# DRI-STOP© 2R & 2RE PUMP PROTECTOR



| FLOW ACTIVATED | | |
|---|---|---|
| **MODELS** | **PRICE CODE** | **CONTROL CIRCUIT NOS.** |
| **DSWF-1/4** | **24V/1/50-60**<br>**115V/1/50-60** | **99-1116R***<br>**99-1152-R*** |
| **DSWFE-1/4** | **24V/1/50-60**<br>**115V/1/50-60** | **99-1116RE****<br>**99-1152RE**** |

**Refer to Bulletin A-105 and Parts List P-0675.**

* PCB (2-3/4" x 1-1/16" x 3-1/2") is mounted in motor starter (ordered separately).
** PCB is enclosed in Dri-Stop case. Motor starter ordered or provided separately, and field wired to Dri-Stop. Includes mounting bracket for 56, 140 & 180 'C' face motor frames.

## DESCRIPTION

The Dri-Stop 2 Switch is designed to sense low flow in bearing flush water for sump pumps and seal cooling water for double mechanical seal pumps to open the motor control circuit to stop pump/motor to prevent dry operation and possible subsequent failure of pump components.

The Dri-Stop Switch is available factory wired to a motor starter in which instance it is necessary only to bring the proper electrical supply to terminals L1, L2, & L3 in the starter. When the motor starter is provided and wired by the user, wiring of the Dri-Stop, motor and starter must be made on site. For the latter, refer to wiring diagrams on Pages 4 and 5 as a guide only since the diagrams apply to starter wired at factory.

## DESCRIPTION OF SERFILCO STARTERS

**SPB4 MANUAL MAGNETIC PUSH-BUTTON-**
**IP 54 watertight enclosure (NEMA 4X)**

For STOP-START control of single or three phase motors. Manual reset. Will not allow automatic restart. Recommended for double mechanical seal pumps. Includes fused industrial control transformer (230/460 to 24VAC) for low voltage control circuit.*

**SA4 MANUAL MAGNETIC SELECTOR SWITCH-**
**IP 557 watertight enclosure (NEMA 4X)**

For manual HAND-OFF-AUTOMATIC control of single or three phase motors. Allows automatic restart. Recommended for pumps with bearing flush water and operated by level control switch. Includes fused industrial control transformer (230/460 to 24VAC) for control circuit.*

## ⚠ SAFETY PRECAUTIONS

1. All wiring should be in accordance with local electrical codes.
2. Make all electrical connections by following wiring diagrams on Pages 4 and 5 as a guide. Follow local requirements.
3. For 460V service, a transformer is required to protect the Dri-Stop switch or a separate 115-230V line must be wired to it.
4. Thoroughly check all wiring before energizing.
5. Functionally check motor starter and Dri-Stop Pressure Switch for correct operation at normal and abnormal conditions of pump operation.

***NOTE: 115 volt starters have 115 volt energizing coil, no control transformer.**

## GENERAL DESCRIPTION FLOW ACTIVATED

### DSWF-¼ & DSWFE-¼

The flow switch acts as a small generator with a detection circuit. Fluid flowing through the switch spins a magnetic rotor to induce voltage in a coil. This voltage is measured by a simple electronic circuit which compares it to a factory set (resettable) trip voltage. When the voltage is above the set point, a relay is held in its active position. If it falls below the set value, or fluid stops flowing, the relay returns to the inactive position and triggers your alarm system or opens the coil control circuit in the magnetic starter.

The relay trip point is set by adjusting a potentiometer which is mounted on the PCB.

***NOTE**: These units are factory set for 0.1 GPM. If used for multiple bearing sump pumps, reset unit to a higher set point per pump operating instructions.*

The switch is sensitive to the direction of flow. The direction of paddlewheel rotation would be clockwise. If it is necessary to mount the switch so that the inlet and outlet are reversed, the black and white wires should be reversed either at the pickup coil or on the electronics board.

The operating range is the minimum and maximum flow rates which will effectively and reliably rotate the paddle-wheel. The trip point range is minimum and maximum flow rates which will effectively and reliably cause the flow switch to switch.

The trip point for the relay may be set anywhere within the flow range. (See "Setting the Trip Point" below.) Regardless of the trip point setting, the actual flow through the switch should not exceed the maximum of the range. An excessive flow rate is easily identified by a loud buzzing created by vibrations in the switch when the flow range maximum is exceeded. Prolonged operation in this mode will decrease the switch life.

## MOUNTING

For best results, the flow switch should be mounted with the face plate in a vertical plane. The switch may be rotated to any orientation.

> The switch is sensitive to the direction of flow. Because the magnets are of the same polarity, reversing the flow will invert the electrical signal generated in the pickup coil.

If it is necessary to mount the switch so that the inlet and outlet are reversed, this may be compensated for by reversing the two quick-disconnect connectors that attach

to the coil on the back of the body. (Make sure that the switch is unplugged before doing this.)

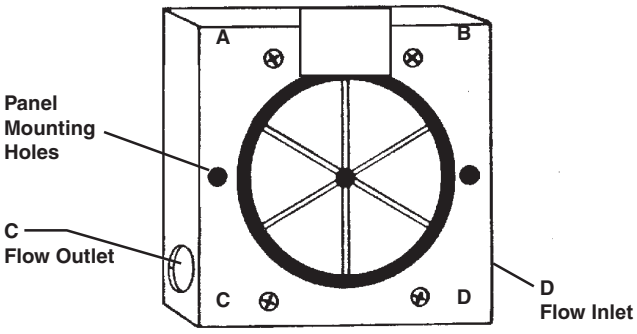



**DIAGRAM A**
**FLOW SENSOR**

The switch may be mounted behind a panel using the two holes designated in Diagram A. Remove the screws from these holes and place the switch behind the panel. (The panel will normally include a circular cutout so that the rotor will remain visible. However, this is not needed if a visual indication of flow is not desired.) Attach the switch to the panel using 8-32 threaded screws. The length of the screws should be approximately 0.4" plus the thickness of your panel.

It is generally undesirable to mount any plumbing immediately over electronic controls or instruments, as leaks could cause damage to the electronics.

## FLUID CONNECTIONS

It is recommended that all connections be sealed using TFE plumbing tape, or any other standard sealing material except for anaerobic pipe sealants. If the fluid may contain particles, it is good practice to filter it. 100 micron is recommended. This is not essential, however, for operation of the switch.

In cooling systems, the switch is normally mounted on the system outlet to assure that cooling loss does not occur within the system being protected. If for example, a hose breaks in the system, a switch mounted on the inlet will not detect the problem but a switch on the outlet will.

The rotor will always spin in a clockwise direction when the fluid lines are correctly connected.

## SETTING THE TRIP POINT (FACTORY SET AT 0.13)

The flow rate at which the relay trips is set by adjusting a 20 turn potentiometer. The potentiometer is mounted on the edge of the PCB. The trip point is raised by turning the potentiometer counterclockwise and lowered by turning it clockwise.

To set the trip point, install the switch in the fluid circuit and adjust the fluid flow to the level at which the relay is to trip. Make sure that the flow rate is steady and all air has been purged from the fluid line.

Connect an ohm meter to either the normally open or normally closed relay outputs (see the "Relay connections" sections below.) Adjust the potentiometer until the relay trips, as shown by the ohm meter. Keep in mind that the trip point is slightly different for rising and falling flow rates. For applications where a precise setting is required, be sure to test the trip point setting by either reducing the flow rate to fall through the trip point or increasing it to rise through the trip point, depending on which condition is expected in operation.

## RELAY CONNECTIONS

Both the normally open (standard for run dry operation) and normally closed contacts on the relay may be used.

The relay can switch up to 5 amps at 28VDC or 220VAC with a non-inductive load. Inductive loads should be derated to allow for surges. Higher currents, including surges, can weld the relay contacts, causing failure of the switch.

## REMOTE MOUNTING THE ELECTRONICS

The electronics may be mounted up to thirty feet from the mechanical portion of the switch.

⚠ To remote mount the electronics:

1. Unplug the switch.
2. Disconnect the electronics from the body of the switch by removing the four mounting screws on the back of the body.
3. Slowly pull the electronics away from the body until the wires connecting them are taut.
4. Using needle-nose pliers, pull apart the quick-disconnect connectors attaching two wires to the coil.
5. Remove the back of the electronics housing, which is now loose.
6. Remove the two wires connecting the pickup coil to the PC board.
7. Select a two-wire cable with 24 AWG or larger conductors. A shielded cable is desirable in electrically noisy environments. Crimp two female quick-disconnect connectors (Panduit DV-18-188FI-M or equal) to two conductors on one end of the cable.
8. If shielded cable is used, attach the shield to the ground on the input power connector.
9. Run the cable to the electronics module, stress relieving it as needed.
10. Insert the leads from the coil in the two PC board connector positions from which the old leads were removed. Determine which lead was connected to the right hand pin in the body as the body is held with the pins up and the back facing you. This lead must be inserted on pin marked '**B**'. The other lead is on pin marked '**W**'. See below.

## MAINTENANCE

Maintenance of the switch is normally limited to cleaning the chamber in which the rotor spins. It may be necessary to replace the 'O'-ring during cleaning.

The frequency of cleaning will vary with the type of fluid being run, and the cleanliness of the fluid. The switch should be cleaned at least annually.

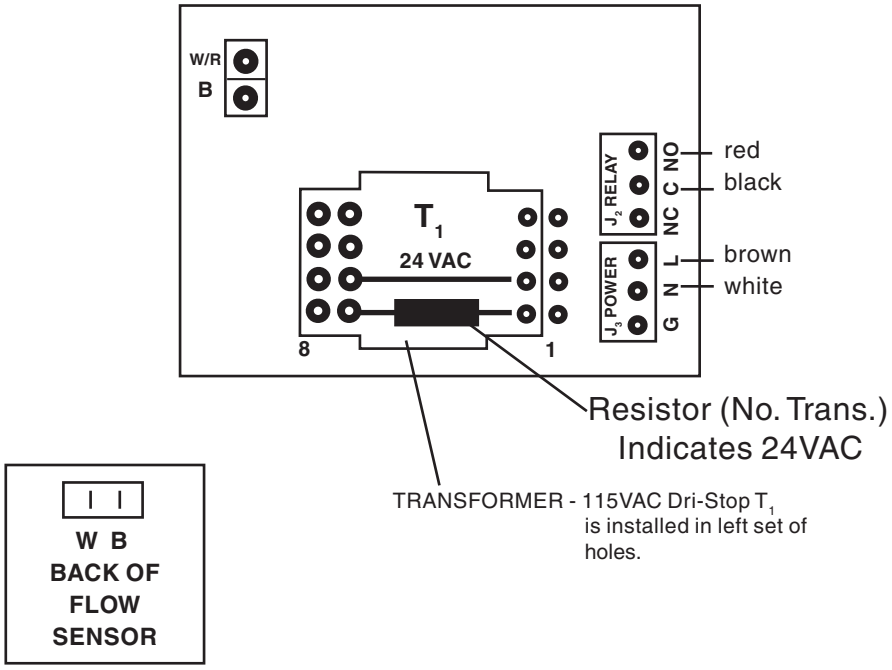
To clean the switch, turn off the water or other fluid, remove the six screws holding the window and remove the

window, pin and rotor. Clean each of these as well as the chamber. (Usually, wiping with a damp cloth will be sufficient.) Check the 'O'-ring to assure that it is not brittle, cracked or damaged. If it is, replace it.

Reassemble the switch and verify that the calibration is still correct by following the procedure "Setting the Trip Point" on Page 2.

The torque needed for each screw on the face plate is 10 inch-pounds.

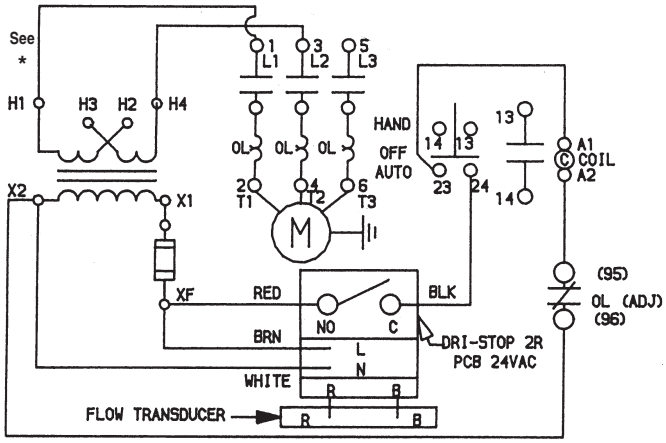
## Partial Schematic of PCB.



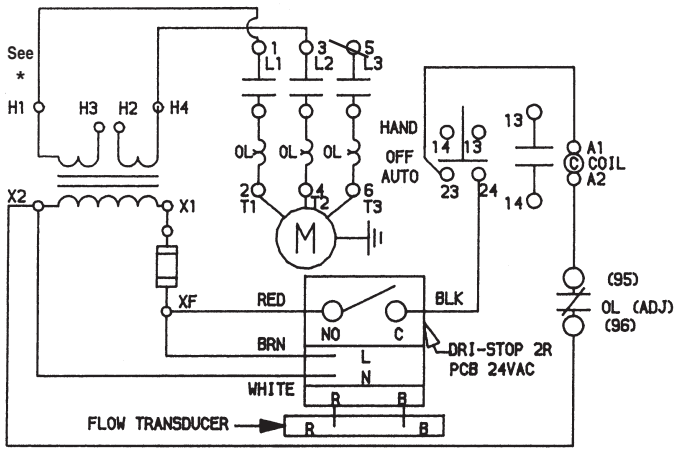
# WIRING DIAGRAMS

## For use with SA4 Motor Starters

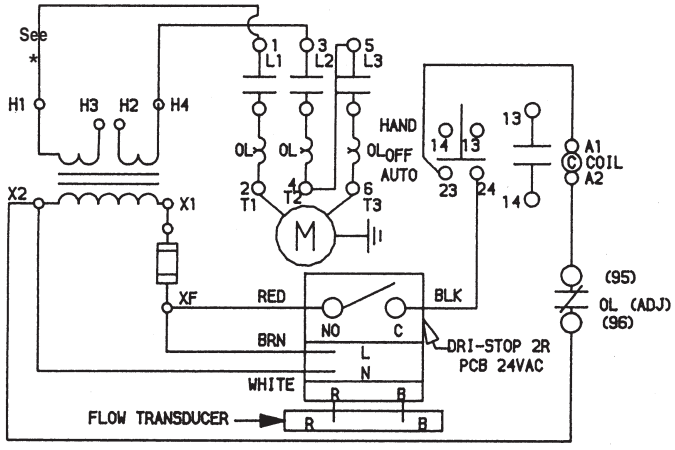
### (A) STARTER 460V/3Ø/50-60 CONTROL CIRCUIT 24VAC



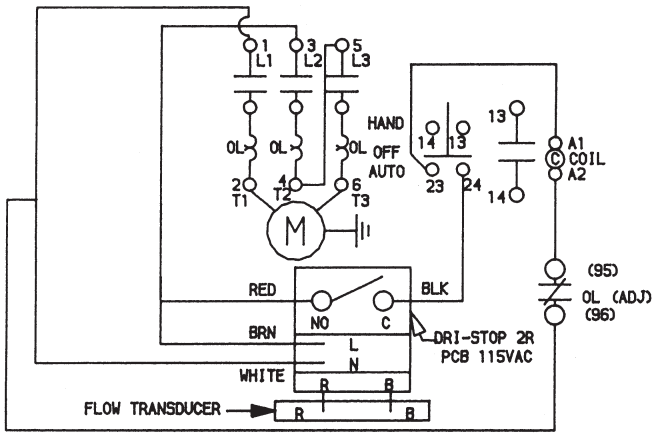

### (B) STARTER 230V/3Ø/50-60 CONTROL CIRCUIT 24VAC




### (C) STARTER 230V/1Ø/50-60 CONTROL CIRCUIT 24VAC




### (D) STARTER 115V/1Ø/50-60 CONTROL CIRCUIT 115VAC




*** See label on transformer for primary jumper connections.**

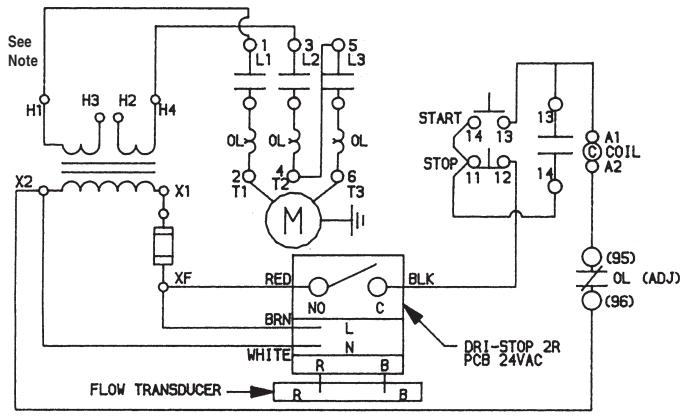
**NOTES:**

1. **Hand position is not wired.**
2. **Dri-Stop 2R can be used with 24VAC or 115VAC control circuit.**

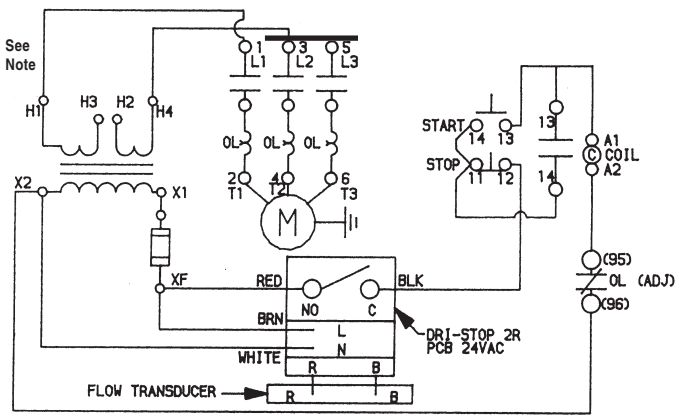
# WIRING DIAGRAMS

## For use with SPB4 Motor Starters

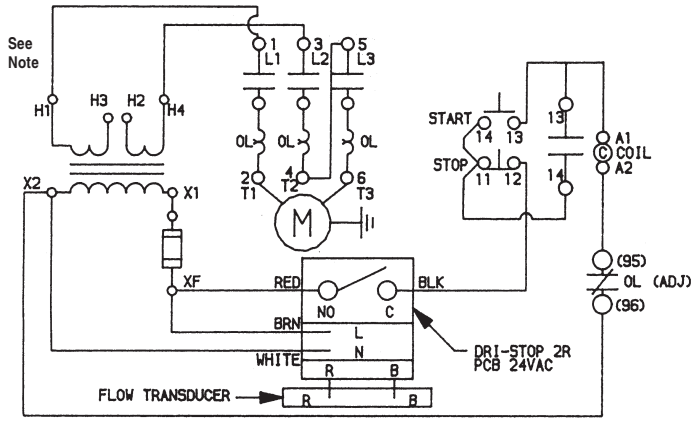
### (A) STARTER 460V/3Ø/50-60 CONTROL CIRCUIT 24VAC



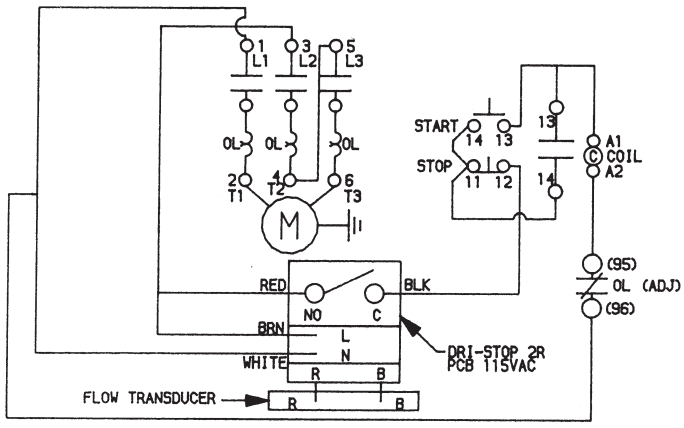

### (B) STARTER 230V/3Ø/50-60 CONTROL CIRCUIT 24VAC




### (C) STARTER 230V/1Ø/50-60 CONTROL CIRCUIT 24VAC




### (D) STARTER 115V/1Ø/50-60 CONTROL CIRCUIT 115VAC




**NOTE: See label on transformer for primary jumper connections.**

## SPECIFICATIONS

**Flow Rate**
Three ranges -
0.2 - 2.5 GPM

**Maximum pressure**
100 PSI (690 kN/m$^2$)

**Maximum Pressure Drop**
**Approximately equal to drop through 3" length of pipe with same diameter as switch connections.**

**Maximum Temperature**
Flow switches are suitable for liquid temperatures up to 212°F (100°C).

Ambient temperatures for the electronics should not exceed 100°F(38°C)

**Dimensions Flow Transducer Assembly**
'RE' Models (Not shown)
2.75" high x 3.0" wide x 4.4" deep

'R' Models
2.75" high x 3.0" wide x 2.25" deep

**Electrical Requirements**
**24 VAC, 110 VAC, 1Ø, 50/60 Hz**
**Current drawn - 30mA maximum**

**Relay**
SPDT 5 amp non-inductive contact rated at 220 VAC or 28 VDC. Mechanical rating above one million cycles.

**Maximum Distance to Electronics**
50 feet (15 meters) from switch

**Pipe Connections**
Size ¼" NPT

**Hysteresis**
**15%. Hysteresis is the difference in the point the switch is tripped by rising flow and by falling flow. Some hysteresis is desirable since it inhibits cycling if flow is near the trip point.**

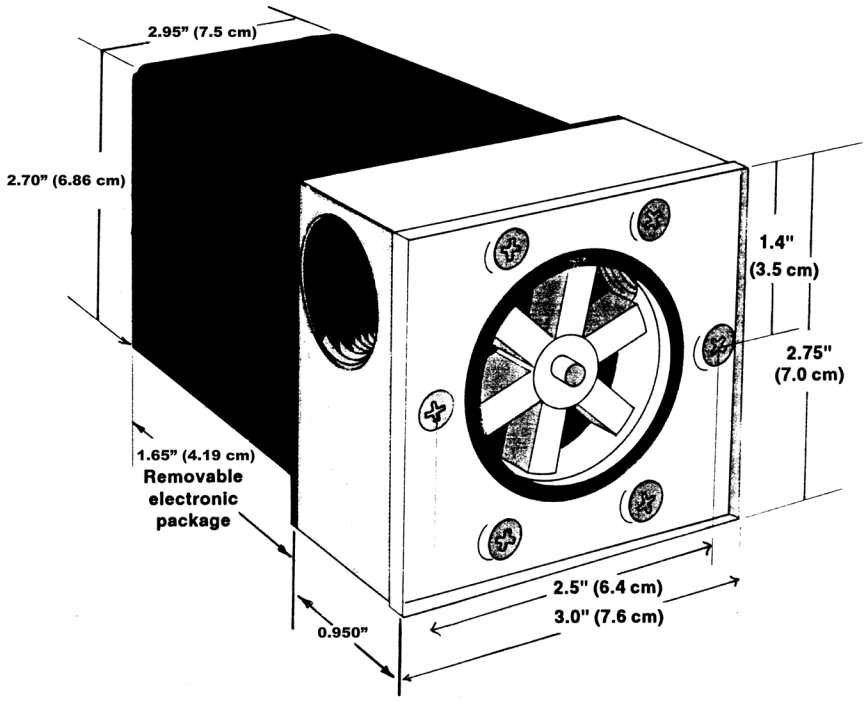
## WETTED MATERIALS

Wetted materials include polysulfone for the face plate, 316 stainless steel for the pin, a Buna-N 'O'-ring, a nylon based composite rotor and an acetal body.

## VISCOSITY

**The flow switches are suitable for use with fluids compatible with the wetted materials and with low to moderate viscosities (up to 30 weight oil.)**

## DRI-STOP 2RE

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