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Subject: Pos-E-Stop 203 Release

## Elliott Launches the Pos-E-Stop 203™ Fail-safe Turbine Trip Block

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The Elliott Pos-E-Stop 203 is an electro-hydraulic solenoid valve assembly used to dump hydraulic fluid from the trip valve actuator circuit to shut the tripping valve of steam turbines, hot gas expander inlet valves and other critical applications. The design of the Elliott Pos-E-Stop 203 simultaneously allows for the constituent solenoid-operated valves to be individually tested for correct function with the turbine in operation.

Pos-E-Stop 203 comprises three identical sub-systems, which together form a hydraulic 2 out of 3 voting logic as shown in the schematic below. The solenoid actuators act on spring-loaded control pistons. The position of each control piston – valves open / valves closed - is sensed by up to 3 position sensor(s). For safety reasons the spring beneath each control piston forces the control piston into a “fail to open” position.

The Pos-E-Stop 203 is designed for fully automated on-line testing and on-line replacement of critical components without defeating the trip protection. It receives its signals either from an existing Emergency Shutdown System (ESD) or from a separate Turbomachinery Control System such as the Elliott EDS+, which also performs the test routines and monitoring functions of the Pos-E-Stop 203.

The unique design of the Pos-E-Stop 203 does not require any isolation valves in the dump arrangement of the safety trip system (risk of operating errors), nor does it require pressure gauges, flow measurement devices, bypass orifices, etc. for the on-line testing. Some of the more important features of the Pos-E-Stop are listed below:

- Improved trip system reliability on large mechanical drive steam turbines
- Increased system availability through automated on-line testing
- Allows trip system standardization across the plant
- Easy to install, simplifies most piping layouts
- On-line testing and servicing without use of isolation valves which eliminates risk of operating errors
- Direct acting, hydraulic 2 out of 3 voting logic
- On-line test capability without defeating trip protection
- On-line replacement capability of critical components without defeating trip protection thereby increasing system availability

- Individual valve and solenoid condition monitoring
- Very fast response time (Best in Class) reducing tripping interval.
- Meets Hazardous Area Classifications
- Approval: CSAC, US certified. Meets applicable CE directives
- Can be used on Elliott and Non-Elliott equipment
- SIL3 Compliant
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## **Construction, Installation and Operation**

The Pos-E-Stop 203 is a mono-block design. The valve matrix is controlled by three individual quick acting solenoid actuators. The block has three hydraulic connections:

1. The feed port P (from control oil header) features an integrated flow orifice
2. The control port A is connected to the trip valve
3. The dump port T is connected to the return header

This facilitates installation, piping, wiring and maintenance when compared to arrangements of similar functionality made up from a number of individual solenoid valves.

The Pos-E-Stop 203 trips the turbine if any two of the three solenoids are de-energized. Each one of the three solenoids can be exercised individually. The correct function is monitored with individual position sensors. Failing to exercise of one of the solenoids will alarm the operator. Each of the solenoids can be replaced on-line, while the trip functionality remains intact in a “one out of two” pattern. The “two out of three” logic is re-instated once the solenoid has been replaced and tested. Also the position sensors can be replaced on-line without defeating the trip functionality.

## **Target Applications**

- API 612 Turbines
- Integrated Power Plant (IPP) Turbines 5 – 50 MW
- Utility Turbines > 50 MW

(U.S.A and International patents pending)

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