

FRANKLIN AID



Franklin Electric



Franklin Application/Installation Data (AID) ... For The Professional Driller-Installer

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OVERLOADS – UNSUNG HEROES

If there is such a thing as an unsung hero in an electrical motor, it has to be the overload. Overloads play a crucial role in protecting submersible electric motors from overheating conditions. For this reason, Franklin Electric supplies overloads for all of its single-phase submersible motors. Depending on the motor design and horsepower, the overloads may be located externally in a control box or internally in the motor itself. Since we recently made some changes to the overload placement in our 1.5 horsepower (hp) motors and controls, we thought now would be a good time to review how overloads work and what they are designed to protect. We'll also review your options as a professional water systems contractor when it comes to overloads in our 1.5 hp product.

The Job of an Overload

As you know, all electrical currents generate heat. Although in some cases we can use this to our advantage, in the case of an electric motor, that heat works against us. In extreme cases, such as a locked rotor, this heat can even cause motor failure. The job of the overload is to prevent just that.

There are two primary conditions that cause a motor to overheat and fail: a lack of a cooling flow of water past the motor, and a high current (amp) condition. While the first condition is straightforward, a high current condition may be caused by several factors, including low voltage, high voltage, a ground fault, or an overloaded motor. Regardless of the reason, when the motor gets too hot, we have to cut power to the motor. This is where overloads really earn their pay by preventing motor failure and saving it for another day.

Remember that the components in each Franklin Electric control box have been carefully selected for use with a Franklin Electric submersible motor. Using a control box from another manufacturer will void the warranty on your Franklin motor.

Overload Placement

In general, the closer an overload is located to the motor

it is protecting, the better it is for the motor. If the overload is located inside the motor, it can detect an overheat condition from a lack of cooling flow. A control box overload is not in a position to do this (literally).

In addition, overloads located in control boxes can be affected by extreme external conditions. That is, although overloads used in Franklin Electric control boxes will hold the motor's nameplate maximum amps in temperatures up to 122 °F, ambient temperatures due to hot pump houses or direct sunlight can force internal control box temperatures much higher. This reduces the amount of current the overload can carry, and nuisance tripping may occur. Nuisance tripping of overload protectors during extreme temperature conditions may be alleviated by reducing the motor current or by providing a cooler environment for the overload, either by moving the control box or placing the overload in the motor itself.

(For more information, please refer to Franklin AIM Manual sections titled "Control Box and Panel Environment" and "Auxiliary Running Capacitors".)

Why aren't all overloads located inside the motor? As noted above, whether overload protection is located inside the motor (internal placement) or the control box (external placement) depends on the motor design and rating. It is simply an issue of physical space and packaging. As motor ratings get larger, their currents increase as well. This requires larger overloads, which eventually become too large to package in the confines of a submersible motor.

Internal Overloads (Automatic Reset)

All ratings of Franklin Electric 2-wire submersible motors, as well as 60 Hz 3-wire single-phase submersible motors rated 1.5 hp and lower, utilize a single overload that is built into the motor. These overloads, which trip in response to high internal motor temperatures caused by high amperage and/or



Overload Changes for 1.5 Hp Motors/Controls

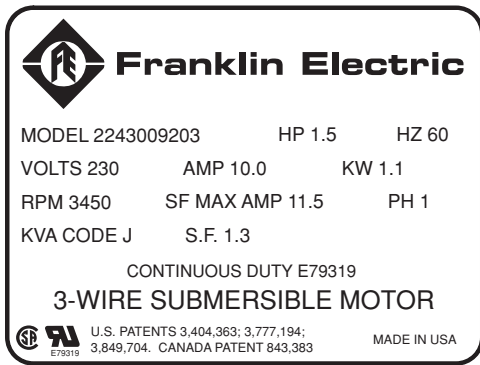
Older motors (prior to 06H date code) must be used with the old design control boxes, or with new control boxes that have been fitted with an overload kit.

To accommodate existing installations where a control box may be replaced, Franklin offers two options: the old design control box containing overloads (p/n 2823008110), and an overload kit that may be installed into the new control box. See the table below for ordering information.



		Motor Model 224300XXXX 1.5 HP 230 Volt 60 Hz, 3-Wire	
		Date code 06G & older	Date code 06H & newer
Control Box Models	2823008110 10 µF with Overload	Overload in control box only	Overload in control box & in motor
	2823008610 15 µF no Overload	Overload/Capacitor kit (305388901) required	Overload in motor only

inadequate motor cooling, automatically reset themselves after a cool-down period. Once reset, the pump will restart when the system calls for water. Franklin motors with internal overloads can be identified by the words "THERMALLY PROTECTED" located below the nameplate.



THERMALLY PROTECTED

External Overloads (Manual Reset)

Franklin 3-wire single-phase motors rated 2 hp and larger use manual reset overloads located in the control box. These control boxes have two separate overloads: one for the start winding and one for the main winding. Looking at the front of the control box, the main winding overload is located on the left side, and the start winding overload on the right. External overloads trip when the current (amperage) exceeds what the motor can handle.

1.5 Horsepower Overload Changes

Until recently, the 1.5 hp Franklin 4-inch motor found its overload protection only in the control box. In 2006, however, Franklin Electric's engineering team was able to design and package a 1.5 hp internal overload. In August of that year, Franklin began manufacturing its 1.5 hp motors with this internal overload.

In February 2008, Franklin offered a new 1.5 hp control box that was consistent with the 1.5 hp motor with the internal overload. That is, it did not have the redundant overload in the control box. At the same time, we changed the value of the 1.5 hp run capacitor from 10 to 15 microfarads to provide better motor efficiency, smoother operation, and reduced amp draw. However, Franklin Electric still offers the old style 1.5 hp control box which contains the overload.

Summary

Regardless of their location or type, overloads are critical to the life of a submersible motor. To wrap up our discussion, keep the following in mind:

- Overloads are thermal devices. They detect heat from high current or other conditions.
- The ideal location for an overload is in the motor, as close to the windings as possible. All Franklin Electric single-phase motors 1.5 hp and below are now manufactured with built-in overloads.
- In higher horsepower ratings, physical limitations prohibit placing the overload in the motor. As a result, overloads for Franklin single-phase motors rated 2 hp and above are located in the control box
- Recent design changes make Franklin's 1.5 hp product a special case. Starting in August of 2006 (date code 06H), 1.5 hp motors feature built-in overloads. So, in a new 1.5 hp installation, install the corresponding new 1.5 hp control box. This will provide overload protection in the motor, and eliminate the redundant overload in the control box. However, if you're retrofitting a 1.5 hp control box with an older motor (06H or prior), install a control box with an overload. Both models are available from Franklin Electric and your local distributor.

Finally, to maximize the service life for your submersible motor, make sure it always carries proper overload protection. When conditions heat up, you'll be glad you did.

LOCATION OF OVERLOADS IN SINGLE-PHASE MOTORS

Motor Design	1/3	1/2	3/4	1	1.5	2
3-Wire	Motor	Motor	Motor	Motor	Motor	Control Box
2-Wire	Motor	Motor	Motor	Motor	Motor	N/A

TOLL-FREE HELP FROM A FRIEND

Contact Franklin's toll-free SERVICE HOTLINE for answers to your questions on submersible installations. When you call, a Franklin expert will offer assistance in troubleshooting submersible systems and provide answers to your water systems questions.

Franklin Electric SERVICE HOTLINE 800-348-2420 FAX 260-827-5102
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