paladon
TOTAL VALVE CONTROL

AUTONOMOUS SHUTDOWN VALVE

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.

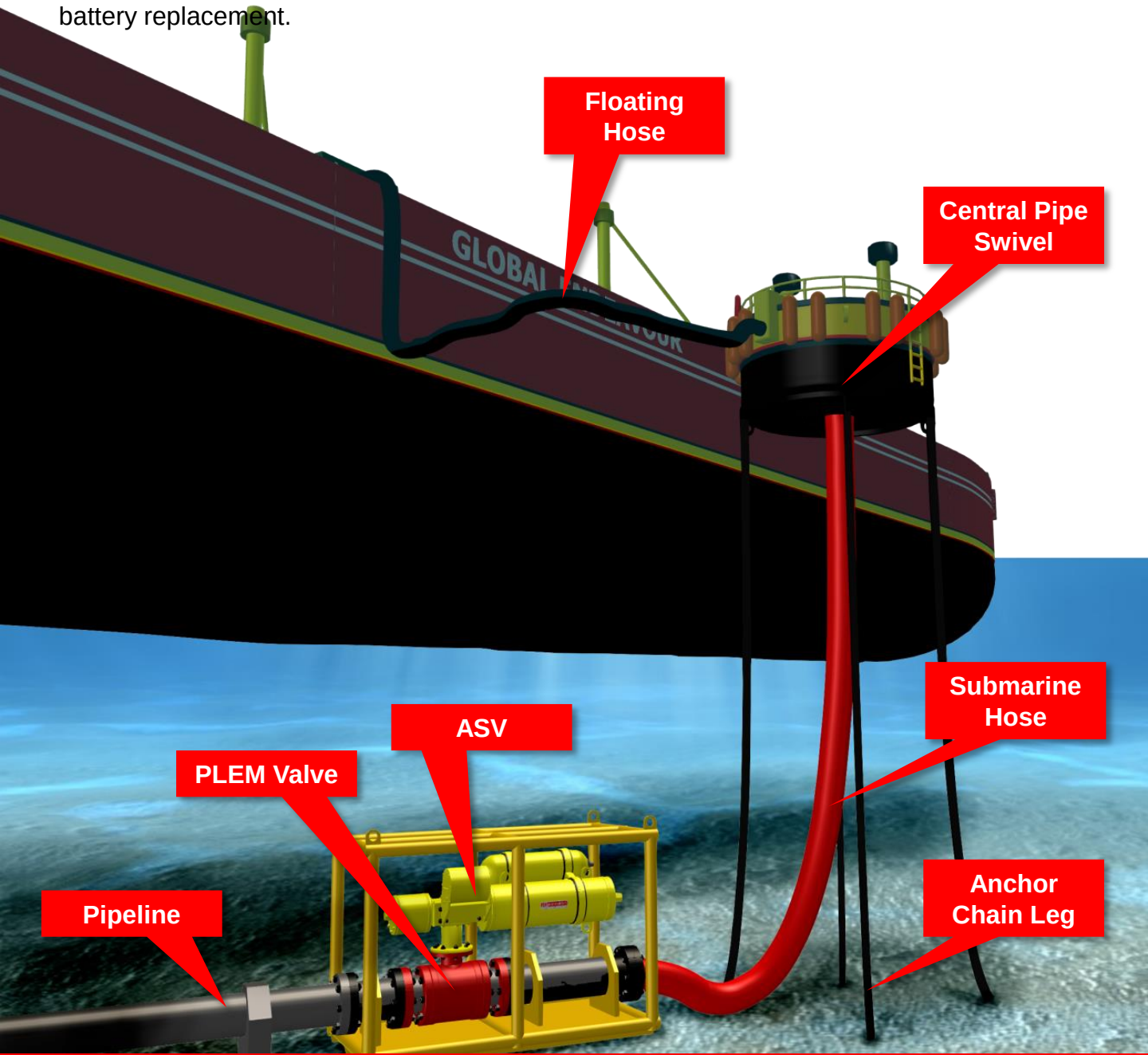
Headquartered in England, Paladon Systems has offices and facilities in Scotland, Italy, Malaysia, the Russian Federation and the United States. With a comprehensive suite of valve automation solutions backed by a dedicated team of field service engineers, Paladon Systems is **Total Valve Control**.

INTRODUCTION

Paladon Systems Autonomous Shutdown Valves (ASV) provide operators of Calm Buoy SLS and similar onshore loading and offloading tanker facilities with an innovative solution to dramatically reduce operating costs, whilst increasing process reliability and environmental protection.

Comprising of a subsea spring-return valve actuator, control system and PLEM valve, the standard ASV system automatically opens the PLEM valve on start of inventory pumping, and closes it either on completion of pumping or in the event of a linebreak condition.

Fully autonomous and self-contained, the ASV requires no human interventions or external power sources and is designed to operate for a minimum of five years before requiring battery replacement.



TRADITIONAL SYSTEMS

Traditional Calm Buoy SLS and similar systems use either manually operated or actuated PLEM valves. Both of these approaches create significant problems for system operators, including:

Manually Operated PLEM Valves

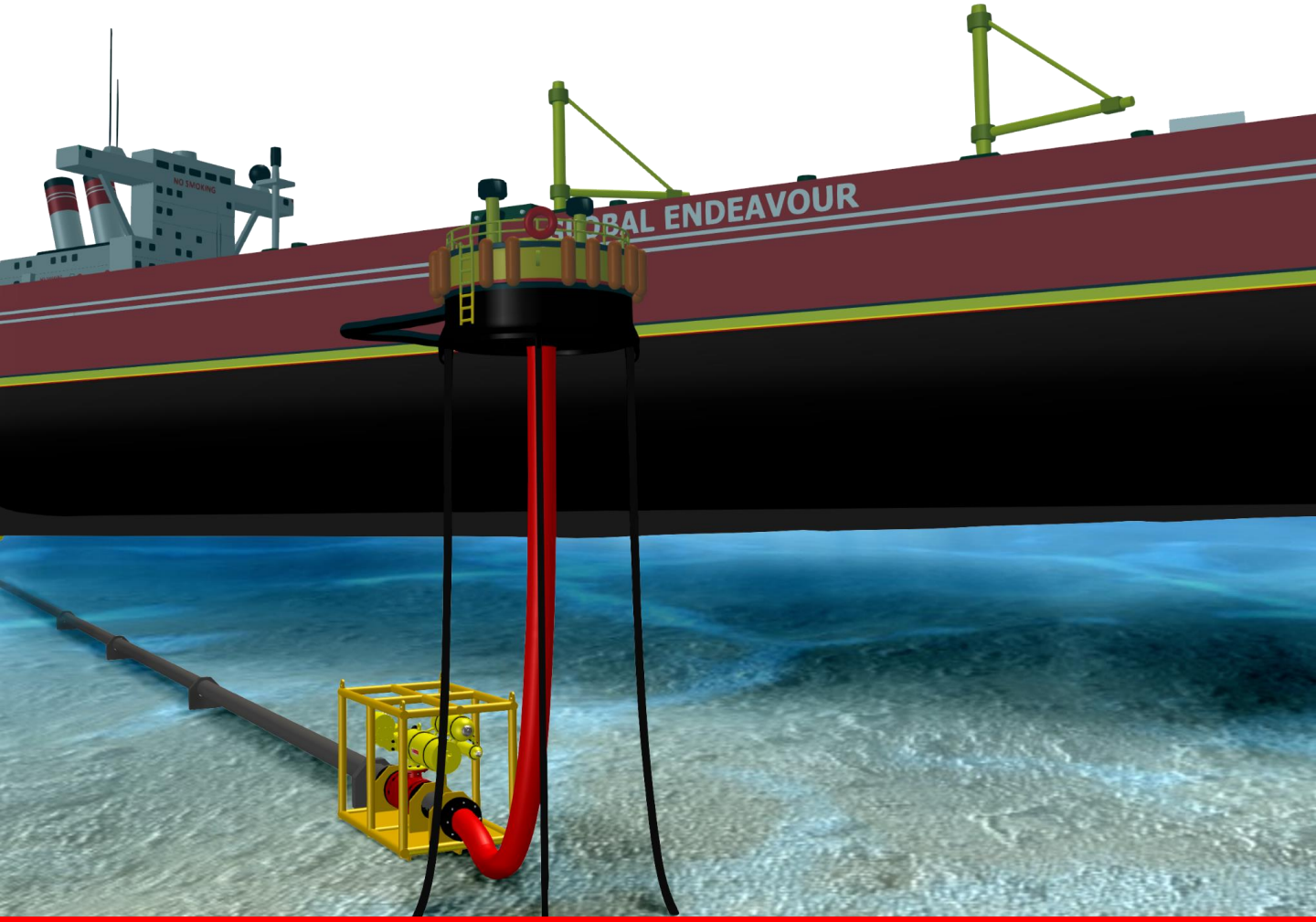
- Often not used in normal operation causing risk of pollution
- Expensive diver interventions required for each tanker visit
- Valve operation is only available in fair weather

Actuated PLEM Valves

- Operated by Hydraulic Power Unit (HPU) on surface buoy; however, unsatisfactory system availability due to dependence on offshore visits and extended chain of components with inadequate reliability
- No Emergency Shutdown facility, or control is reliant on a telemetry link as opposed to hard wired
- Requires frequent trips to buoy for checking and recharging of HPU pressure

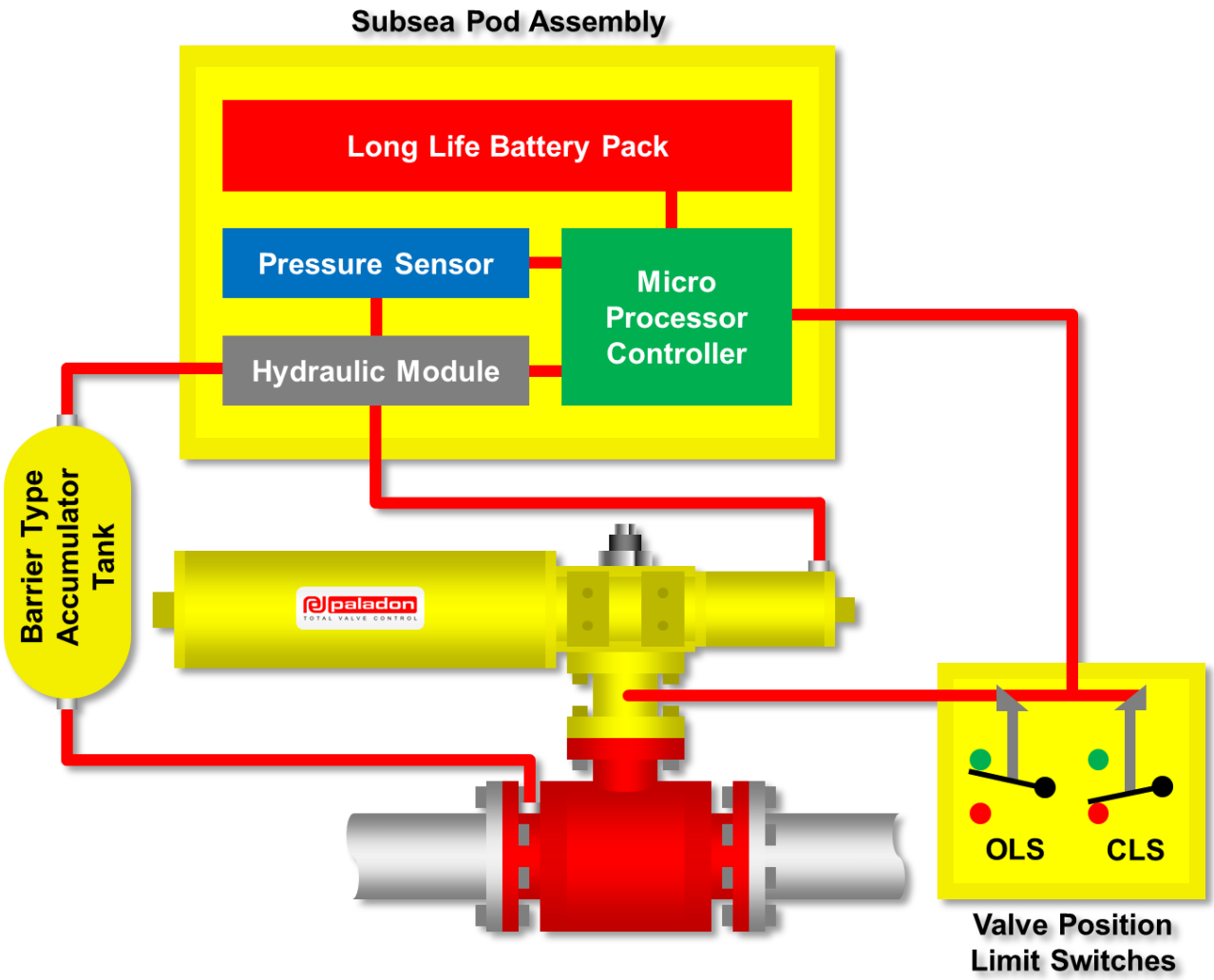
KEY FEATURES

- Fully automatic fail-safe operation of PLEM valve to isolate the pipeline from the riser
- 24/7/360 system availability irrespective of weather conditions
- Significant OPEX reduction when compared to traditional systems
- Automatic linebreak detection and shutdown
- Risk of pollution, liability and loss of sealine inventory significantly reduced when compared to traditional systems
- Comprehensive communications suite providing remote status monitoring, override control and in-situ diagnostics
- Rugged design for the harshest conditions using proven technology across all system components
- Non pressure compensated designs suitable for depths down to 120 m (394 ft); pressure compensated designs for operation from 120 m (394 ft) to 200 m (656 ft)
- Also suitable for remote land based applications where power supplies are unavailable or limited



SYSTEM OVERVIEW

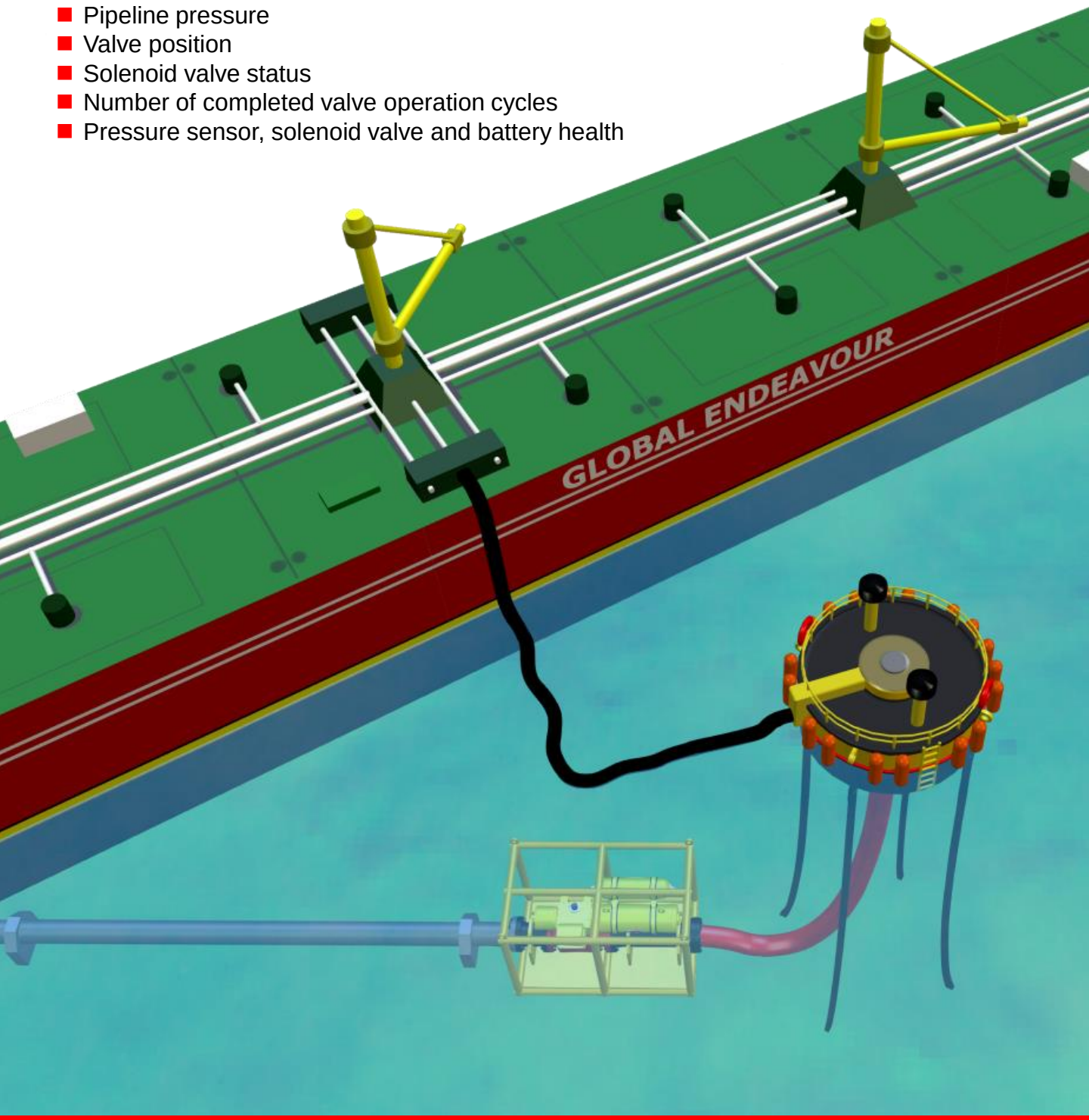
- Pipeline pressure acts on barrier vessel, pipeline pressure on one side converts to hydraulic control pressure on the other
- Complete electro-hydraulic manifold system housed within an oil filled pressure compensated pod
- Valve actuator powered via a high flow pilot valve
- Internal watchdogs give 1:115 time ratio to conserve battery power
- Expected life 7/10 years, 5 years guaranteed based on 3 operations per week
- Batteries have a 20A/Hr capacity, rechargeable option available
- 8-Bit micro controller



SYSTEM COMMUNICATIONS

Communication can be provided via RS232 (RS485 available for longer distances) link to the surface buoy; however, wireless and acoustic communication data links are also available. Standard communication and data includes:

- Remote status indication
- Manual override function
- In-situ diagnostics and configuration
- Pipeline pressure
- Valve position
- Solenoid valve status
- Number of completed valve operation cycles
- Pressure sensor, solenoid valve and battery health



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