

# Quadvoter

## Turbine Hydraulic Trip System

### Summary

Quadvoter hydraulic trip block allows both online testing and online maintenance. The Quadvoter can be configured to interface with a two-way (dump style) system or with a three-way (pressure source) system.

### Business Value

By facilitating online testing, diagnostics, and maintenance, the Quadvoter provides the highest possible availability while preventing the potential for spurious trips.



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# Product at a glance

## Trip System Challenge

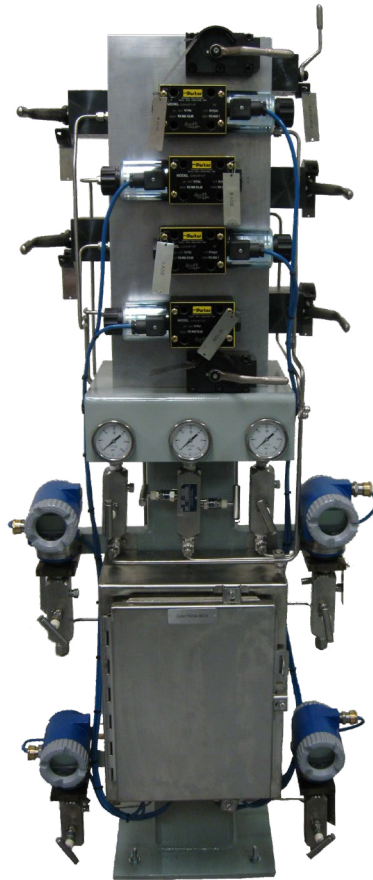
When trip systems are converted from mechanical to electronic, system reliability is improved while incidents related to overspeed testing decrease. However, the hydraulic trip solenoid valve configuration consistently hinders the trip chain. The main challenge relates to online testing and maintenance: a single solenoid valve can't be tested without tripping the turbine. Two valves in parallel present a higher probability of spurious trips and produce a risky isolation process for testing. Some manufacturers offer a 2oo3 voting arrangement that can be tested online, but not repaired online.

## Quadvoter Solution

Utilizing four three-way solenoid valves (configured to be redundant 2oo2), the Quadvoter hydraulic trip block allows both online testing and online maintenance. The solenoids are arranged in two series paths and mounted on a monolithic manifold. Isolation valves allow all active components to be maintained online. Dedicated pressure transmitters allow for continuous diagnostics. The Quadvoter can be configured to interface with a two-way (dump style) system or with a three-way (pressure source) system.

## Quadvoter Operation

The Quadvoter is placed in series with the hydraulic trip header to facilitate necessary turbine trips, and to prevent spurious trips. In normal operation, all solenoids are energized closed to retain pressure on the trip header, keeping the steam trip valves open. In the event of a trip, the trip system will de-energize all solenoids, allowing pressure in the trip header to dissipate. Thus, no single solenoid can cause the turbine to trip and no single solenoid can prevent the turbine from tripping.



## Test Procedure

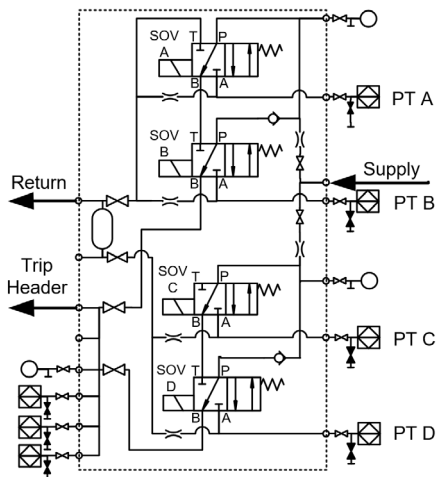
To reduce the probability of failure on demand, the Quadvoter has instrumentation to test all active components and judge results. Pressure transmitters monitor the state of each solenoid valve and confirm the success of each test step. In non-explosion-proof environments, optional proximity switches provide an additional level of diagnostic redundancy by monitoring the performance of each solenoid valve. Isolation valves allow either pair of solenoid valves to be taken out of service and replaced without compromising the system's availability to trip if necessary.

## Standards

- Manifold-mounted components
- Pressure transmitters for spool position feedback
- Junction box with terminal strips
- Support frame
- Viton O-rings and seals
- Internal surge tank
- Two-valve block and bleeds on all instrumentation

## Options

- Buna/Nitrile O-rings and seals for ammonia applications
- Trip header transmitters
- Area classification ratings
- Double isolation for high-pressure applications



## Automated Testing

Schneider Electric logic enables both fully-automated testing and operator-initiated testing. Each step of the automated test sequence has criteria for passing; if any step fails, the test is aborted and the operator is notified. Because each step is monitored and documented, failure details are readily available via HMI to facilitate quick troubleshooting.

## Bottom Line

While enabling necessary turbine trips, the Quadvoter prevents spurious trips. By facilitating online testing and maintenance, the Schneider Electric Quadvoter overcomes the challenges associated with the single, double and 2oo3 trip solenoid configurations.

## Features

To meet the requirements associated with different pressures, trip header configurations and volumes, the Quadvoter comes in three different models: QV1, QV2, and QV3.

	QV1	QV2	QV3
QV Trip Configuration	2- or 3-way	2-way	2- or 3-way
Pressure PSIG	0 to 1500	0 to 3000	100 to 3000
Valves to Trip	1 to 5	1 to 30	1 to 30

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