

F7 Drive with Safe-Off Function Now Available

We are proud to announce the availability of the F7 with a Safe-Off function. The Safe-Off option, when used with other safety components, provides protection according to **EN954-1 Category 3** for safe stop and protection against restart. The Safe-Off function performs a safe stop according to the **EN60204-1 Stop Category 0** referred to as “uncontrolled stop by power removal” or “coast to stop.” Safe-Off is certified to meet the requirements of the **EN954-1, Safety Category 3**. The Safe-Off function is implemented totally in hardware on the F7 control board.

Ordering:

The F7 with Safe-Off should be ordered using the following model number format: CIMR-F7U□□□□□□-118 where □□□□□□ is the exact model of the F7 required (i.e. □□□□□□ = 43P71F). There is a \$500 list price adder included for the upgraded control board and terminal board. In addition to the standard technical manual, the units are shipped with the *F7 Drive Safe-Off Option Technical Manual*, TM.F7.03, which is available on the web.

Safe-Off Details:

First, there is nothing inherently *unsafe* about an F7 without the Safe-Off option. However, the F7's operation is fully programmable. It is commanded by programmable inputs. Multiple sources (keypad, terminals, serial communications, option cards, etc.) can issue a *Run* command. When turning off the motor is essential to safety related functions in the system, the F7's flexibility necessitates a reliable mechanism to ensure that the motor will stop and cannot be started regardless of how the drive is programmed, configured or controlled otherwise.

The Safe-Off option, when used with other safety components, provides protection according to **EN954-1 Category 3** for safe stop and protection against restart. An F7 drive equipped with the Safe-Off option is just one component in a safety control system. To assure that the Safe-Off function appropriately fulfills the safety requirements of the application, a thorough risk assessment shall be done according to ISO12100 for the whole safety system at the final installation. All components in the system must be appropriately selected and applied to achieve the desired safeguarding.

The Safe-Off function performs a safe stop according to the **EN60204-1 Stop Category 0** referred to as “uncontrolled stop by power removal” or “coast to stop.” Safe-Off is certified to meet the requirements of the **EN954-1, Safety Category 3**. The Safe-Off function is implemented totally in hardware on the F7 control board.

Safe-Off disables the motor, not the drive controller. Power to the control board and display is maintained so all parameters, monitors and fault data may be read and observed. Also, all communications (Modbus RTU, Profibus-DP, DeviceNet, EtherNet/IP, etc.) stay active.

The Safe-Off function uses two independent hardware channels to redundantly block the driver signals to the output devices (IGBTs) so the motor is disabled and operation prevented. Redundancy ensures that a single fault in any of the parts involved in Safe-Off does not lead to a loss of the safety function.

Safe-Off is all electronic. No mechanical moving parts (relays) are involved in the Safe-Off circuitry. Safe-Off is suitable in applications classified as “medium risk” where coasting to a stop is the appropriate response to a fault condition.

Safe-Off merely prevents the motor from moving. The Safe-Off option does **not** serve as a motor disconnecting means (NEC Article 430 Part IX) and does **not** provide electrical safety. It is only suitable for preventing motor operation when people are working near parts of a machine affected by the drive system.

The Safe-Off option should **not** be used as the normal means to start and stop the drive.

The Safe-Off function option involves two added digital inputs, BB and BB1, as well as supply terminal SN on the terminal board. See Figure 1 below. Removing the voltage from either terminal BB or BB1 disables the drive motor output. Both terminals BB and BB1 must be energized (connected to SN) for the drive to start or run the motor. BB and BB1 individually break the drive signals to the output devices (IGBTs) resulting in a reliable means of removing power from a motor and preventing it from restarting until both BB and BB1 are reenergized. As long as either BB or BB1 is open (de-energized), no command given the drive will start or run the motor no matter how the drive is programmed, configured or commanded.

The F7 with Safe-Off option is shipped from the factory with a jumper connecting BB and BB1 to SN. This jumper allows the F7 “out of the box” to operate as a conventional F7 drive without Safe-Off. The **jumper must be removed** to use the Safe-Off option.

The time from opening either Safe-Off input until the drive output is switched off is less than 10 mSec.



Figure 1: Location of Safe-off Terminals

Rafi Wilkinson
Product Marketing Manager

Mark Bernicky
Director of Sales