

**YASKAWA**

## Combination Starter Interconnection with VFD and Motor

The National Electrical Code and most local codes require an induction motor have a disconnect and some form of thermal protection.

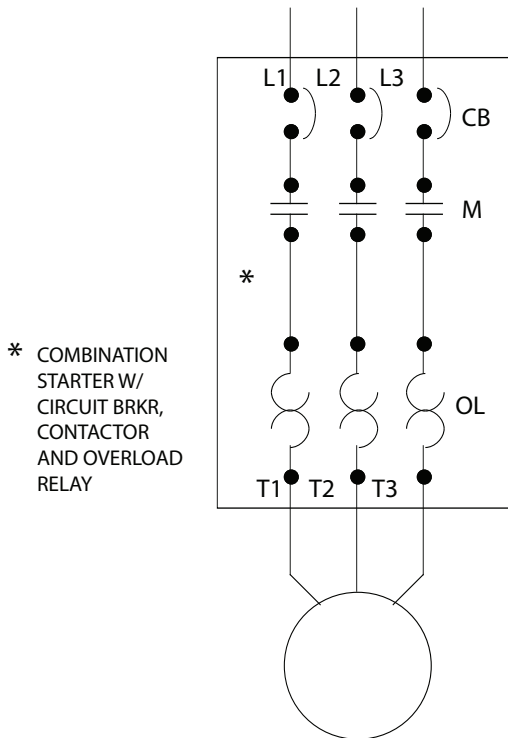
A combination starter is the most common means of meeting code. A simple electrical schematic is shown in Figure 1.

When retrofitting an adjustable frequency drive to an application where a combination starter already exists, the starter can be interconnected to the drive as shown in Figure 2. This will meet code and negate the expense of adding another circuit breaker and overload.

In retrofit situations, it is common to leave the existing motor starter in place to avoid the need to rewire the “safety circuit” already connected to this starter. If the existing motor starter is left in place, it should be on the input side of the drive. The starter is not actually required since the drive performs the starting and overload functions. In this case, the existing motor starter becomes a “safety device” rather than a “control device”. The starter contacts remain closed, except in the rare occurrence of a safety device trip or a shutdown for maintenance purposes.

To minimize stress to the drive’s components, operation of the Yaskawa drive should normally be from RUN/STOP control signals. For ordinary operation, the motor and drive should be started or shutdown through the drive keypad or a remote control signal wired directly to the drive. Done properly, an input side disconnect or motor starter has no affect on drive warranty.

If load-side disconnects or motor starters are used, the drive output must be reduced to zero before operating the disconnect or motor starter to prevent damage to drive components. A disconnect between the motor and drive is **NOT RECOMMENDED**.



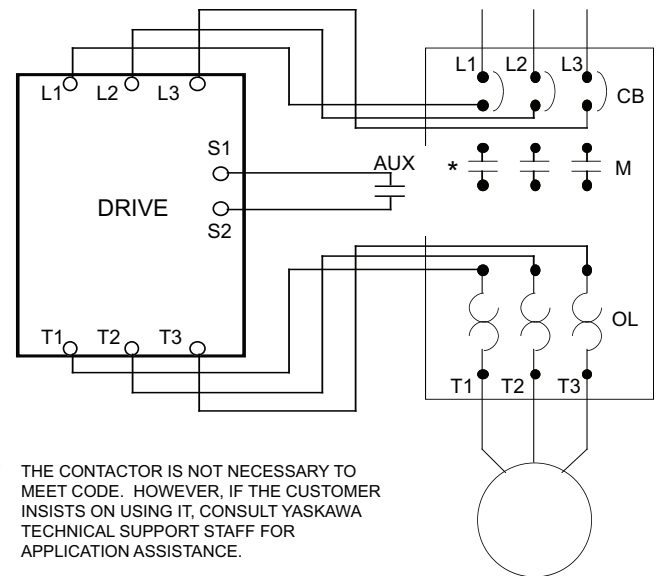
**Figure 1. Induction Motor Wiring With Combination Starter**



## Combination Starter Interconnection

An alternate approach is to re-wire the existing combination starter as shown in Figure 2. This configuration would operate the drive as an extension of the original starter, while minimizing the stress on the drive components.

Figure 2 shows use continued use of the circuit breaker and overload functions of the existing starter. With this set-up, ON/OFF control could then be transferred from the existing starter to the drive by employing an otherwise unused auxiliary contact on the starter as the run signal to the drive. Note: Auxiliary contacts should be rated at 3 amps or less.



**Figure 2. Wiring Drive Into  
Motor/Combination Starter Circuit**