

FRANKLIN AID



Franklin Electric



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

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OVERLOADS SERVE AN IMPORTANT PURPOSE

Overload protectors are one of a single-phase submersible motor's most important "hidden" components, and play a crucial role in protecting the motor. This issue of Franklin AID will discuss the various types of overloads found in single-phase Franklin Electric submersible motors.

All electrical currents generate heat and under normal operating conditions the heat generated in a motor is easily dissipated into the surrounding water. However, certain conditions can cause the amount of current (amperage) in the motor to exceed the motor's design limits. Examples include a locked rotor (or locked pump), mechanical drag, and a low or high voltage supply. The heat generated by this excessive current can quickly damage the motor and cause failure. The job of the overload is to protect the motor from failing due to excessive current.

Overload protectors should not be confused with surge arrestors. Surge arrestors are designed to protect the motor from an external voltage surge, such as happens with a nearby lightning strike or an electrical surge on the power grid.

Franklin Electric supplies overloads for all of its single-phase submersible motors. However, depending on the motor design and horsepower, the overloads may be located externally in a control box or internally in the motor itself.

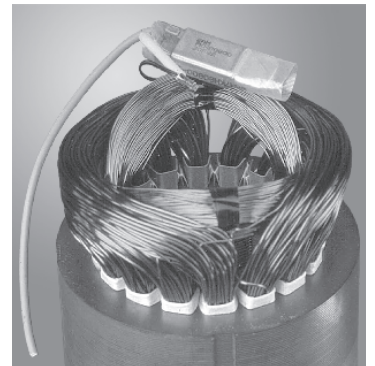
Internal Overloads (Automatic Reset): All HP ratings of Franklin Electric 2-Wire motors, and 60 Hz 3-Wire motors rated 1 HP and smaller, utilize a single overload that is built into the motor and are identified with the words "THERMALLY PROTECTED" below the nameplate.

Overloads located inside Franklin motors **automatically reset**. They will trip in response to high internal motor temperatures caused by high amperage and/or by inadequate motor cooling. The overload will reset automatically after a "cool down" period, usually a few minutes. At that time, if the system is still calling for water, the pump will restart. However, if the condition that caused the overload trip is still present, the

overload will trip again and will continue to cycle off and on in this manner until the source of the problem is removed or repaired.

External Overloads

(Manual Reset): Franklin 3-Wire motors rated 1½ HP and larger use a **manual reset** type overload located in the control box. External overloads trip when the current (amperage) flowing through them is in excess of what the motor can handle.

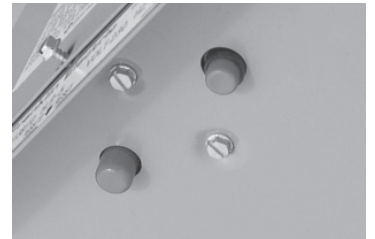


Internal overloads are installed on the motor winding.

The 1½ HP control box has a single overload that protects both the start winding and the main (run) winding. This overload uses a push-button for manual reset. Note that in some cases, manual overloads may require a fairly solid push to reset.

Control boxes rated 2 HP and larger 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 will always be on the left side. The start winding overload will always be on the right side.

All start winding overloads are of the push-button type. Main winding overloads are also push-button, with the exception of the 10 HP and 15 HP ratings. Those two ratings feature a toggle design. **Note that these toggle overloads should never be used as a switch to disconnect power to**



On Franklin control boxes rated 2 HP through 7½ HP both overloads are push-button reset.

LOCATION OF OVERLOADS IN SINGLE PHASE MOTORS

Motor Design	1/3	1/2	3/4	1	1 ½	2	3	5	7 ½	10	15
3-Wire	Motor	Motor	Motor	Motor	Control Box	Control Box	Control Box	Control Box	Control Box	Control Box	Control Box
2-Wire	Motor	Motor	Motor	Motor	Motor	2-Wire Motors Not Available In These HP Ratings					

Larger 15 HP Deluxe Control Box Now Available



The X-Large Deluxe Control Box is designed for use with Franklin Electric's 15 Hp single-phase submersible motors and is recommended for water systems that utilize standard pressure or control switches.

This control box is rated for up to 10 starts per hour with a maximum of 100 starts per day. A minimum of 3 minutes off-time between shutdown and restart is required.

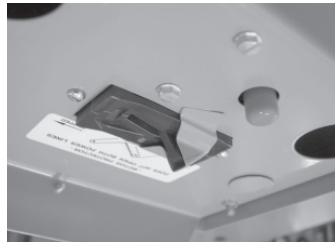
This box has approximately twice the area of the standard 15 Hp box. This makes it ideal for deep pump settings or long utility runs that require large cable to enter the box.

the motor. Even when tripped they do not totally remove power from the motor or the system.

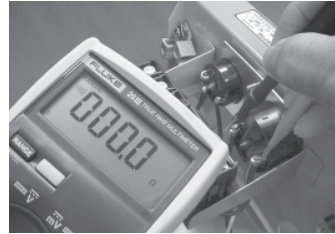
Overloads used in Franklin Electric control boxes will hold the motor's nameplate maximum amps in ambient temperatures up to 122°F (50°C). However, with extreme heat, such as when the control

box is mounted outdoors in direct sunlight, or inside a hot pump house, control boxes can experience very high internal temperatures. This reduces the amount of current the overload can carry without tripping, and nuisance tripping can occur. In such high heat conditions, longer cool-down periods may be required before the overload can be reset. Nuisance tripping of overload protectors during extreme temperature

conditions may be alleviated by providing a cooler environment for the control box, or by reducing the motor current (For more information, please refer to the Franklin AIM Manual sections titled "Control Box and Panel Environment," and "Auxiliary Running Capacitors.")



Franklin control boxes rated 10 HP and 15 HP use both push-button (start) and toggle (main) overloads.



Overloads in Franklin control boxes may be checked with an ohmmeter

Testing and Troubleshooting Single-Phase Overloads:

As mentioned above, internal overloads automatically reset and are not accessible for test purposes. However, external overloads can be easily checked with an ohmmeter.

It goes without saying that if there is no continuity through an overload, the electrical path to that particular winding is open and current will not flow. To check an overload, use your ohmmeter to measure between the two terminals that have wires attached. Use the R x 1 scale with an analog (needle)

WARNING: Never jumper around or otherwise by-pass an overload that is tripping on a regular basis. Overloads are very reliable devices that, in almost every case, are tripping due to high amperage. If the source of the high amperage is not located and repaired or removed the motor can suffer irreparable damage.

SERVICE TIP 1: Start overloads trip because of problems in the operation of the switching relay. See the Franklin AIM Manual for ohmmeter tests that can be performed to determine the condition of control box components.

SERVICE TIP 2: Main overload trips are often associated with ground faults or mechanical problems in the pump or motor. Capacitor failures may also be a factor.

SERVICE TIP 3: When investigating the problem of a main overload tripping, always ensure that the start overload has not already tripped as well. The motor may continue to run on the main winding only even though the start winding is no longer in the circuit. However, the main overload will trip when the motor tries to start on the next cycle. If either overload is tripped you should make sure both overloads are reset

ohmmeter. When using a digital ohmmeter, select the lowest ohm scale available. Resistance should measure 0.5 ohms or less. If the reading is higher than 0.5 ohms, ensure that the overload has been reset and then re-test. If it is certain that the overload has been reset, yet the resistance still measures higher than 0.5 ohms, the overload should be replaced. Consult the Franklin AIM Manual for overload replacement kit numbers from Franklin Electric.

IMPORTANT: The components in each Franklin Electric Control Box have been carefully selected for use with a Franklin Electric submersible motor. As we have discussed in this issue of Franklin AID, Franklin motors rated 1½ HP and above require overload protection in the control box, and this protection can prevent unnecessary motor failure in certain problem conditions. When you use a Franklin Electric control box, you know that your Franklin motor is properly protected.

TOLL-FREE HELP FROM A FRIEND

Phone Franklin's toll-free SERVICE HOTLINE for answers to your installation questions on submersible pump motors. When you call, a Franklin expert will offer assistance in troubleshooting submersible systems and provide immediate answers to your motor application questions.

Franklin Electric SERVICE HOTLINE 800-348-2420 FAX 260-827-5102
www.franklin-electric.com



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