

TETRASENTRY

TURBINE HYDRAULIC TRIP SYSTEM



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QUAD-REDUNDANT TURBINE HYDRAULIC TRIP SYSTEM

APPLICATION

Preventing overspeed has always been the primary focus for turbine safety system design.

Recent changes to industry standards such as API612 (Special-Purpose Steam Turbines for Petroleum, Chemical, and Gas Industry Services) and API670 (Machinery Protection Systems) have highlighted the importance of considering the performance of all components in the safety chain. The hydraulic trip block (or dump valve) is a critical link in that chain.

In the Petroleum, Chemical and Gas Industries there are various hydraulic trip block (dump valve) configurations including: single, redundant and multiple redundant architectures. Until now each of these configurations has been a compromise of one type or another.

A single solenoid valve for dumping the trip oil is simple but it can't be tested without bypassing the safety function and is subject to spurious tripping. Two parallel valves can be tested online, but are also subject to spurious tripping. A few manufacturers provide two-out-of-three trip blocks that are testable online and prevent spurious trips, but these designs have components that cannot be repaired online without bypassing.

With the TetraSentry there are no compromises;, no single component failure can cause a trip and no single component failure will prevent a trip. Additionally, all the active components can be repaired online without bypassing the trip.



Fully assembled, ready to install - All components are mounted and installed, making installation simple; bolt the frame to the floor, attach the piping and connect the field wiring to the terminal strip in the junction box

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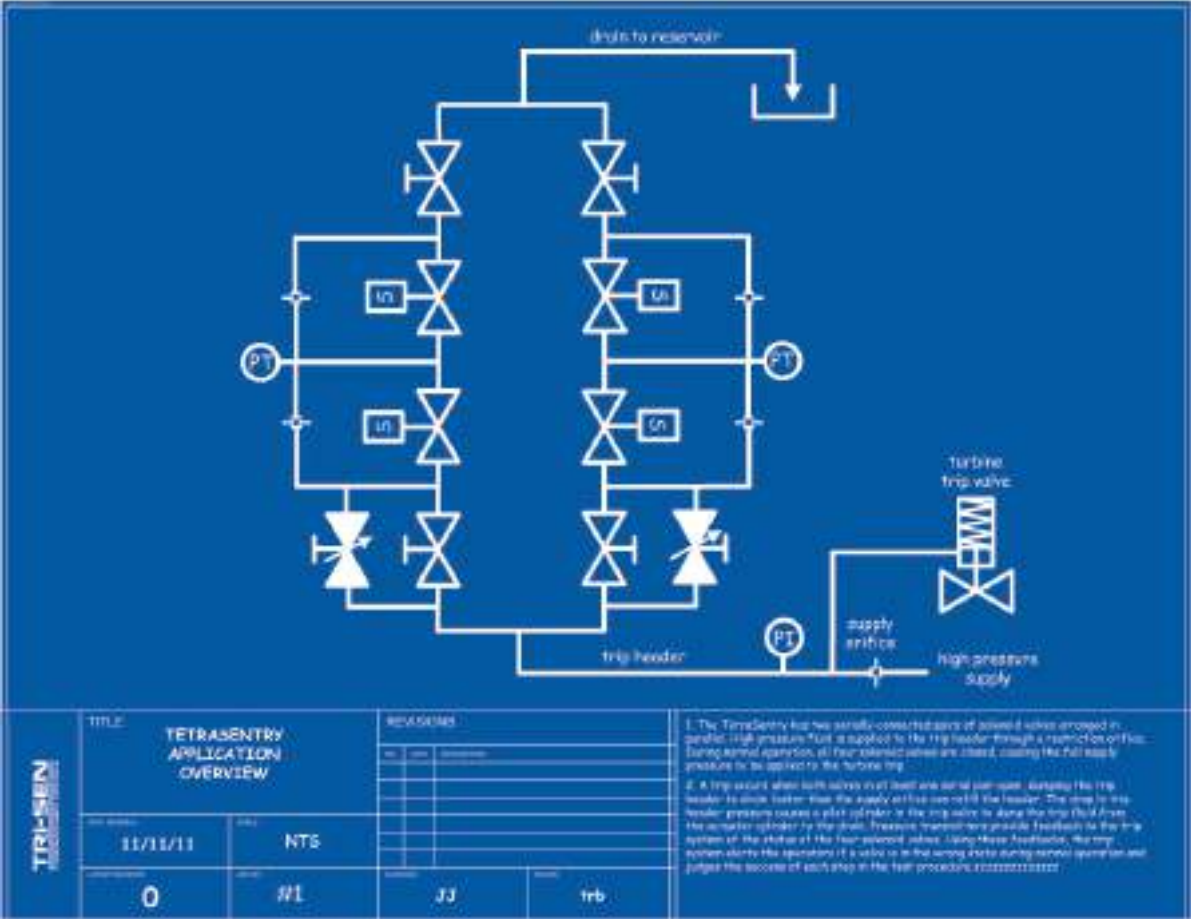
OPERATION

The theory of operation for the TetraSentry is simple. It's connected to the hydraulic trip header in parallel with the turbine trip valve. During a trip action, the high capacity solenoid valves dump the trip header fluid to the reservoir faster than the supply orifice can refill it.

The TetraSentry has two serially-connected pairs of solenoid valves arranged in parallel. High pressure fluid is supplied to the trip header through a restriction orifice. During normal operation, all four solenoid valves are closed, causing the full supply pressure to be applied to the turbine trip valve actuator. A trip occurs when both valves in at least one serial pair open, dumping the trip header to drain faster than the supply orifice can refill the header. The drop in trip header pressure causes a pilot cylinder in the trip valve to dump the trip fluid from the actuator cylinder to the drain.

Pressure transmitters provide feedback to the trip system of the status of the four solenoid valves. Using these feedbacks, the trip system alerts the operators if a valve is in the wrong state during normal operation and judges the success of each step in the test procedure.

Block valves around each serial pair allow all the active components to be repaired online without compromising the trip function. Needle valves around the trip header block valves allow the system to be refilled after the system has been opened for maintenance.



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Easy maintenance - All piping connections are made at the back of the unit (no active components are mounted on the back). The manifold is arranged to segregate serviceable components into associated groups. Galvanized frame and stainless steel junction box eliminate need for painting. Block and bleed valves for instruments allow service and calibration.

FEATURES

Standard Features

- Manifold-mounted components
 - Solenoid valves (4)
 - Full-flow block valves (4)
 - Restriction Orifices (4)
 - Cartridge filters
- Pressure Transmitters (2)
- Stainless steel junction box with terminal blocks
- Support frame
- Companion flanges
- Viton O-rings and seals
- Fully tubed and wired
- Independently verified to meet SIL3 requirements

Optional Features

- Buna-N O-rings and seals
- Trip header pressure transmitters
- Class 1, Div 1 electrical components
- Drain accumulators

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SPECIFICATIONS

Materials

Manifold	Aluminum
Frame	Galvanized Steel
Junction Box	Stainless Steel

Performance and Power

System CV	10
Solenoid Voltage	24V DC, 120V DC, 120V AC
Solenoid Power	30W

Dimensions (WxHxD)

Junction Box	12" x 16" x 12"
Manifold	16" x 12.5" x 9"
Package	32" x 63" x 19"

Weights (total)

Aluminum manifold	520lb
Stainless Steel manifold	850lb

Certifications

SIL Rating	Independently verified to meet SIL 3
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DIMENSIONS

32"W x 63"H x 19"D

