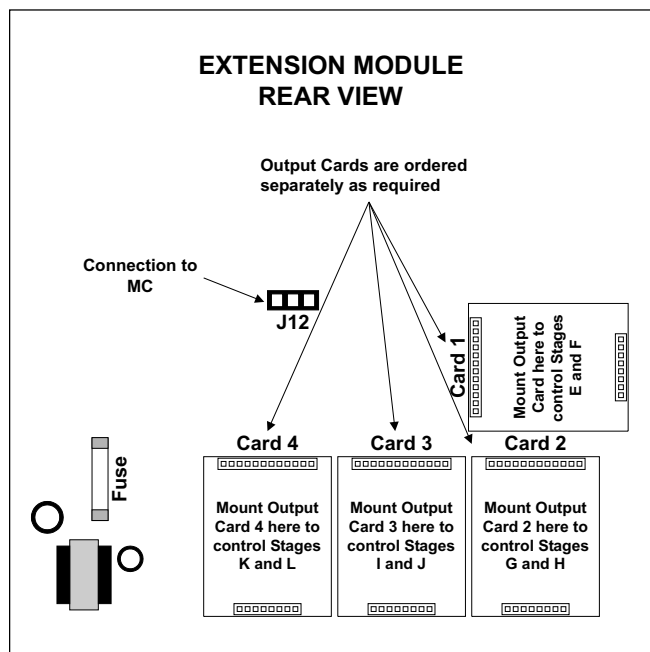


Figure 1. MCX Rear View.

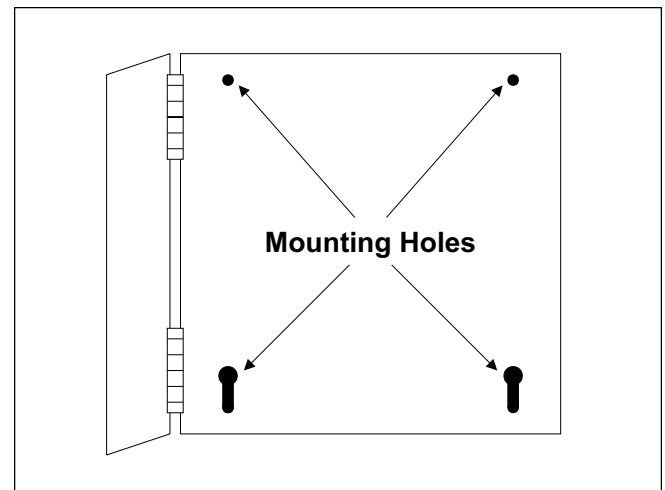


Figure 2. Mounting Holes.

## 1.2 Mounting the Output Cards

The Output Cards are mounted on the rear of the MCX (see Figure 1).

Each Output Card controls two stages. The two stages connected to one Output Card must have the same type of output (135Ω, 0-5V, 1-5V, 0-10V, 2-10V, or 4-20mA). However, different types of Output Cards can be combined on the MCX, and each Output Card can be programmed differently.

Align the Output Card with the pins on the back of the panel and gently press them on until the top of the pins appear through the Output Card connector.

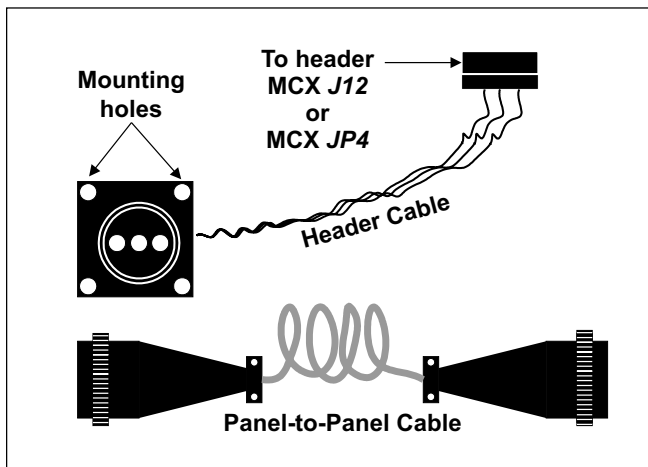


Figure 3. Cable Connections.

## 1.3 Attaching the Connecting Cable to the MCX

Disconnect the Panel-to-Panel cable from the two Header cables (see Figure 3).

Remove a Knockout from the enclosure.

Insert the end of the Header cable with three screw terminals through the Knockout into the interior of the enclosure.

Use the mounting holes to secure the square end of the Header cable to the enclosure.

Connect the three screw connector to the black header on the rear of the MCX marked *J12* (see Figure 1).

Return the panel to its enclosure, replace the top screw, and tighten the bottom two screws.

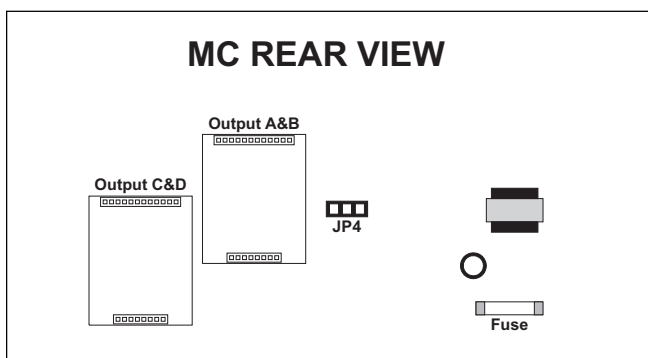


Figure 4. MC Rear View.

## 1.4 Attaching the Connecting Cable to the MC

Remove the MC from its enclosure.

Secure the remaining Header cable to the enclosure as described above.

On the rear of the MC, locate *JP4* and attach the three screw terminal connector.

Return the panel to its enclosure, replace the top screw, and tighten the bottom two screws.

Reattach the Panel-to-Panel cable to the Header cables.

## 1.5 Wiring the Power

Bring the 120VAC 60Hz power wires through a bottom Knockout of the enclosure. The right front Knockout is preferred.

Class 1 voltages must enter the enclosure through a different opening from any Class 2 voltage wiring.

Connect the hot line to terminal marked *LINE*.

Connect the neutral line to the terminal marked *NEUT*.

The green ground screw **MUST** be connected to earth ground (see Figure 5).

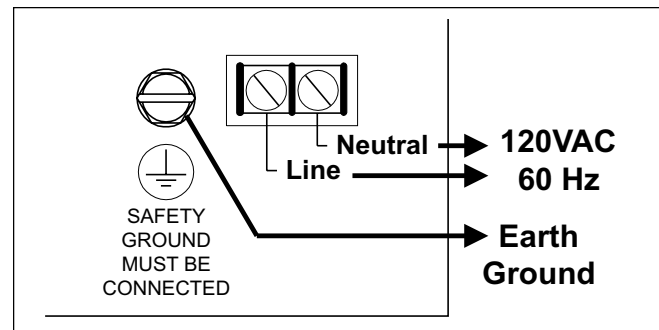


Figure 5. Power Wiring.

## 1.6 Installing the Output Relays

Each output stage (*E* through *L*) which is to be used must have a relay installed in the socket. These relays are ordered separately (p/n CA002300).

To install a relay, orient the pins and then press it gently into the appropriate socket.

Any stage output which does not have a relay must have its Mode set to *Off* (see MC I/O manual, Stage Settings).

## 1.7 Wiring the Stage Outputs

Each Stage output (*E* through *L*) has one Normally Open (N.O.) relay contact.

The N.O. contacts are dry contacts only. They do not source any voltage.

Each N.O. contact is capable of switching 6A resistive at 120VAC.

Total output of all stages must not exceed 15A.

Wire the N.O. relay contacts in series with the unit's limit circuit (see Figure 6).

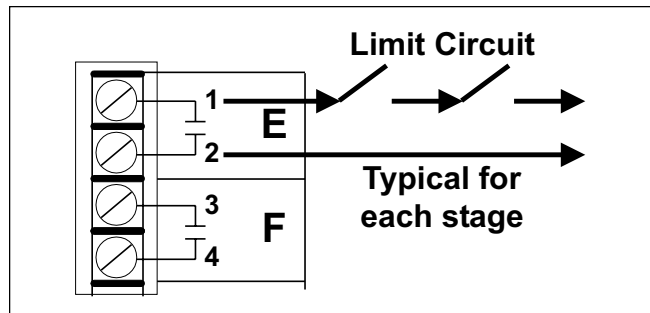


Figure 6. Stage Wiring.

Class 1 voltages must enter the enclosure through a different opening from any Class 2 voltage wiring.

### 1.8 Wiring to 135Ω Modulating Motors

The MCX can be equipped to operate up to eight 135 Ω modulating motors.

Each pair of stages, E&F, G&H, I&J, and K&L, are controlled by one output board.

Wire as shown in Figure 7 and Table 1.

### 1.9 Wiring to Current Controlled Modulating Motors

The MCX can be equipped to operate up to eight 4-20 mA modulating motors.

To program the control for 4-20 mA output, see the MC I/O manual (MC I/O Manual, System Startup settings).

Apply the supplied label marked 4-20 mA below the output terminals.

Each pair of stages, E&F, G&H, I&J, and K&L, are controlled by one output board.

The MCX sources 24VDC excitation voltage for the 4-20mA signal.

Wire as shown in Figure 7 and Table 1.

### 1.10 Wiring to Voltage Controlled Modulating Motors

The EXM can be equipped to operate up to eight 0-5 V, 0-10V, 1-5V, or 2-10V modulating motors.

To select the range, 0-5V, 0-10V, 1-5V or 2-10V, see the MC I/O manual (MC I/O Manual, System Startup settings).

Apply the supplied label marked Voltage below the output terminals.

Each pair of stages, E&F, G&H, I&J, and K&L, are controlled by one output board.

Wire as shown in Figure 7 and Table 1.

### 1.11 Wiring the Lockout Inputs

A closure across the pair of MCX LOCKOUT INPUT terminals informs the MC that the particular stages's boiler, chiller, etc. has encountered a safety limit and can not be restarted without a manual reset. The MC will not activate or modulate a Stage in Lockout.

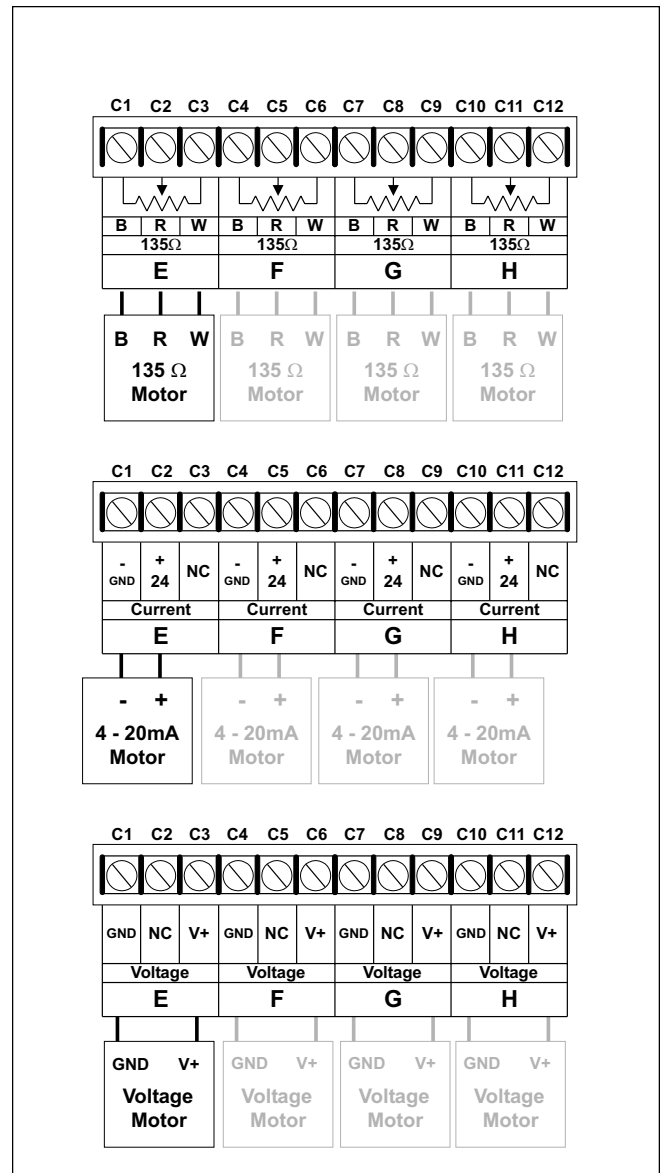


Figure 7. Control Voltage Wiring.

A pair of LOCKOUT INPUT terminals is provided for each stage.

The Lockout signal must be a dry contact closure from the boiler, chiller, etc. controlled by that stage's output.

The LOCKOUT INPUTS are dry contacts only. No voltage can be placed across the terminals.

Wire the Lockout signals to their respective STAGE terminals (see Figure 8):

- STAGE E to Lockout Input terminals B1&B2
- STAGE F to Lockout Input terminals B3&B4
- STAGE G to Lockout Input terminals B5&B6
- STAGE H to Lockout Input terminals B7&B8
- STAGE I to Lockout Input terminals B9&B10
- STAGE J to Lockout Input terminals B11&B12
- STAGE K to Lockout Input terminals B13&B14
- STAGE L to Lockout Input terminals B15&B16

|         | 135Ω   |              |              | Current           |                | Voltage |     |
|---------|--------|--------------|--------------|-------------------|----------------|---------|-----|
|         | Common | Increase Mod | Decrease Mod | Signal Sink (GND) | 24V Source (+) | V+      | GND |
| Stage E | C2     | C3           | C1           | C1                | C2             | C3      | C1  |
| Stage F | C5     | C6           | C4           | C4                | C5             | C6      | C4  |
| Stage G | C8     | C9           | C7           | C7                | C8             | C9      | C7  |
| Stage H | C11    | C12          | C10          | C10               | C11            | C12     | C10 |
| Stage I | C14    | C15          | C13          | C13               | C14            | C15     | C13 |
| Stage J | C17    | C18          | C16          | C16               | C17            | C18     | C16 |
| Stage K | C20    | C21          | C19          | C19               | C20            | C21     | C19 |
| Stage L | C23    | C24          | C22          | C22               | C23            | C24     | C22 |

Table 1.

## SECTION 2. Operation

### 2.1 EXM Status Lights

Whenever the MCX is powered, the red LED marked *POWER*, located in the upper left of the panel, should be lit. If it is not, check the 120VAC power source.

If the MCX is correctly connected to a powered MC, the green LED marked *COMM ERROR* will blink on and off, approximately once a second. If the light is does not blink, check the connecting cables.

If the N.O. contacts of a Stage relay are energized, the red LED immediately to the left of the relay will be on. If the relay is not energized, the red LED will be off.

### 2.2 Display Stage Status

The percent modulation and Mode of each stage is displayed on the main screen of the MC control (see Figure 9). Stages in the Automatic mode which are not active show ---.

The default screen shows Stages A through D. Simply rotate the *ADJUST* knob clockwise (without pressing) to see the remaining Stages, E through L.

Rotate the *ADJUST* knob counterclockwise to go back in the Stage order.

Stages A through D correspond to the Stages marked *A* through *D* on the MC panel.

Stages E through L correspond to Stages of the MCX.

### 2.3 Stage Settings

All Stage setting are made at the MC panel.

If the *COMM ERROR* LED is flashing, the MC recognizes the MCX panel and all its Stages.

Carefully follow all the steps in the MC I/O manual (Stage Settings) to set up Stages E through L.

**⚠ WARNING**

Each Stage, A through L **MUST** be setup properly. Failure to do so will result in erratic set point control and may cause system damage.

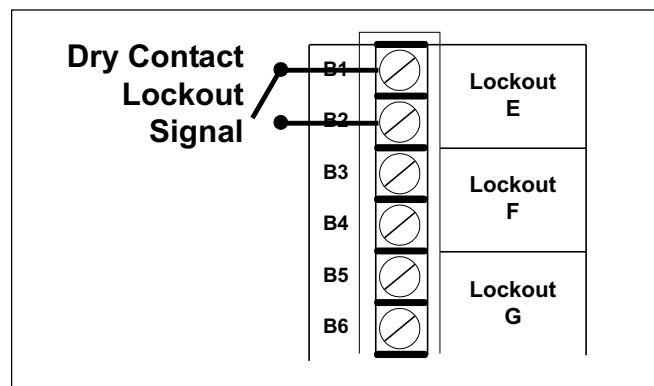


Figure 8. Dry Contact Wiring.

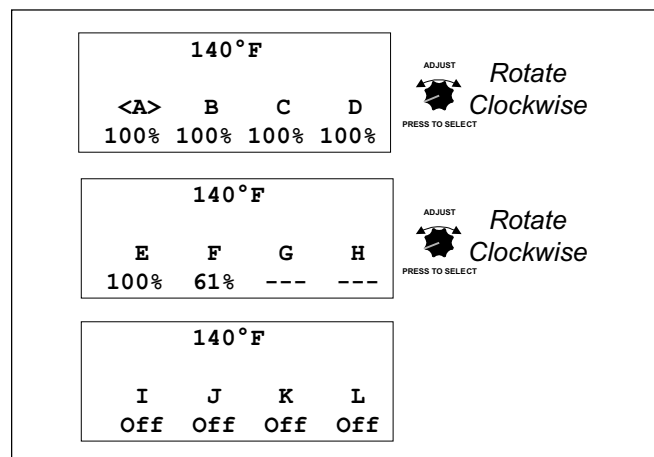


Figure 9. Main Screen Display and Operation.