

# FRANKLIN AID



Franklin Electric



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

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## Like No One Else's Product ... How SubDrive and MonoDrive Measure Water Pressure



SubDrive and MonoDrive, Franklin Electric's constant pressure controllers, cover ratings all the way from ½ to 5 horsepower, but they all use the same component to measure water pressure. We call it the SubDrive / MonoDrive pressure sensor. In this issue of Franklin AID, we'll give you a better understanding of how this rugged device works.

To begin, the SubDrive / MonoDrive pressure sensor is actually a switch. That is, it is either open or closed, much like the standard pressure switch in a conventional water system. Also, like a standard pressure switch, it uses a standard ¼-inch NPT connection. However, this is where the similarities end. The SubDrive / MonoDrive pressure sensor is different in the following respects:

- **Low Voltage / Low Current** – A conventional pressure switch operates at line voltage, generally either at 120V or 240V. The SubDrive / MonoDrive sensor operates at less than 5 volts and at a few milliamps (a milliamp is one-thousandth of an amp). This means that as it opens and closes, there isn't enough voltage or current for "arcing or sparking" to occur. This, in turn, means there's never any "pitting" or corroding of the contacts.
- **Sensitivity** – A conventional pressure switch generally operates with a 20 psi swing. That is, 30 to 50 psi, 40 to 60 psi, etc. The sensor used in SubDrive / MonoDrive is much more sensitive and open and closes with pressure fluctuations of less than ½ psi.
- **Duty Cycle** – The SubDrive / MonoDrive pressure sensor is designed for literally millions and millions of cycles. As a matter of fact, we've never been able to wear one out in our laboratory life cycle testing.

- **Proven Performance** – The SubDrive / MonoDrive pressure sensor is not unique to Franklin Electric or even to water systems. This same type of sensor is used in a myriad of commercial, automotive, and industrial applications.

It is important to remember that the SubDrive / MonoDrive pressure sensor is not a pressure transducer. Pressure transducers work completely differently, and are fairly complex. They convert pressure into an electrical signal. One of the more common types of pressure transducers converts pressure into an electrical current between 4 and 20 milliamps. The greater the pressure, the more current is delivered by the transducer to the controller. The controller can then interpret this value and adjust the VFD's speed to maintain a constant pressure.

### What is Constant Pressure?

One of the recent product success stories in the water systems industry has been the emergence of variable-speed, constant pressure products. Besides eliminating the pressure cycling associated with conventional systems, these products offer a wide range of other benefits, such as:

- **consistent spray patterns for lawn sprinklers**
- **faster cycling for appliances**
- **more efficient water treatment**
- **built-in pump protection**

Franklin Electric's variable-speed, constant pressure products are called SubDrive and MonoDrive. Both work the same way. That is, they use a variable frequency drive (VFD) to continuously adjust the speed of the pump and motor to maintain a constant, steady pressure. Both also use single-phase incoming power. The difference between SubDrive and MonoDrive is that SubDrive uses a 3-phase motor and MonoDrive uses a 3-wire single-phase motor. This makes MonoDrive perfect for retrofitting existing 3-wire, single-phase installations. This enables water systems professionals to retrofit a top-of-the-line, constant pressure system into an existing installation – without pulling the pump.

## Business Benefits for Registered Dealers

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Program benefits include:

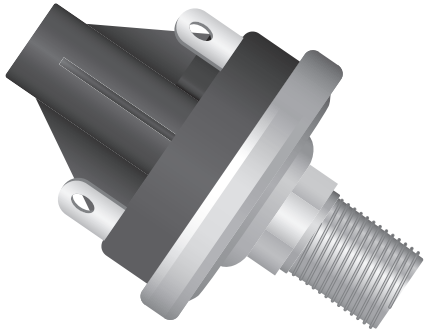
- **Extended warranties**
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- **Signage and promotional items program**
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### So, How Does It Work?

The SubDrive / MonoDrive pressure sensor works just like a standard water system pressure switch in one more respect: it is spring-loaded to a normally closed position, and water pressure opens it, breaking the circuit.



The secret is in the software of the SubDrive / MonoDrive controller. Several times each second, the controller looks to see if the switch is open or closed. If the switch is closed, the controller knows that more pressure is needed. So it speeds the motor and pump up a small amount, and then looks again. If the switch is still closed, the controller increases the motor speed a little more. At some point, the increasing motor / pump RPM will increase the water pressure enough that the switch will open. When this happens, the process reverses itself. It will continue to adjust the motor speed downward until the switch closes.

The result is that the system is constantly making small adjustments as the pressure sensor opens and closes. It's important to note that this process is transparent to the homeowner or user. That's because the controller is constantly sampling the sensor, but only making small adjustments in the motor and pump's RPM. In other words, SubDrive / MonoDrive is constantly slightly adjusting its speed, even under a steady flow condition. However, those changes in speed don't create enough of a pressure change for the end-user to ever notice. Remember, the switch has a resolution of less than 1/2 psi.

To summarize, the controller constantly looks to see if the pressure sensor is open or closed, then makes a decision to speed the motor up or down. It's really that simple.

### Adjusting the Pressure

All of the SubDrive / MonoDrive systems are factory pre-set at 50 psi. A hex driver, provided with each system, is used to adjust the pressure. First, remove the protective rubber boot and insert. (By the way, these keep the pressure adjustment hidden from the homeowner.)

Each quarter turn of the hex nut will result in a pressure change of 3 psi. Turn the hex nut clockwise to increase and counterclockwise to decrease pressure.

One more note: SubDrive300 has 2 pressure sensors. The first is no different than the sensor in the other Franklin Electric variable-speed products. However, because SubDrive300 is a 5 hp system, a second pressure sensor must be installed to handle potential overpressure situations. This sensor is factory-set at 100 psi and cannot be adjusted. If the system pressure exceeds 100 psi, this switch opens, thereby shutting down the SubDrive300.

### Troubleshooting

Because the SubDrive / MonoDrive pressure sensing and adjustment system is so simple, it facilitates troubleshooting. As mentioned above, the sensor is normally closed. Therefore, a quick way to determine if a problem is with the drive or the sensor is to connect the pressure sensor leads momentarily. The SubDrive / MonoDrive Controller should interpret this as a need to operate and develop pressure. If the drive runs, the problem may be with the sensor. To check the condition of the sensor, disconnect it, and then place an ohmmeter across the connections. It should read "shorted" or 0 ohms. If it reads "open", this indicates a faulty switch that must be replaced.



In summary, all of Franklin Electric's SubDrive and MonoDrive products use the same pressure sensor. It is a very sensitive, rugged, low-voltage switch capable of millions of cycles. It opens and closes in response to small changes in water pressure, and the controller adjusts the speed correspondingly.

Like many things, the simplest way to do something is often the best. In the case of constant pressure controllers, SubDrive and MonoDrive prove that adage once again.

## 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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