

Differential Temperature Control across a Heat Exchanger

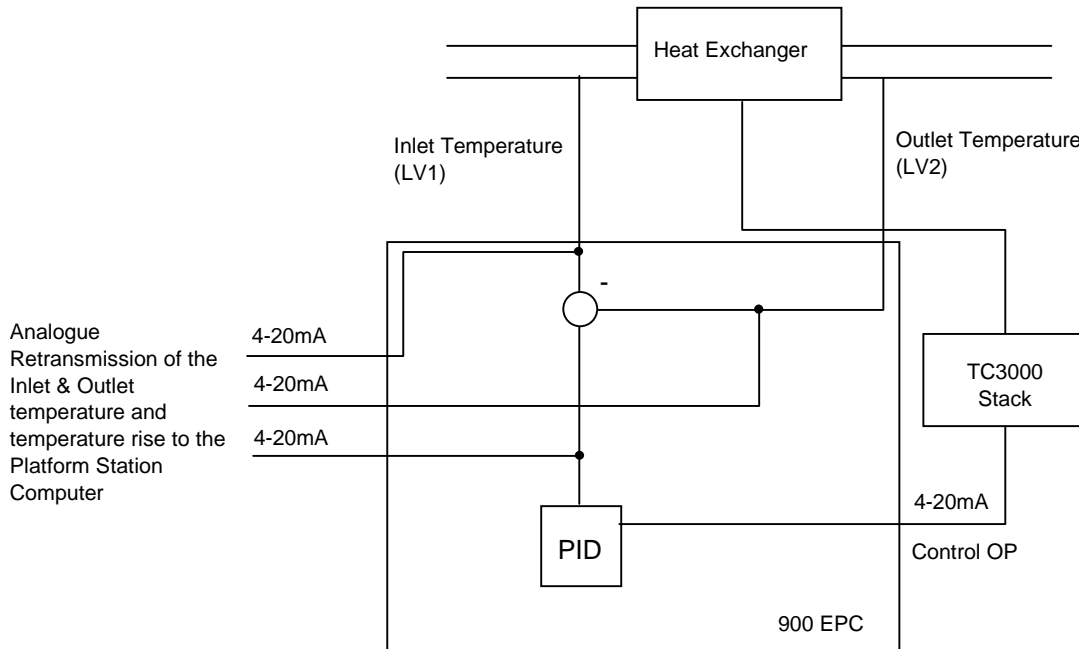
Author: Dave Tilbrook & Jim Tebbs
Sales

This application is to control the temperature rise across the inlet and outlet of an electrical heat exchanger to give a constant temperature difference (rise) across the heat exchanger.

- **Differential Control using Derived Inputs**
- **Offshore installation using the 24V Power Supply**
- **Multiple Analogue Retransmissions**

The heat exchanger forms part of the Distributed Control System on a North Sea Oil/Natural Gas Platform. The controller has to be able to communicate the inlet temperature, outlet temperature and temperature difference to the Platform Station Computer using 4-20mA

analogue retransmission. It is also necessary to display both the outlet temperature and the temperature difference simultaneously. Being an off-shore installation the controller has to operate from a 24V supply. The application is illustrated in the diagram below:



Temperature Difference Control across a Heat Exchanger on an Offshore Platform

The 917D Dual Loop Derived input controller satisfies all the requirements. Although there is only one PID loop required, a dual loop controller is used so that both the outlet temperature and the temperature rise can be displayed on the page. The process values are derived as follows:

$$\begin{aligned} \text{PV1} &= \text{LV2} \\ \text{PV2} &= \text{LV2} - \text{LV1} \end{aligned}$$

It is the second loop that provides the control signal. The 24V mains supply is available as an option on all 900 EPC instruments. Support for the analogue retransmission of

the three parameters LV1, LV2 and PV2 is also available on all 900 EPC instruments. Option slots are available to provide the necessary deviation high and low alarms on PV2 for out of limits indication to the Platform Control system.

The first of these systems has already been commissioned and instrumentation has been provided for two further systems. About sixty such systems are due for refurbishment by one major North Sea operator alone.