

# Installation Instructions



## MARS No. 61400 MARSwitch™

**Operator: Save these instructions for future use!**

Failure to read and follow all instructions carefully before installing or operating this control could cause personal injury and/or property damage.

### DESCRIPTION

MARSwitch™ is an electronically-controlled relay that can be used to replace single and two-pole contactors commonly used in air conditioners, heat pumps and other applications. A patented switching algorithm reduces arcing between contacts, which nearly eliminates pitting and welding for a longer life. The switching mechanism is sealed to prevent intrusion from insects and other debris. MARSwitch™ also provides advanced features for HVAC troubleshooting and system reliability:

- Line-Voltage Brownout Protection
- Short Cycle Protection
- Random Start Delay
- Lifetime Cycle Count

MARSwitch™ is similar to a 1 1/2 pole contactor, in that only the compressor terminal C is switched. The compressor terminal R is connected by a shorting bar to line input L1, and is energized even when a call is not present.

### PRECAUTIONS

Installation should be done by a qualified heating and air conditioning contractor or licensed electrician.

Do not exceed the specification ratings.

All wiring must conform to local and national electrical codes and ordinances.

This control is a precision instrument, and should be handled carefully. Rough handling or distorting components could cause the control to malfunction.

Following installation or replacement, follow manufacturer's recommended installation/service instructions to ensure proper operation.

MARSwitch™ has no user serviceable parts. Replace as a unit.



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### ⚠ WARNING



Failure to comply with the following warnings could result in personal injury or property damage.

#### FIRE HAZARD

- Do not exceed the specified voltage.
- Replace existing control with exact model and dash number.
- Protect the control from direct contact with water (dripping, spraying, rain, etc.).
- If the control has been in direct contact with water, replace the control.
- Label all wires before disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.
- Safety route and secure wiring after installation.

#### SHOCK HAZARD

- Disconnect electric power before servicing.
- Ensure proper earth grounding of appliance.
- Ensure proper connection of line neutral and line hot wires.
- Compressor output "R" is not switched and is energized at all times.

# SPECIFICATIONS

## Electrical Ratings

Line Voltage Input .....	240 VAC, 50/60 Hz
Full Load Amperes (FLA) .....	30 A
Locked Rotor Amperes (LRA) .....	150A
Control (Coil) Voltage (Y, C) .....	24 VAC, 50/60 Hz

## Recommended Terminal Torque – L1, L2, R and C

#4 – 6 AWG .....	45 in-lbs
#8 AWG .....	40 in-lbs
#10 – 14 AWG .....	35 in-lbs

## MOUNTING

1. Disconnect power to the condensing unit or heat pump at the disconnect switch and/or main electrical panel. Ensure that all sources of power are disconnected before proceeding.
2. Label wires and remove old contactor.
3. Find a suitable mounting location inside the control box. Rotate MARSwitch™ as necessary to allow space for wiring and other components.
4. Loosen four housing captive screws attaching the bottom mounting plate to the main housing and separate the mounting plate from the main housing.
5. The bottom of the mounting plate has four mounting holes that match the typical mounting screw locations of a single or two-pole contactor. Secure the bottom mounting plate to the control box using the two self-tapping screws provided.
6. Replace the main housing on the mounting plate and secure by tightening all four housing captive screws. Take care to avoid over tightening.
7. Connect line and control voltage wiring. Refer to the wiring diagrams provided for more information. Tighten the L1, L2, R and C lugs to the recommended torque specifications.
8. Affix the provided Quick Reference Label inside the control box for future service.

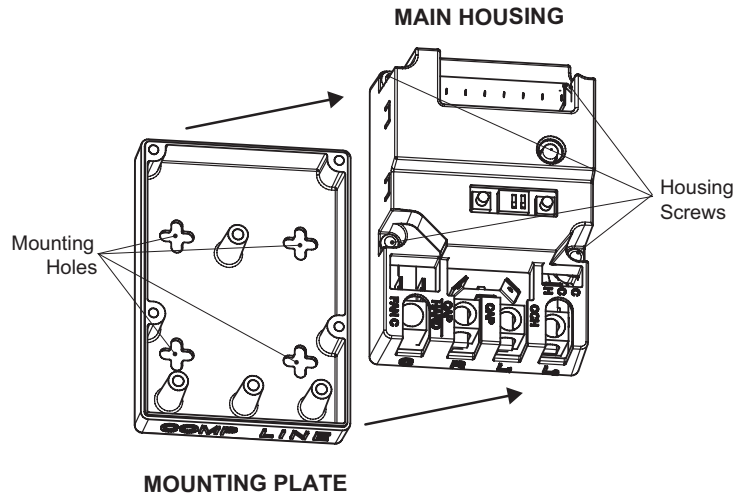


Figure 1 - Two Piece Design

## QUICK REFERENCE

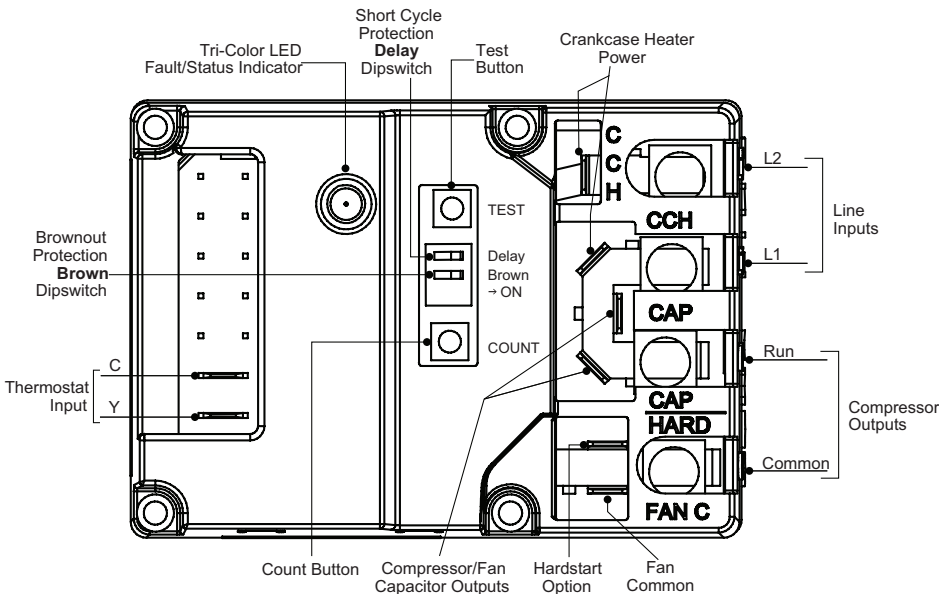


Figure 2 - 61400 Terminals and Switches

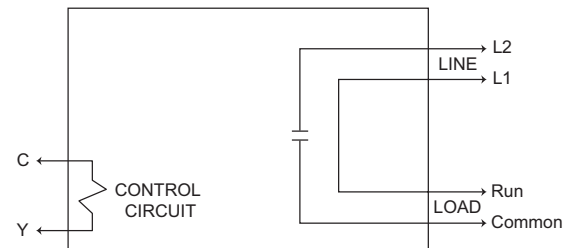


Figure 3 - Electrical Diagram

## OPERATION

### Call For Compressor Operation

24 VAC between the **Y** and **C** terminals will signal a call for compressor operation. The **C** compressor and fan outputs will be energized. Loss of 24 VAC between **Y** and **C** will de-energize the outputs.

### Test

MARSwitch™ includes a Test Mode to assist in system installation and troubleshooting. Press the “**TEST**” button for one second to energize the compressor and fan for five seconds without a **Y** call.

### Random Start Delay

At power-up and when MARSwitch™ recovers from a brownout, a random start delay of 5-90 seconds will be activated. This delay is in addition to the short cycle delay. During this delay the compressor will not be energized, even if a call for compressor operation is present.

The random start delay can help reduce spikes in power consumption when multiple loads are re-energized after a blackout or brownout. The random start delay cannot be disabled, but is only active at initial power-up and when recovering from a brownout. Normal compressor cycling will not activate the random start delay.

### Short Cycle Protection

At power-up, and any time the compressor is de-energized, MARSwitch will activate a three minute short cycle delay. During this delay the compressor will not be energized, even if a call for compressor operation is present, to prevent compressor damage due to rapid on and off cycling. Normal operation resumes when the delay expires.

Short cycle protection can be disabled by setting the “**Delay**” dipswitch to the **OFF** position.

### Line-Voltage Brownout Protection

Brownout protection will de-energize the compressor and fan if line voltage drops below 180 VAC for more than four seconds during a call for compressor operation. Compressor operation will not resume until line voltage returns to a minimum of 190 VAC. In addition, MARSwitch will not attempt to start the compressor if line voltage is less than 187 VAC.

Brownout protection can be disabled by setting the “**Brown**” dipswitch to the OFF position.

### Lifetime Cycle Count

A count of compressor cycles since the control was installed is stored in the control’s memory. To display the count, press and hold the “**COUNT**” button for one second. The LED will flash to indicate the total number of compressor cycles, rounded to the nearest 100 cycles:

GREEN – One Flash per 10,000 Cycles

RED – One Flash per 1,000 Cycles

YELLOW – One Flash per 100 Cycles

EXAMPLE: 52,318 cycles would flash five GREEN, then two RED, then three YELLOW

### Led Status Codes

The tri-color LED will flash fault and status codes while MARSwitch is powered.

LED Color	Status
NONE	No Power
GREEN Slow Flash	Standby – No Call
GREEN Solid	Call for Compressor – Compressor and Fan Energized
GREEN Fast Flash	Short Cycle/Random Start Delay
GREEN/RED Alternating	Brownout Detected
GREEN/RED/YELLOW Alternating	Compressor Test Mode – Compressor and Fan Energized

## TROUBLESHOOTING

For assistance with system troubleshooting, refer to the original equipment manufacturer's instructions accompanying the condensing unit, furnace or air handler, and thermostat.

Symptom	LED Flash Code	Possible Causes	Corrective Actions
Compressor running, but fan not running	GREEN – Solid	<ul style="list-style-type: none"> <li>Wiring fault</li> <li>Fan motor or capacitor fault</li> </ul>	<ul style="list-style-type: none"> <li>Check line voltage wiring</li> <li>Check fan motor and capacitor</li> </ul>
Fan running, but compressor not running	GREEN – Solid	<ul style="list-style-type: none"> <li>Wiring fault</li> <li>Compressor internal/overload protector tripped</li> <li>Run/Start/Hardstart Capacitor Fault</li> </ul>	<ul style="list-style-type: none"> <li>Check line voltage wiring</li> <li>Check capacitors</li> <li>Wait for protector to reset</li> </ul>

