

HEATEC TEC-NOTE

Publication No. 5-04-123

Use of pressure switches to sense flow of thermal fluid

Heatec has used a variety of pressure switches in helical coil heaters to determine flow of thermal fluid. The switches are in limit circuits that shut down the heater when abnormal flow is detected.

It's extremely important to maintain adequate flow to avoid damaging the heater coil, to prevent breakdown of the thermal fluid and to achieve efficient use of the heat produced by the burner. Worse yet, a fire could result if there is leakage of thermal fluid inside the heater.

Abnormally *low* flow can result either from blockage in the thermal fluid circuit or from leakage due to a rupture in the coil or piping, or from a pump malfunction, etc.

Blockage is the most common problem. It is usually due to a strainer clogged by debris that the thermal fluid has picked up from the piping. This is more apt to happen upon the initial startup of the heater when there is debris left over from the manufacturing process and installation of the piping.

HISTORY

Figure 1 shows a history of what switches we have used and when we started using them. Early construction heaters had no pressure switches and are not pictured in Figure 1. We have improved our heater controls over the years. We have also made changes to meet insurance codes.

For a brief period we used certain types of pressure switches that proved to be unsatisfactory for use on Heatec heaters. The switches were made by Mid-West instruments and are shown in the accompanying photo. Their reed switches cannot handle the current in limit circuits of some of our heaters. As a result the contacts may fail, providing no protection against abnormal flow. Moreover, high oil temperatures may cause leakage in their internal sensing parts.

HOW EACH SYSTEM WORKS

It's important to understand the protection offered by each system, past and present, and its limitations.

Heaters with no pressure switches have no protection against abnormal flow of thermal fluid. Thus, the heater will not shut down automatically in the event of blockage, leakage or pump failure.



United Electric Controls J400-S156B



United Electric Controls J400K-S147B



Mid-West Instrument Models 120 and 122



Barksdale Dialmatic CDPD2H-A80SS

We strongly recommend replacing all Mid-West Instrument pressure switches on Heatec heaters as soon as possible with Barksdale Dialmatic switches.

We will provide a Barksdale switch free of charge for any Heatec heater that originally had a Mid-West switch, even though the heater may be out of warranty.

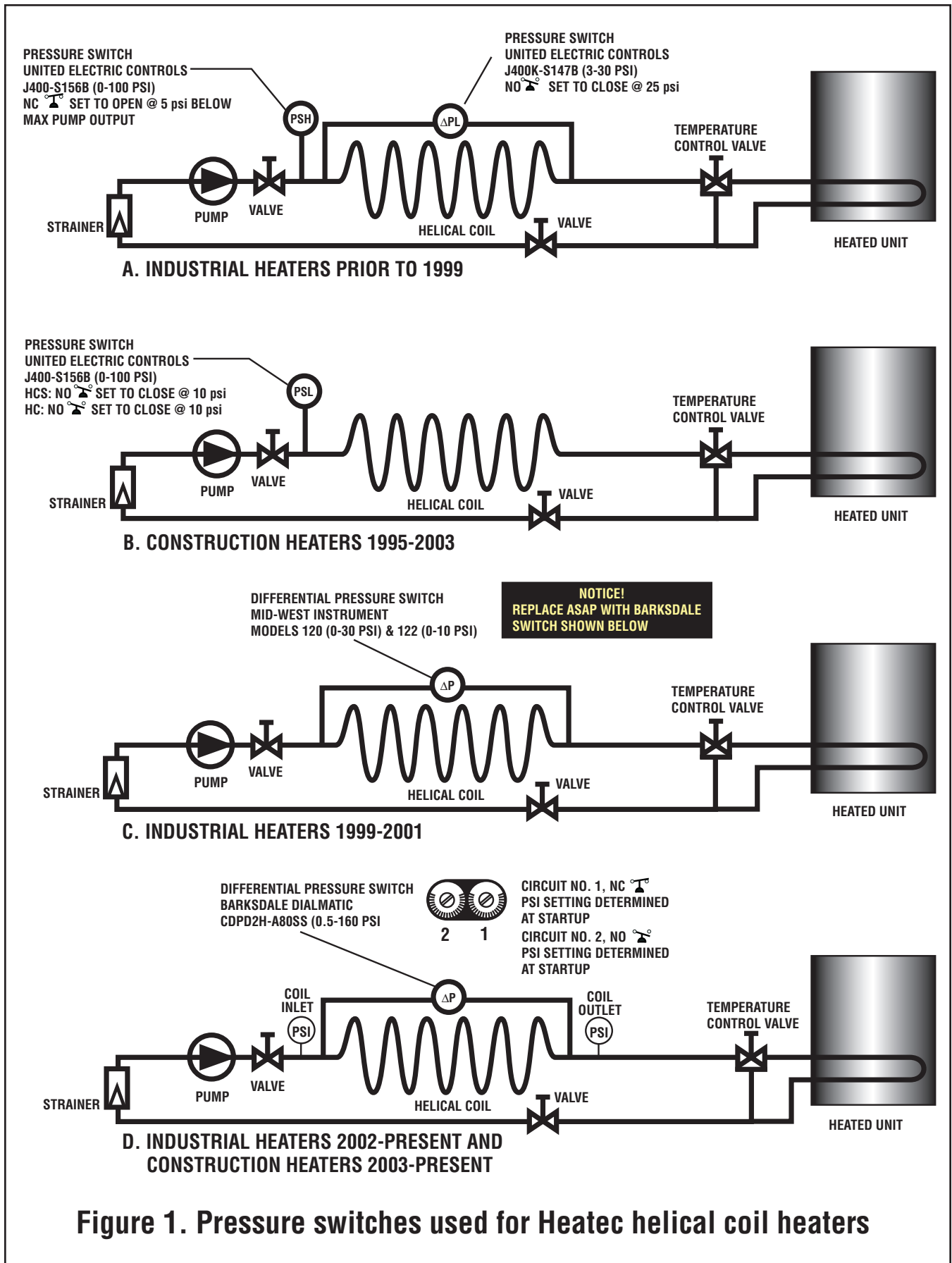


Figure 1. Pressure switches used for Heatec helical coil heaters

INDUSTRIAL HEATERS PRIOR TO 1999 (A, FIGURE 1)

Pressure switch PSH will shut down the heater in the event of abnormally *high* pressure due to blockage in the coil. Moreover, switch Δ PL will shut down the heater in the event of abnormally *low differential pressure* due to blockage, leakage or pump malfunction.

Switch J400-S156B (shown as PSH) contains a single pole double throw (SPDT) switch. Its normally-closed (NC) contacts should be set to *open* at a pressure of 5 psi lower than maximum pump output. Its normally-open (NO) contacts are not used on these heaters.

Switch J400K-S147B (shown as Δ PL in A, Figure 1) contains a single pole double throw (SPDT) switch. Its normally-open (NO) contacts should be set to *close* at a pressure of 25 psi. Its normally-closed (NC) contacts are not used on these heaters.

CONSTRUCTION HEATERS 1995 TO 2003 (B, FIGURE 1)

Pressure switch PSL will shut down the heater in the event of abnormally *low pressure* due to a clogged strainer or pump malfunction. However, it may not protect against *low flow* due to leakage or blockage in other parts of the system.

Switch J400-S156B (shown as PSL) is the same switch as in A, Figure 1. But here it is used to sense *low* pressure. On HCS (single line) heaters its NO contacts should be set to *close* at a pressure of 10 psi. On HC (manifold heaters) heaters its NO contacts should also be set to *close* at a pressure of 10 psi. Its NC contacts are not used on these heaters.

INDUSTRIAL HEATERS 1999 TO 2001 (C, FIGURE 1)

Switch Δ P will shut down the heater in the event of abnormally *low flow* through the heater coil due to pump malfunction or blockage or leakage anywhere in the system. The problem is the limitations of the switch, which should be replaced as previously noted.

INDUSTRIAL HEATERS 2002 TO PRESENT AND CONSTRUCTION HEATERS 2003 TO PRESENT (D, FIGURE 1)

Switch Δ P will shut down the heater in the event of abnormally *low flow* through the heater coil due to pump malfunction or blockage or leakage anywhere in the system.

Please refer to Heatec Tec-Note, Publication No. 5-04-122 for information on setting Barksdale pressure differential switches now used on all Heatec thermal fluid heaters.

Please call Heatec to obtain Barksdale switches to replace Mid-West switches. Please ask for Randy Osby or Eddie Griffith. Phone 1-800-235-5200