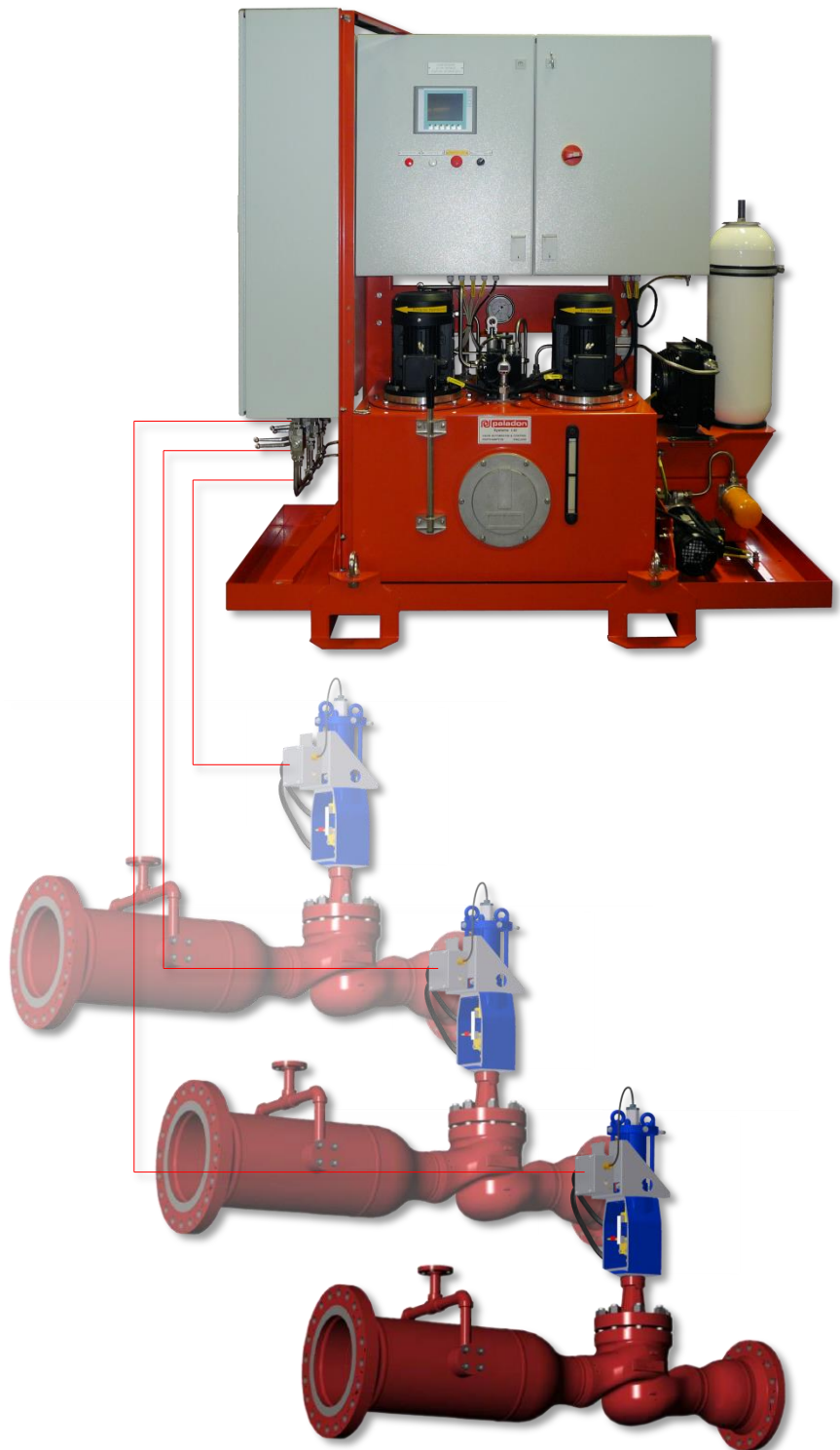
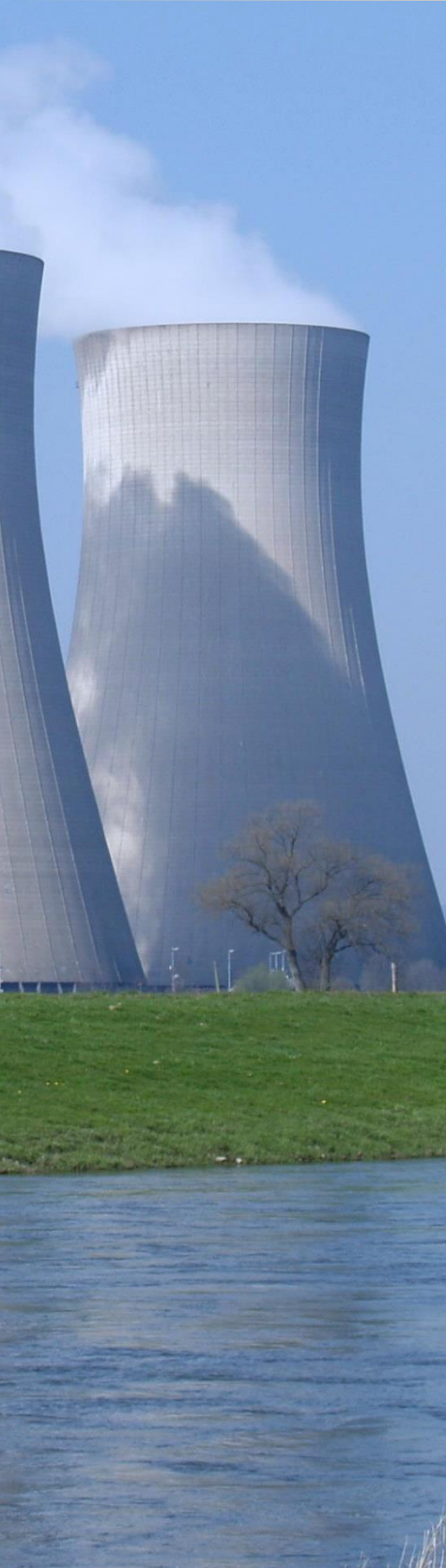


# TURBINE BYPASS SYSTEMS

Electro-Hydraulic Control Systems



## COMPANY



For over 30 years Paladon Systems has been supplying valve actuators and control systems on a global basis.



Since its inception in 1981, Paladon Systems has continuously developed its design, engineering, organisational, quality and management capabilities. Today Paladon Systems designs and manufactures many valve automation technologies that lead the industry in terms of cost efficiency, operational performance and environmental responsibility.



Paladon Systems' vast experience with supporting the Oil, Gas and Power industries with valve automation solutions for the most critical applications in extreme operating environments has resulted in product designs that offer unsurpassed quality and reliability across all industries and applications.

Holding ISO 9001 certification for over 20 years, today Paladon Systems hold accreditation and approvals from almost all major institutes, engineering companies and end users.

Headquartered in England, Paladon Systems has offices and facilities in Scotland, Italy, Malaysia, the Russian Federation and the United States. With a comprehensive suite of valve automation solutions backed by a dedicated team of field service engineers, Paladon Systems is **Total Valve Control**.





## INTRODUCTION

Since the 1960s, most traditional power stations have adopted LP and HP turbine bypass systems.

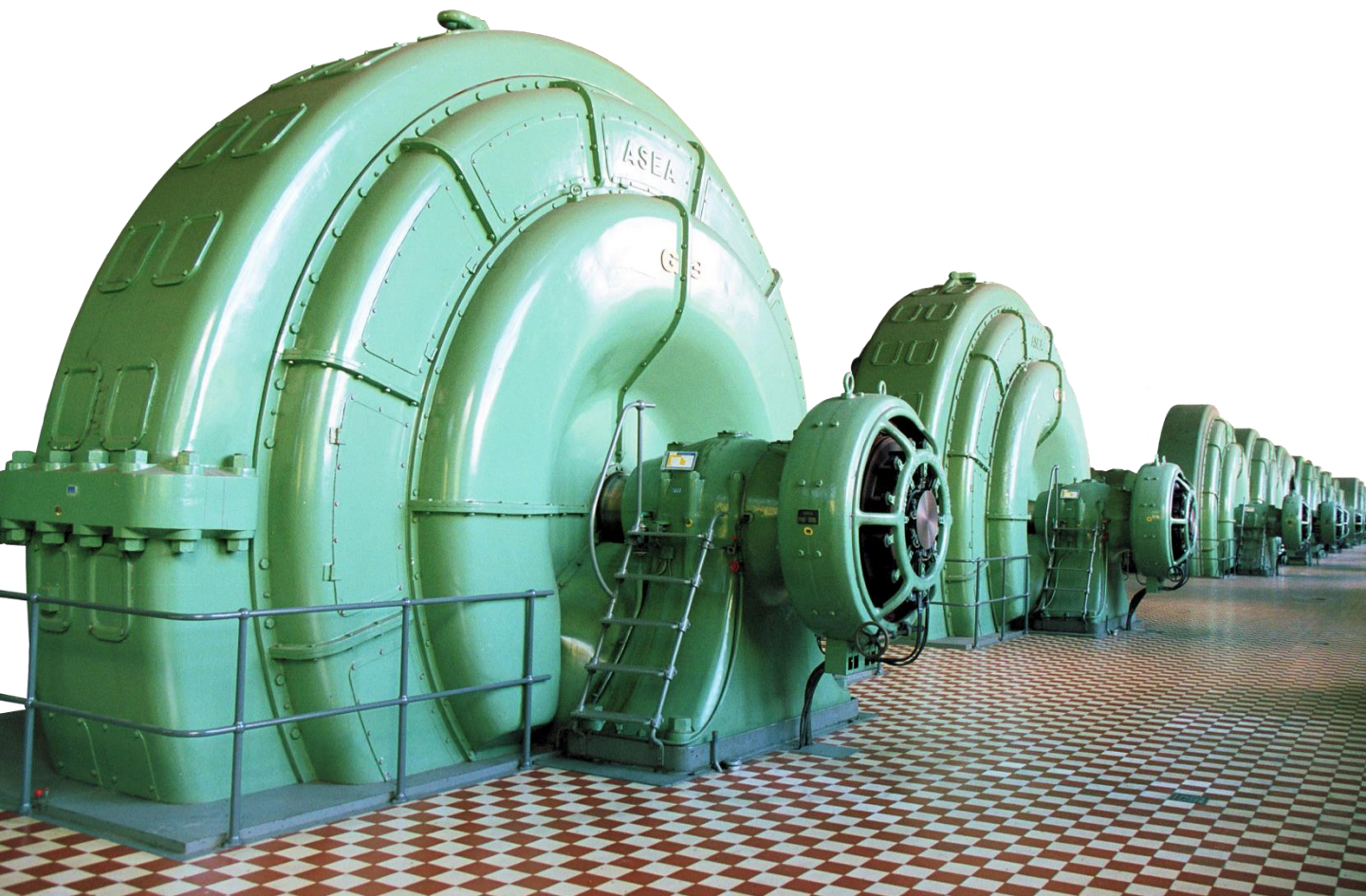
Turbine bypass systems allow operation of the boiler independently of the turbine during start-up, commissioning, shutdown and load change activities.

This ability to operate the boiler independently of the turbine greatly enhances operational flexibility during transient operating conditions and ultimately:

- Reduces start-up and reloading times
- Increases equipment life
- Increases plant availability

With the effectiveness of a turbine bypass system being dependent on the speed and accuracy of the valve actuators and control systems positioning the bypass, spraywater and isolation valves, it is imperative that customers choose a manufacturer with the required experience and proven track record.

Paladon Systems has over 30 years' experience providing advanced hydraulic positioning systems for the most demanding and critical applications.



## KEY FEATURES

- Compact design for arduous duty
- Customised to suit specification requirements
- Operation of multiple control valves
- Dual pumping system with auto changeover
- Independent filtration with oil cooling as required
- Direct-acting zero leakage solenoid valve for proportional control with accuracy and fast response
- Failure modes to suit specification requirements
- Manifold construction to eliminate pipework and increase system reliability and ruggedness
- Independent hydraulic control mounted locally or onto each valve





## DESIGN CRITERIA

### ■ Manual Override

Will be achieved by means of hydraulic hand pump mounted on the Hydraulic Power Unit (HPU) with manual control local at each valve.

### ■ Accumulator Storage

The HPU will be supplied with sufficient storage as required from the specification. With certain installations it is preferable for the accumulator storage to be mounted local to the valve with the hydraulic control system; this will ensure installation pipework is kept to a minimum size.

### ■ Filtration

An independent motorised filtration unit can be fitted to the HPU requiring a power supply of 0.37 kW and also be used for filling or draining the reservoir. Being an independent unit also allows for changing the filter element without switching off the HPU.

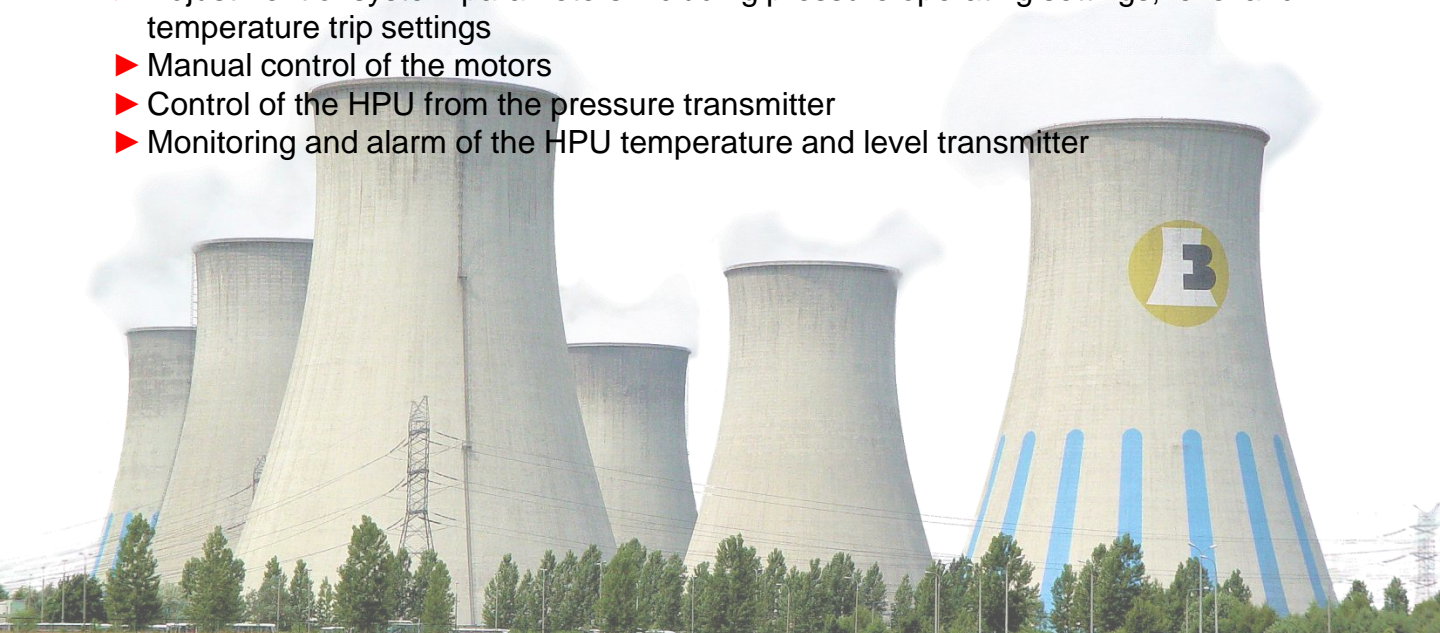
### ■ Oil Cooling

An air blast oil cooler can be fitted if necessary within the system installed in the filtration unit and requiring a power supply of 0.37 kW.

### ■ System Condition Monitoring with PLC Control

System pressure, level and temperature will be visually monitored on the HPU. The control panel will be fed from the required AC supply and have a 24VDC power supply for the control circuits. The Programmable Logic Controller (PLC) selected to control the system will be a Siemens S7-1200 PLC connected to a KTP400 4" mono Human Machine Interface (HMI). The PLC control panel will provide the following functions:

- ▶ System alarm handling and diagnostics
- ▶ Adjustment of system parameters including pressure operating settings, level and temperature trip settings
- ▶ Manual control of the motors
- ▶ Control of the HPU from the pressure transmitter
- ▶ Monitoring and alarm of the HPU temperature and level transmitter



## DESIGN CRITERIA

### ■ Valve Actuator

The hydraulic valve actuators will:

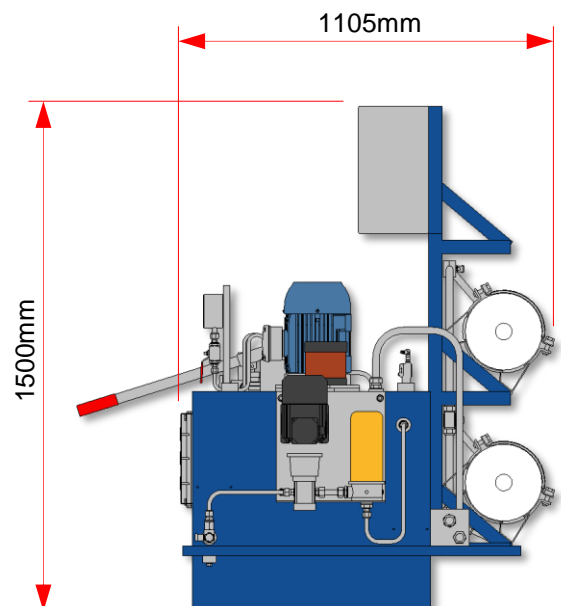
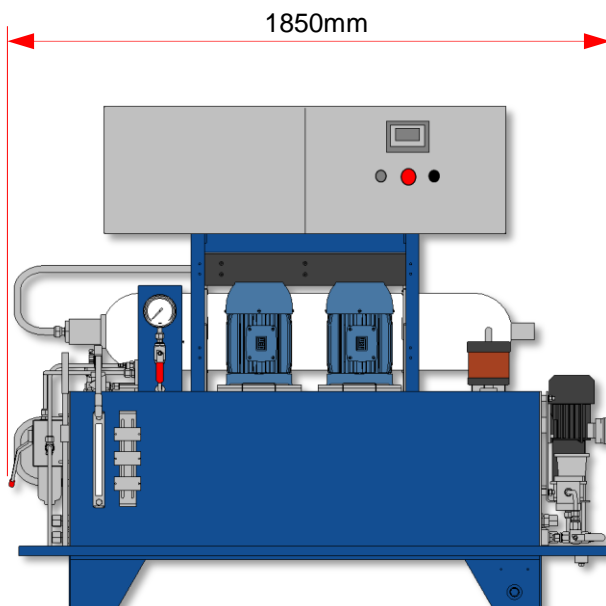
- ▶ Be all steel construction
- ▶ Have ENP coated cylinders with external tie bars where applicable
- ▶ Have circular apertures sealed by 'O' rings
- ▶ Include a heavy duty piston rod operating in sleeve bearings to ensure no degradation of sealing surfaces due to working loads
- ▶ Incorporate a central guide rod to support the combined piston and guide pin assembly throughout the entire valve stroke cycle
- ▶ Ensure all critical nuts and bolts are positively locked
- ▶ Have adjustable end stops to provide external adjustment and locking.
- ▶ Be suitable for a standard operating temperature range of  $-20^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$  ( $-4$  to  $+176^{\circ}\text{F}$ )



### ■ Feedback Device

A micropulse transducer will be integrally mounted within the valve actuator for reliability and protection. Device will be stainless steel with an ingress protection of IP66.

## TYPICAL HPU DIMENSIONS

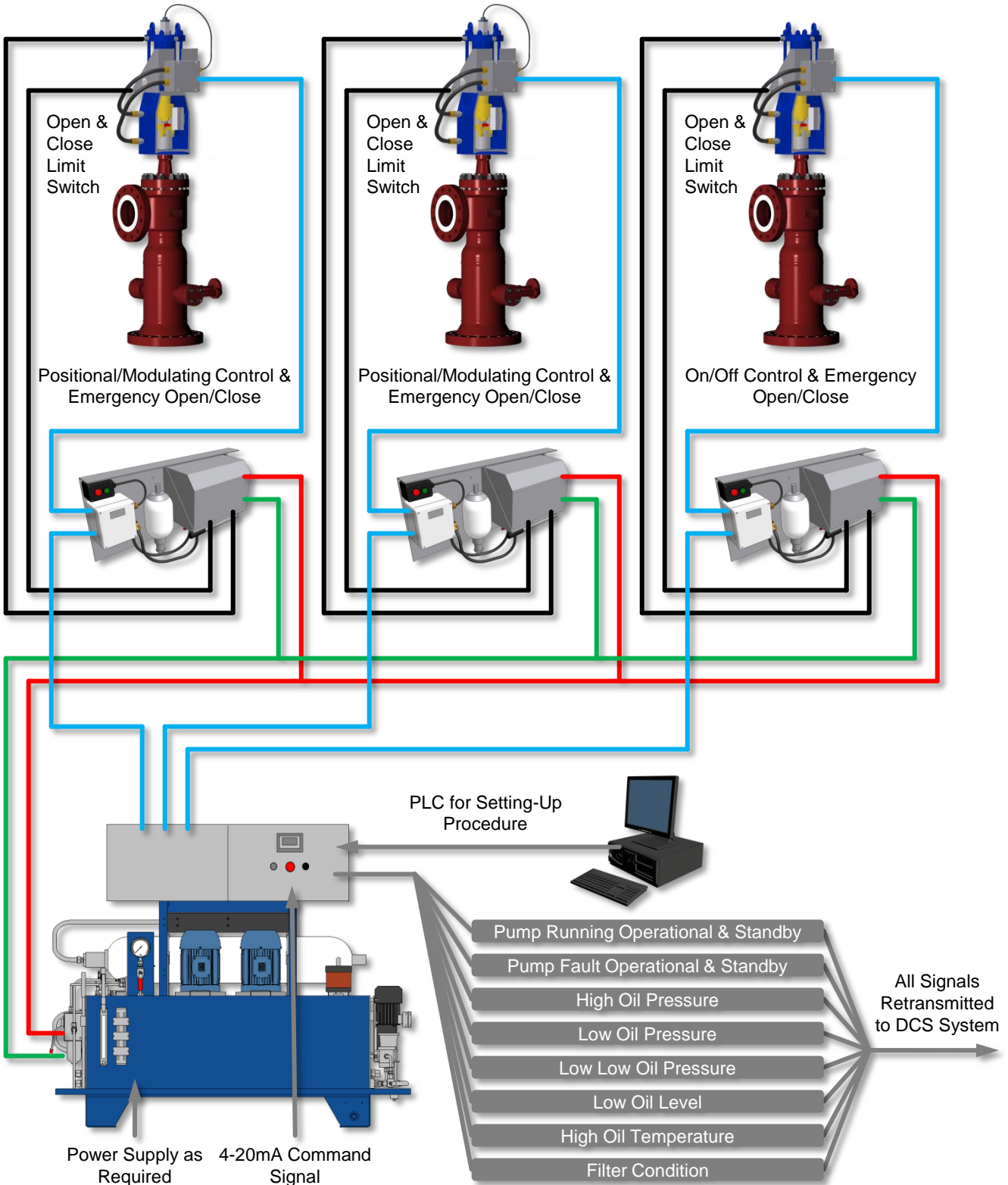


# SYSTEM ARCHITECTURE

## Bypass Control

## Spray Water Control

## Bypass Isolation



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