A well designed steam and water analysis system (SWAS) provides reduction as well as regulation of three critical parameters – temperature, pressure and flow. The system needs to feed the sample to various online analysers for analysis.

Samples from services like superheated steam, saturated steam and drum water need to be handled carefully since they are at very high temperatures. The sensors of online analysers like pH, conductivity, silica, dissolved oxygen and sodium cannot directly handle samples at such high temperatures. The samples therefore need to be conditioned and cooled to temperatures suitable for the analysers. A well-designed sample cooler takes care of the temperature reduction requirement.

However, sample coolers can fail if,

- there is sudden reduction in flow of cooling water
- sample coils fail due to stress corrosion cracking (this usually happens due to chloride attacks and other cooling water quality issues)
- there is inadvertent increase in sample flow

An over-temperature protection system can prevent the analysers from getting damaged due to exposure to high temperature samples.

The Forbes Marshall Solution

The Forbes Marshall Relisafe™ TP temperature safety shutoff valve blocks high temperature samples and protects operators, analysers and sampling components from high temperature liquids. It is an economical and reliable mechanical replacement for a solenoid shutoff valve and temperature controller, requiring no external source of electricity, air or hydraulics.
Features

Self-reliant temperature shutoff valve with manual reset feature as per ASME PTC 19.11-2008
High pressure rating for blocked samples
No electrical power supply required
Quick response
Back pressure resistant
Temperature sensing element not exposed to high temperature sample when valve is shutdown
Optional contact for remote alarm indication
Applicable design standard: ASME PTC 19.11 guidelines for sampling system, ASME section VIII, division-II

Working Principles

The sensing element of the Relisafe™ TP is directly exposed to the sample medium. This valve is normally open and allows the sample to pass through it. If the sample temperature exceeds the valve set point, the sensing element will close the valve to protect the analysers and other instruments downstream from over-temperature damage.

High temperatures actuate the sensing element and close the plunger to immediately shut off the sample downstream. This valve is designed to Block High pressure sample and latch in this position.

The temperature set point is fixed at the factory and cannot be changed at site. When the sample temperature is restored, the sample can be allowed to flow in the normal path only after resetting the valve.

Installation

Relisafe™ TP should be installed downstream of the pressure reducing device and upstream of the analysers, rotameters and other low pressure devices. After a trip, the upstream side of the Forbes Marshall TSV will be exposed to the full source pressure. The temperature sensing element will not be exposed to high temperature samples when the valve is shut down.