OVERVIEW

The Gimpel Electro-Hydraulic Trip Throttle Valve (EHTTV) is a microprocessor controlled trip-throttle valve, with a self-contained electro-hydraulic actuator. It is designed specifically for emergency shutdown and throttling on steam turbines. The EHTTV will have a trip time of 0.3 seconds or less. It will incorporate most of the features that are on the current Gimpel valves, with the added feature of being independent of the steam turbine lube oil system.

Note: The Gimpel EHTTV is not designed to replace the steam turbine governor.

The EHTTV will use the same steam section design, as the traditional Gimpel valves, with a new electro-hydraulic actuator. This actuator contains a highly efficient method of pumping hydraulic fluid from one side of a double acting cylinder to the other. Once the correct position is reached, the motor shuts off. Therefore, only minimal power will be required to maintain the actuator position.

The hydraulic system is controlled by a dedicated microprocessor contained within a control panel. The control panel interfaces with an integral motor, which is connected to a hydraulic pump, that will supply the hydraulic pressure to open, close and exercise the Gimpel valve.

EHTTV is controlled by two major components, the actuator (cylinder, feedback and electro-hydraulic power module) and the control panel. The actuator is installed on the valve, while the control panel is mounted remotely. The actuator and control panel will be connected by a module and feedback cables.

Pre-programmed software, designed into the controller, allows Gimpel to set the valve operating parameters by factory trained personnel. The standard features that will be supplied on the EHTTV will be the option to Exercise, Trip, Reset and Throttle.

In addition, the EHTTV will have a CSA Class I Division 2 area classification and the steam section will be built to ASME/ANSI B 16.34 and B 16.5 standards.

ACTUATOR

At the heart of the EHTTV is the electro-hydraulic actuator. This consists of a motor, gear pump, flow match valve (FMV), make-up oil reservoir, thermostat and bypass solenoid. The power module delivers oil to a dual acting hydraulic cylinder. The actuator's rated output is calculated based on a maximum working pressure of 2000 psi. However, the power module will only generate enough oil pressure to initiate motion.

The actuator also contains an integral active feedback assembly. This assembly contains a position sensor, which will provide accurate valve position feedback to the control panel. The feedback assembly is sealed in a NEMA 4 cover and mounted within or adjacent to the dual acting cylinder. The connection of the position sensor is by direct mechanical means. This allows the user to control the Gimpel valve within $\pm$0.1%.

The scope of supply for the electro-hydraulic actuator is as follows:

- Anodized aluminum power module;
    - Requires a maximum of 1200 watts
- Self-contained lube oil system
    - Capacity of less than 2 quarts of oil
- Active integral feedback position sensor;
- 115 VAC or 24VDC integral high speed solenoid trip valve(s);
    - Quad solenoid trip systems available for API 612 applications
    - Other VAC or VDC solenoid options available.
- Single or dual nested springs;
- Carbon steel yoke;

STEAM SECTION

The steam section of the EHTTV will be designed to the current Gimpel valve body specifications. They will be available in straight-through, corner-body and offset globe designs.

The scope of supply for the steam section is as follows;

- Multiple stem orientation options available, to meet most applications;
- ASTM WCB, WC6 or WC9 alloy steel, globe type valve body with bolted yoke/cover;
- Above and below seat drains;
- Low pressure and high pressure leakoff connection(s), as applicable;
- Integral replaceable steam strainer basket,
- Nitrided valve stem/steam bushings;
- Stellite seating contact surfaces,
- Chrome moly steel valve seat and disc;
- Corrosion resistant materials for outdoor installation;

CONTROL

Included with the EHTTV will be a Control Module/Panel. This control panel contains a microprocessor that has a low dead-band, with immediate response and a modulating duty cycle.

There will be four (4) contact features, on the front of the control panel (see figure 3) that will be on the control panel. Those features are described below;

- Exercise:
    - There will be a local Exercise feature to allow the user to exercise the valve.
        - Exercising is the process of partially stroking the valve to verify movement of the critical sliding parts in the EHTTV
    - Exercising can be performed during valve operation without affecting the full load steam supply to the steam turbine.
    - Remote actuation of the Exerciser is available, as an option.
- Trip:
    - There will be a local Trip feature that can be used to trip the valve offline.
    - The Trip feature will signal the valve to trip, by de-energizing the solenoids.
    - The EHTTV is designed trip closed, in 0.3 seconds or less, when the valve is signaled to close.
- Reset:
    - Feature that allows the user to reset the EHTTV after it has been tripped.
        - EHTTV cannot be re-opened, after a trip event, until the Reset feature has been triggered
- Throttling:
    - A throttling feature will also be included with the EHTTV, which gives the user a choice of local (manual) or remote throttling of the valve.

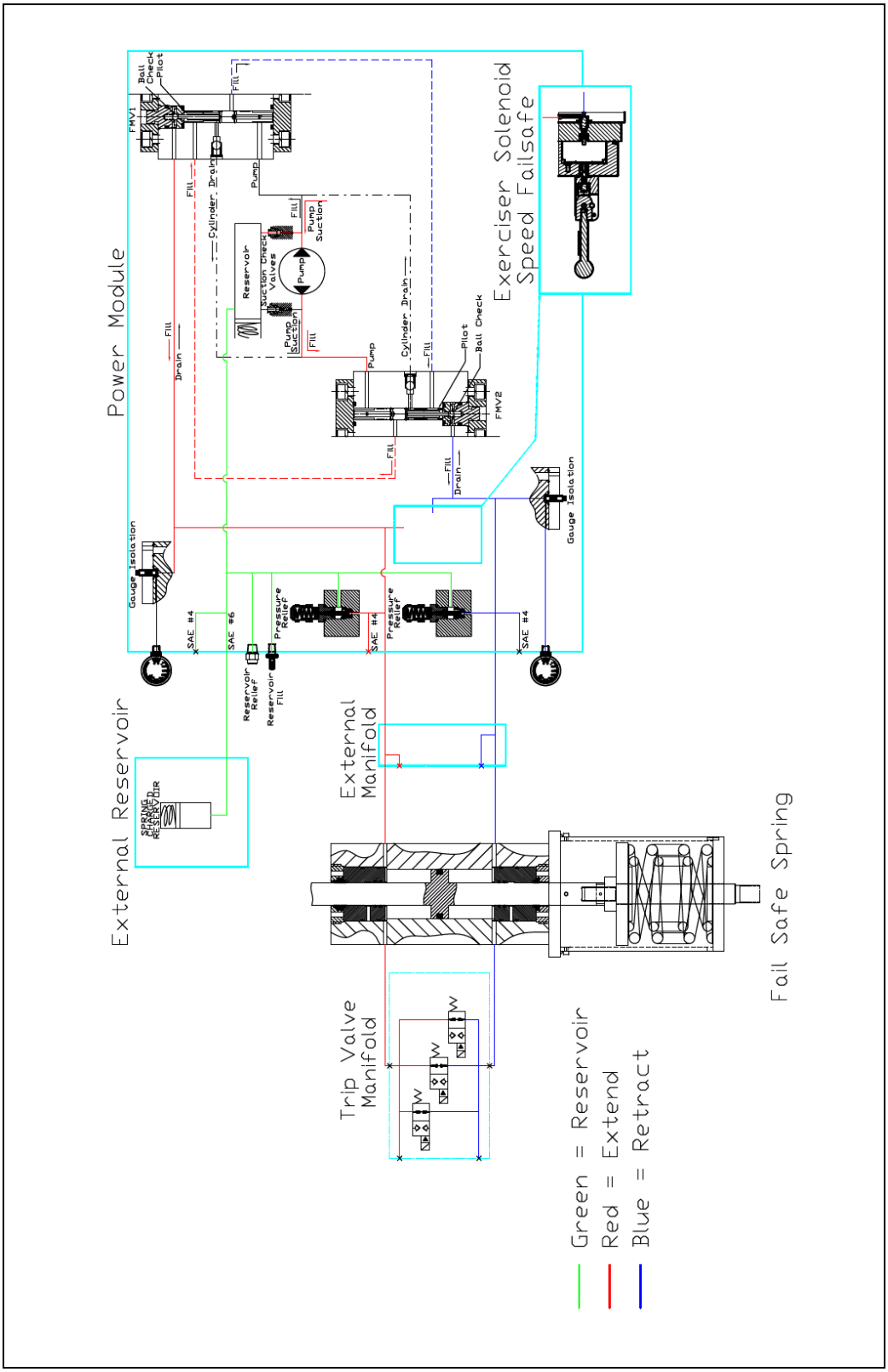

Figure 1: EHTTV Actuator Schematic

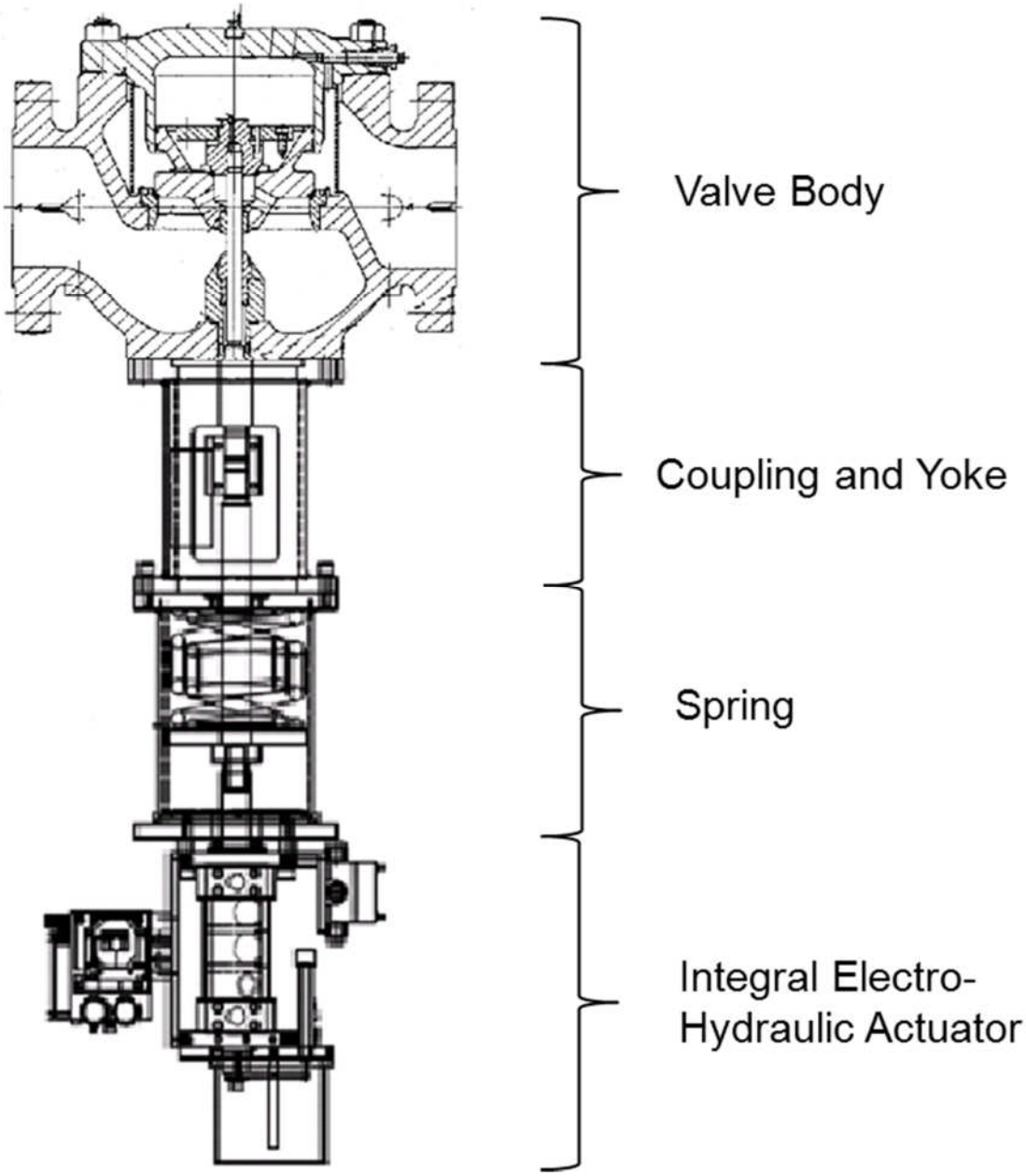

Figure 2: EHTTV Actuator

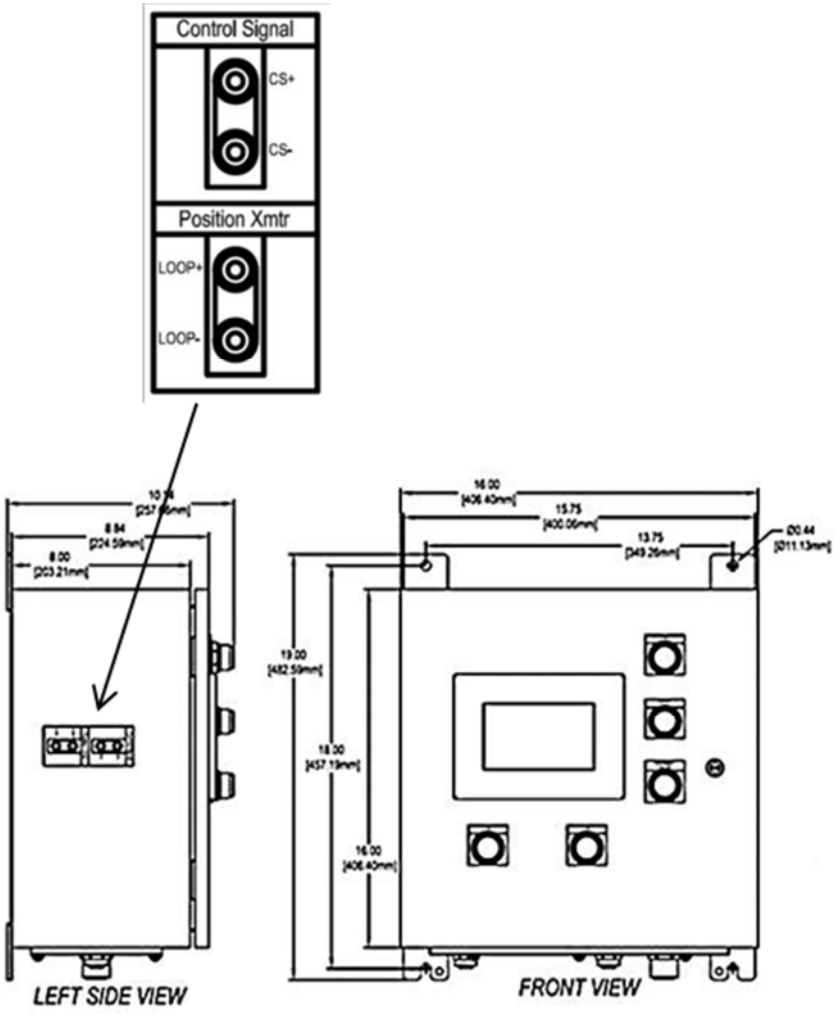

Figure 3: EHTTV Control Panel

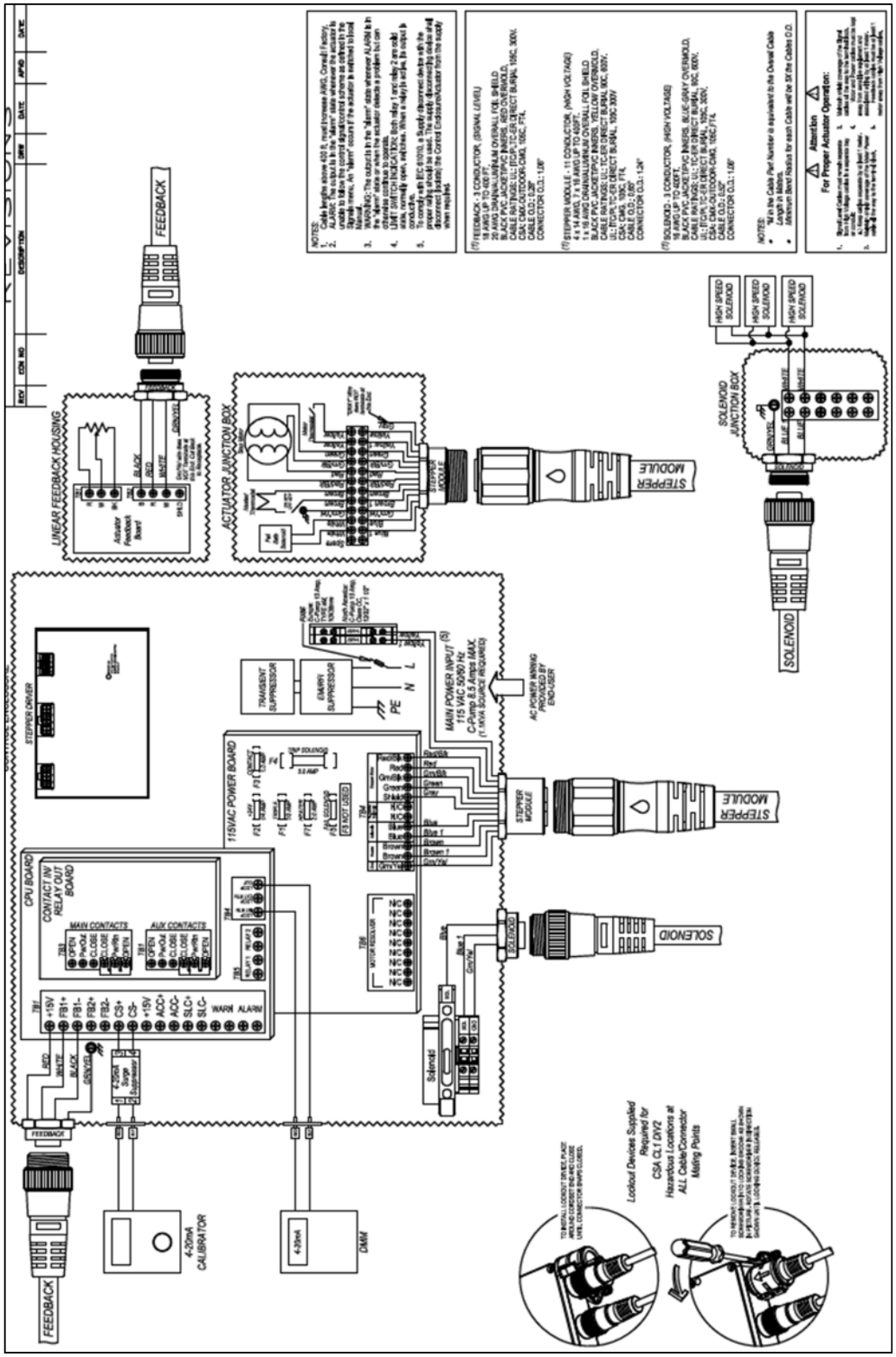

Figure 4: EHTTV Electrical Schematic

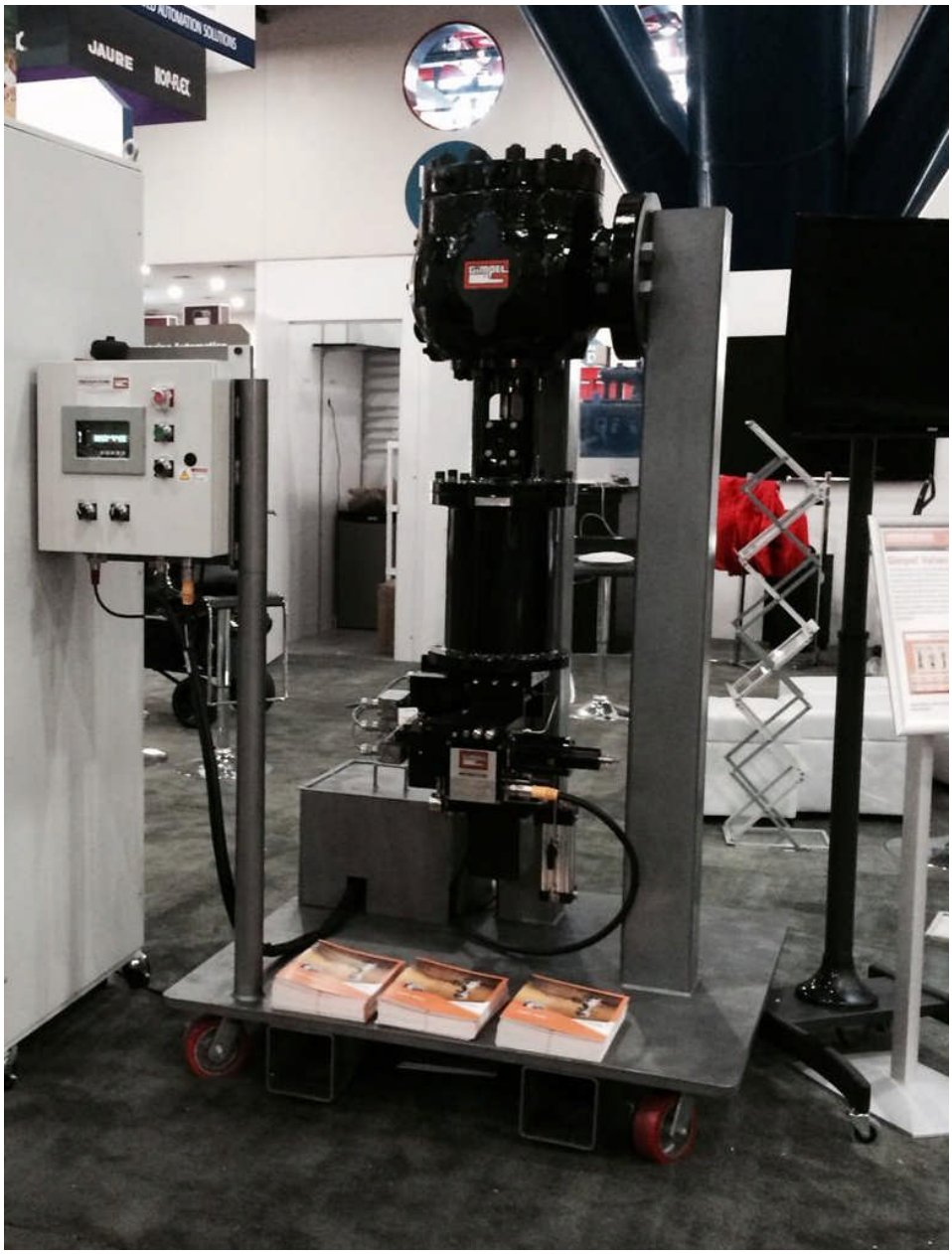

Figure 5: EHTTV