Turbine Hydraulic Trip System

Overspeed Systems and Response Times

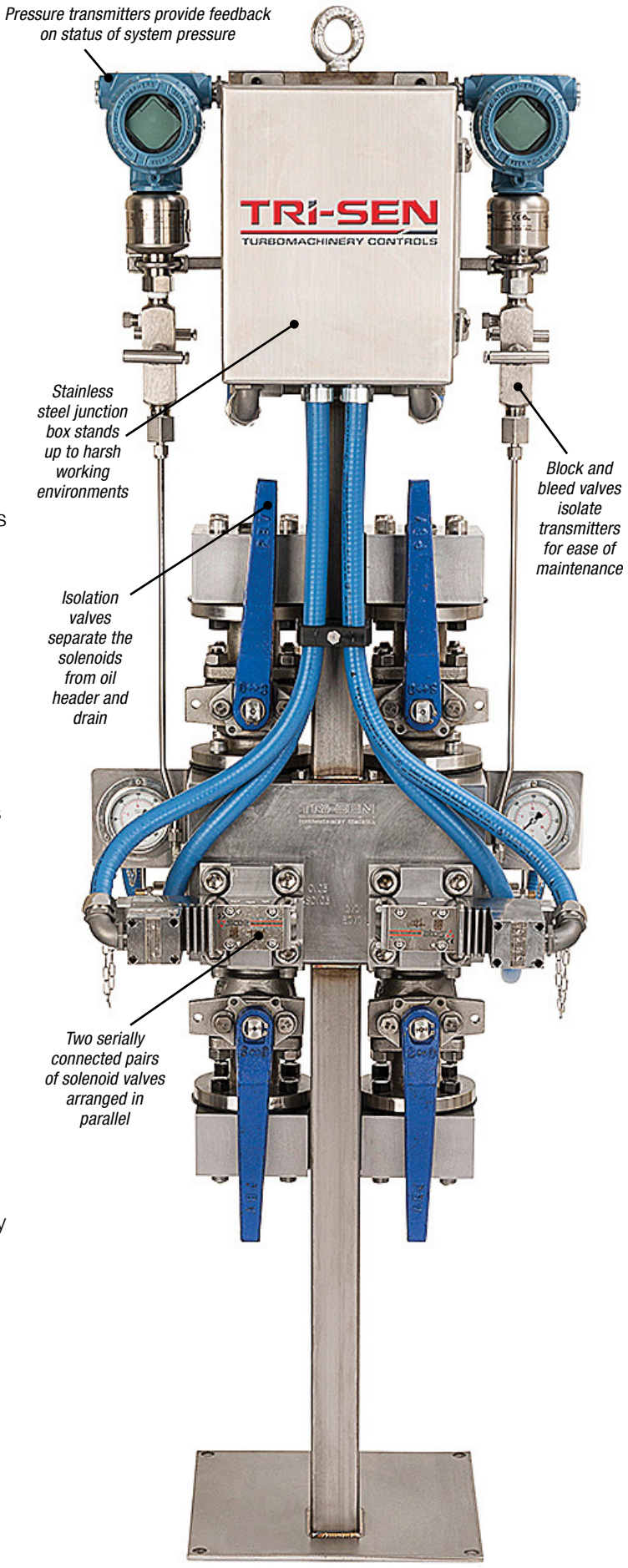
Because many turbine failures are attributed to overspeed events, preventing overspeed is fundamental to turbine safety system design. Working in tandem with an electronic overspeed system, the TetraSentry hydraulic trip system, is capable of tripping a turbine within 40 milliseconds (ms) of overspeed detection. In the event of an overspeed event, the Tetrasentry's rapid trip response quickly and safely shuts down the turbine, thereby preventing damage or possible catastrophic failure.

Quad-Redundant Turbine Hydraulic Trip System

The TetraSentry hydraulic trip system has fewer parts and a smaller component footprint than alternative systems. The TetraSentry is a fault-tolerant, high-speed, compact, dual parallel redundant trip block that is both online testable and repairable. Quad-redundancy ensures that no single component failure will cause a spurious trip and that no single component failure will prevent a trip when needed. For easy maintenance, all piping connections are made at the back of the unit. The manifold is arranged to segregate serviceable components into associated groups. A galvanized frame and stainless steel junction box eliminates the need for painting.

Elliott Tri-Sen Turbomachinery Controls Alliance

The Elliott Tri-Sen Turbomachinery Controls Alliance provides a single point of contact for advanced turbomachinery controls and the full scope of rotating equipment expertise. Through its alliance with Tri-Sen, Elliott provides machinery protection systems such as the TetraSentry hydraulic trip system as standard offerings with new Elliott turbines. Elliott will also retrofit already installed equipments with advanced Tri-Sen controls. The alliance offers one source to address turbomachinery component questions, software issues, and retrofit application concerns.



Features and Operation

The TetraSentry is a fully assembled, ready-to-install system designed to meet industry standards such as API 612 and API 70 industry standards. It is connected to the hydraulic trip header in parallel with the turbine trip valve. During normal operation all four solenoid valves are closed, causing the full supply pressure to be applied to the turbine actuator valve. A trip occurs when both valves open in at least one serial pair, dumping the trip header and draining faster than the supply orifice can refill it. 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.

When interfaced with a programmable controller system, the TetraSentry can be tested online, verifying the integrity of the components. Pressure transmitters provide feedback on the status of the four solenoid valves to the trip system. The operator will be alerted if a valve is in the wrong state during normal operation. Block valves around each serial pair of solenoids enable the active components to be repaired online without compromising the trip function. Needle valves around the trip header block valves enable the system to be refilled after it has been opened for maintenance.

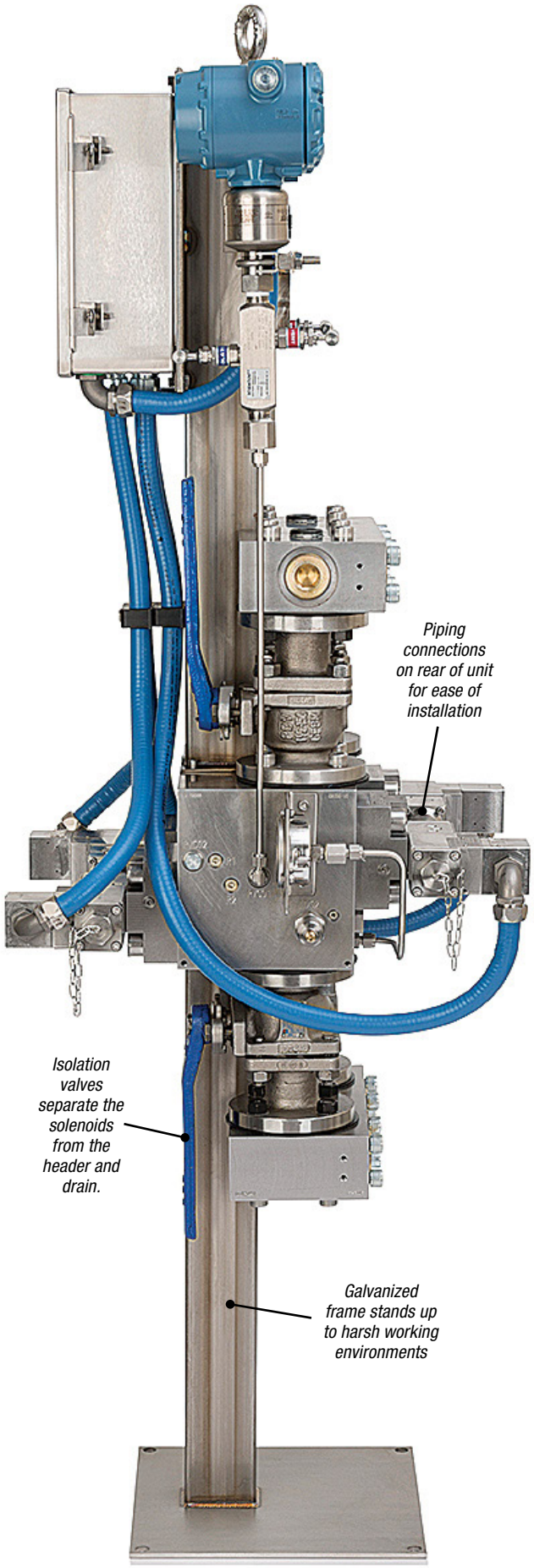
Standard features:

- Manifold-mounted components
- 4 solenoid valves
- 4 full-block valves
- 3 restriction orifices
- Cartridge filters
- 2 pressure transmitters
- Stainless steel junction box with terminal blocks
- Support frame
- Companion flanges
- Viton O-rings and seals
- Fully tubed and wired
- Independently verified to meet SIL-3 requirements

Optional Features:

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

The TetraSentry hydraulic trip system is independently verified to meet SIL-3 requirements, with very low trip rates.



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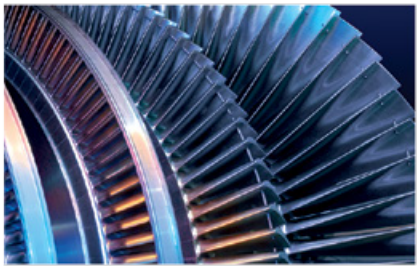


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