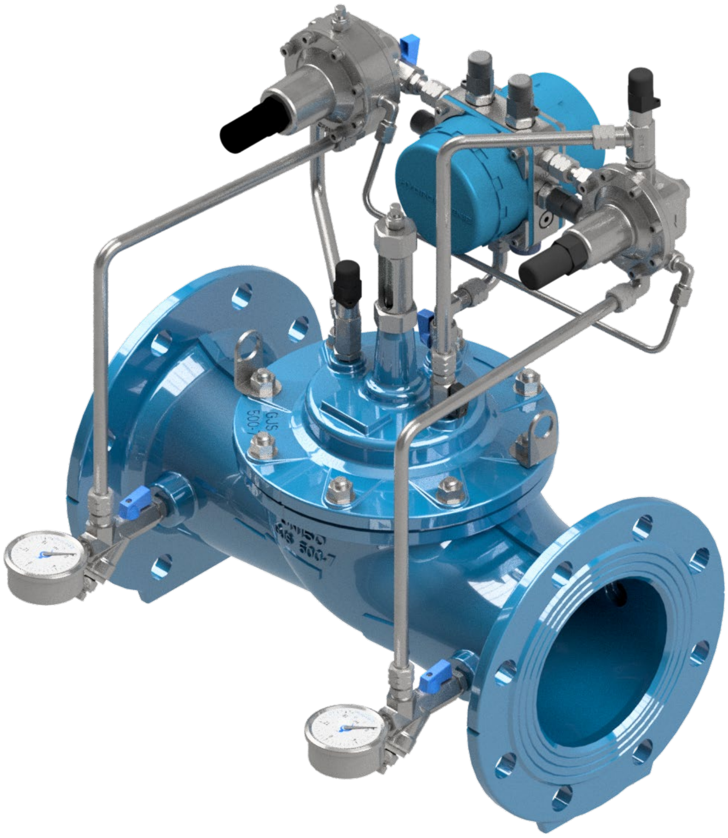
TECHNICAL DECISION FOLDER

For Engineers, Consultants, Operations and Maintenance Teams



Smart Pressure Management, Monitoring and Control

AUST TECH - Primary Representative of HydroGenie in Australia, New Zealand and Far Asia

Decision-Making Guide

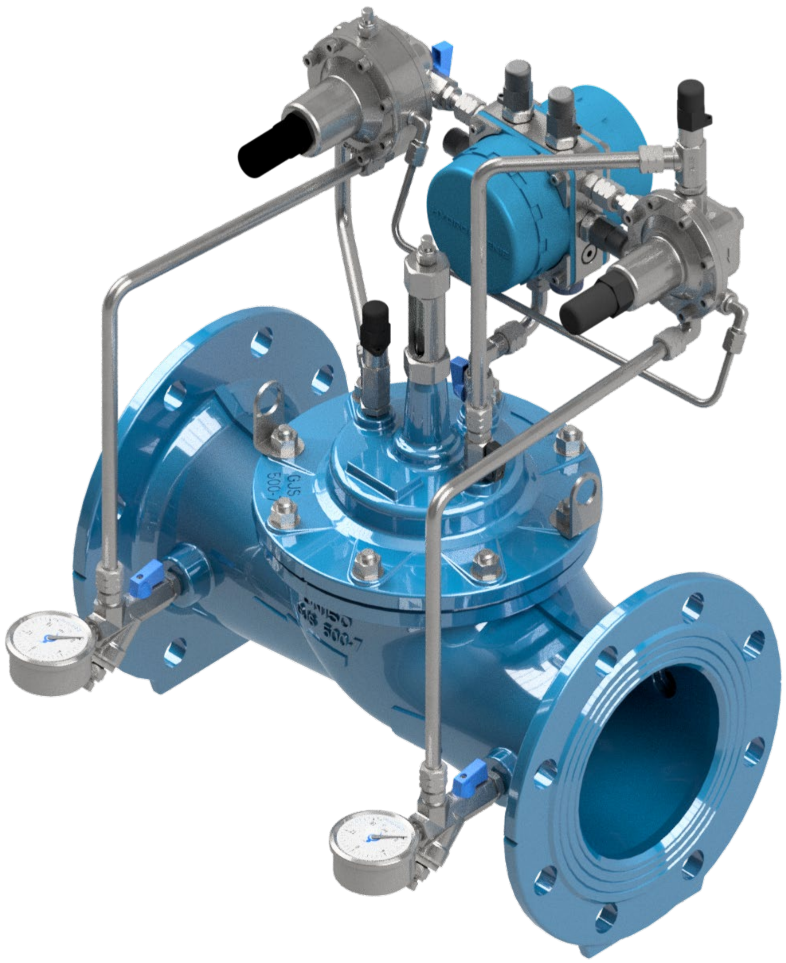
Technical and lifecycle information organised for rapid engineering review

CONTROLLED CLAIMS

Performance and savings depend on site hydraulics, demand patterns, existing pressure settings, inspection regime, utility standards, communications architecture and final product configuration. Project-specific modelling and a monitored pilot are recommended before broader deployment.

1. Diaphragm Operated Globe type control valve

Clear product photo, key components and hydraulic operating principle



- Pilot / electronic control assembly
- Pilot tubing and fittings
- Diaphragm chamber and bonnet
- Main valve body
- Upstream / downstream gauges
- Flanged inlet and outlet

HYDRAULIC OPERATING PRINCIPLE

A pilot diaphragm operated globe type control valve uses line pressure to move the main valve. The pilot circuit regulates pressure in the control chamber above the diaphragm. Changing chamber pressure changes the force balance and therefore the valve opening.

Opening tendency

Upstream and downstream hydraulic forces exceed chamber, spring and moving-part closing forces.

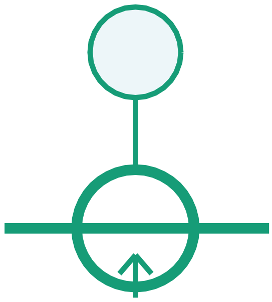
Closing tendency

Control-chamber pressure and spring force exceed the hydraulic forces tending to open the valve.

1. Main Valve Operating States

Opening, modulating and closing through control-chamber pressure

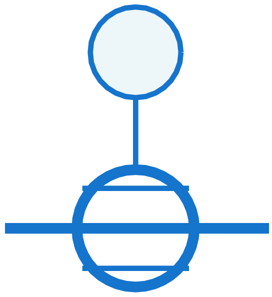
OPENING



Pilot releases chamber pressure. Lower chamber pressure allows upstream force to lift the diaphragm and increase flow.

Control chamber governs position

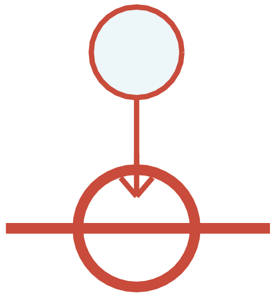
MODULATING



The pilot continuously balances chamber pressure so the valve holds an intermediate position and maintains the required setpoint.

Control chamber governs position

CLOSING



Pilot restricts discharge or admits upstream pressure to the chamber. Chamber force pushes the diaphragm toward the seat.

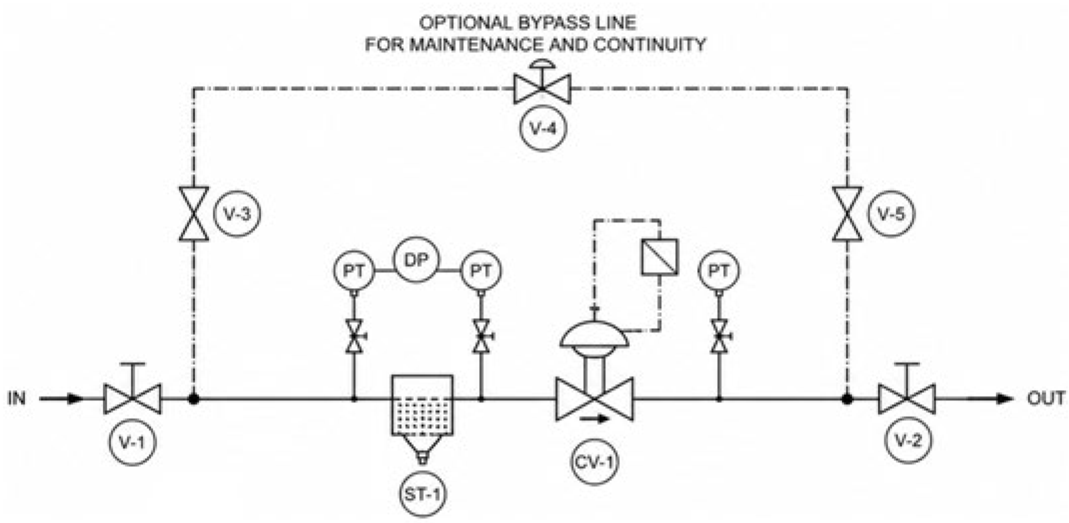
Control chamber governs position

PRIMARY APPLICATIONS

Pressure reducing	Maintains a selected downstream pressure.
Pressure sustaining	Maintains a minimum upstream pressure.
Flow limiting / regulating	Restricts or maintains flow to a configured value.
Level and reservoir control	Controls filling or discharge according to level signals.
Electronic optimisation	Adjusts pressure according to demand, schedule or remote setpoint.

2. Conventional Control-Valve Arrangement

Illustrative arrangement commonly used in water distribution pressure-control stations



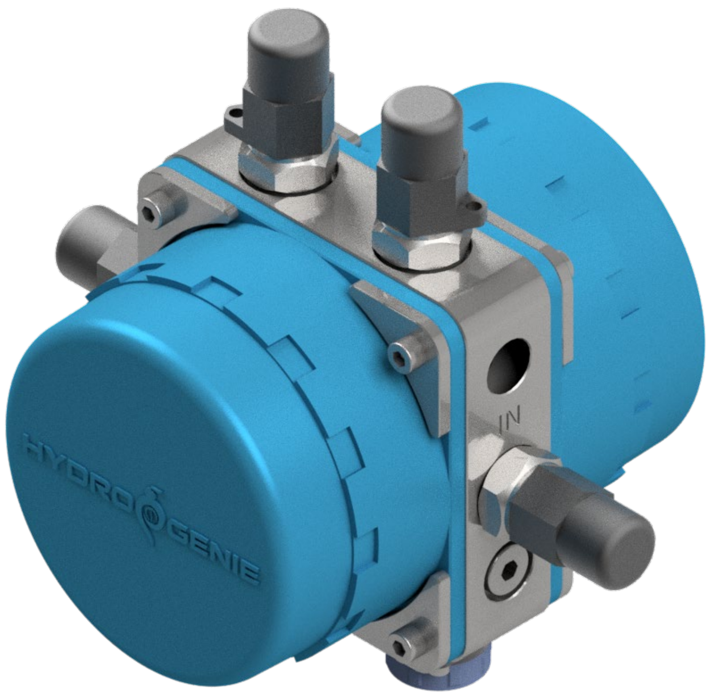
OPERATING PRINCIPLE AND LIMITATIONS

The control valve regulates pressure or flow hydraulically through a pilot circuit. A separate strainer protects the valve and pilots. In many conventional arrangements, strainer condition and pressure readings are checked during site inspections unless additional transmitters, telemetry and alarms are installed.

- Multiple separate components, fittings and potential leak points.
- Gauge readings and routine site attendance may be required.
- Automatic alarms and trend data require additional transmitters, I/O and integration.
- Fault detection can be delayed between inspections.
- Maintenance is often calendar-based rather than condition-based.

3. HydroGenie Pilot Components

Components, functions and operating sequence



Electronic controller

Processes inputs, applies control logic, manages outputs, status and alarms.

Pressure inputs

Receives configured hydraulic measurements for pressure management and monitoring.

Actuator / control output

Modulates the pilot circuit to adjust the main valve position.

Local indication

Provides local status, operating and alarm feedback.

Communications interface

Supports Modbus / SCADA integration according to the approved configuration.

Power supply

Electrical supply and protection in accordance with the manufacturer datasheet and site design.

OPERATING SEQUENCE

1	**Measure**	Read upstream pressure, downstream pressure and configured differential-pressure or process inputs.
2	**Compare**	Compare measured values with setpoints, limits, deadband and alarm thresholds.
3	**Calculate**	Apply the control logic and determine the required pilot or actuator adjustment.
4	**Modulate**	Adjust the pilot circuit and therefore the diaphragm-valve position.
5	**Report**	Transmit status, alarms and available trend data to local or remote systems.

3. Settings and Control Parameters

Final values are established during hydraulic design, commissioning and utility acceptance

Parameter	Function	Typical unit
Downstream pressure setpoint	Target outlet pressure or demand-based target.	bar / kPa
Upstream pressure limit	Minimum or maximum inlet pressure used for protection or control.	bar / kPa
Flow target or limit	Configured flow objective when flow control is enabled.	m3/h or L/s
Differential-pressure threshold	Alarm level for strainer fouling or abnormal pressure loss.	bar / kPa
Deadband / tolerance	Allowable deviation before corrective action.	engineering units
Response speed / gain	Controls how rapidly the system responds to deviation.	configured value
4 Threshold alarm system	Very Low, Low, High and Very High Operating limits (ISA-84.00.01/IEC 61511)	engineering units
Communication settings	Address, baud rate, parity and register mapping.	Modbus parameters
Logging / reporting interval	Configurable depending on polling master (10ms control/scan loop)	seconds / minutes
Fail-safe behaviour	Defined action for power, sensor or communication failure.	project-specific

ENGINEERING CONTROL NOTE

Setpoints and alarm levels must be derived from network modelling, minimum customer-service pressure, fire-flow requirements, transient risk, valve sizing, cavitation assessment and the participating utility's operating rules.

4. Technical Comparison Advantages

HydroGenie integrated control and monitoring versus a conventional arrangement

Factor	Conventional arrangement	HydroGenie
Architecture	Separate valve, gauges, strainer and optional transmitters.	Integrated electronic pilot and monitoring on the control valve.
Pressure control	Hydraulic pilot setting; remote variation requires added equipment.	Configurable electronic control and remote setpoint capability, subject to design.
Strainer monitoring	Manual DP reading unless transmitters are added.	Configured continuous DP / fouling monitoring and alarm.
Field attendance	Periodic visits for gauges, inspection and data capture.	Remote visibility may reduce routine inspection visits.
Alarms	Additional sensors, transmitters and SCADA I/O required.	Local and remote alarms available through the integrated system.
Data and trending	Limited without separate telemetry.	Operating values and events can be made available for trending.
Maintenance	Primarily time-based and reactive.	Supports condition-based planning and earlier intervention.
Troubleshooting	Manual checks across several devices.	Centralised status, alarms and diagnostic information.
Footprint / connections	More components and connection points.	Compact arrangement with fewer standalone instruments.
Control flexibility	Modification may require pilot or instrument changes.	Settings can be configured to suit the approved operating philosophy.

4. Engineering and Operational Benefits

Decision-level advantages to be validated for the selected site

✓ **Integrated monitoring**

Pressure, valve condition, configured DP and alarm information are brought into one control package.

✓ **Earlier warning**

Abnormal pressure or fouling conditions can be identified before a scheduled inspection.

✓ **Real-time visibility**

Operations teams can review live status and trends for faster decisions.

✓ **Condition-based maintenance**

Work can be planned from condition data rather than calendar intervals alone.

✓ **Fewer standalone devices**

Potentially fewer gauges, transmitters, fittings and communication interfaces.

✓ **Faster troubleshooting**

Centralised alarms and data can shorten investigation and diagnosis.

✓ **Configurable control**

Setpoints, limits and response parameters can be adjusted to suit the operating philosophy.

✓ **SCADA integration**

Modbus connectivity supports integration with the utility control environment.

5. Economic Advantages

Operational cost reduction and lifecycle value drivers

1 **Routine site visits**

Remote monitoring may reduce periodic visits made only to read gauges or check strainer condition.

2 **Inspection labour**

Less manual data collection can reduce travel time and field labour.

3 **Reactive maintenance**

Earlier alerts may prevent severe blockage, service impairment and emergency callouts.

4 **Troubleshooting time**

Centralised diagnostics and trend data can shorten fault-finding.

5 **Separate instruments**

An integrated design may reduce the number of transmitters, gauges, manifolds and interfaces.

6 **Downtime risk**

Earlier detection can reduce the duration and consequence of abnormal operation.

7 **Asset management**

Trend data improves maintenance planning, reporting and investment decisions.

8 **Water and energy**

Pressure optimisation may reduce leakage and pumping energy where network conditions support it.

TOTAL COST OF OWNERSHIP

The business case should compare capital cost, commissioning, communications, licence fees, scheduled maintenance, site attendance, emergency response, water loss, energy and expected asset life over the selected evaluation period.

5. Economic Evaluation Model

Project-specific inputs required for a defensible business case

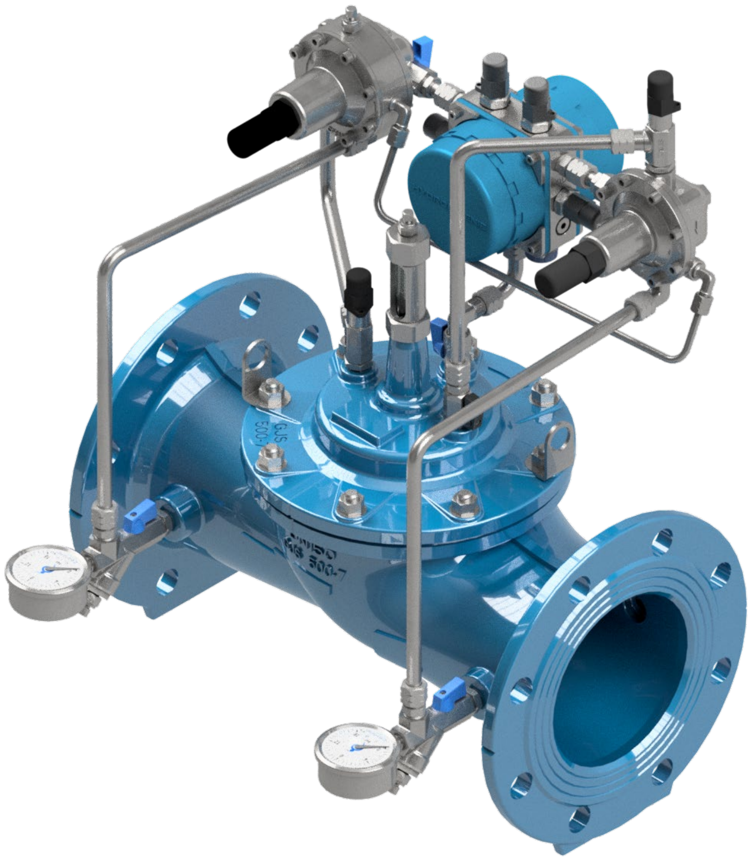
Cost / benefit category	Calculation basis
Site attendance	Number of routine visits/year x labour hours x loaded labour rate x travel cost
Manual inspection	Gauge / strainer inspection time and reporting cost
Reactive callouts	Historical callouts/year x average repair and response cost
Downtime / service impact	Expected outage duration x consequence cost
Instrumentation	Avoided or added sensors, transmitters, gauges, manifolds, panels and I/O
Communications	SCADA engineering, telemetry, SIM, cloud or licence cost
Maintenance	Annual preventive and corrective maintenance cost
Water value	Estimated leakage reduction x treated-water marginal value
Energy value	Estimated pumping-energy reduction x electricity tariff
Residual / asset value	Expected life, replacement cycle and salvage / residual value

RECOMMENDED DECISION GATE

Proceed through technical review, hydraulic modelling, compliance assessment, monitored demonstration, 3-6 month pilot and independent evaluation. Broader deployment should follow only after agreed KPIs and lifecycle benefits are demonstrated.

Recommended Next Step

A monitored Australian pilot with agreed baseline data, KPIs and independent validation



PILOT EVIDENCE

- Baseline pressure and flow
- Minimum night flow / leakage indicators
- Valve stability and response
- Alarm and communication uptime
- Inspection and maintenance hours
- Water and energy impact
- Lifecycle cost and payback

AUST TECH REGIONAL ROLE

AUST TECH is the primary representative of HydroGenie for Australia, New Zealand and Far Asia. The proposed delivery pathway includes stakeholder engagement, site assessment, design coordination, installation support, commissioning, training, documentation, pilot reporting and ongoing regional support.

Contact

Raghdan Bashir - Director

AUST TECH ENGINEERING & SUPPLIES PTY LTD

director@aust-tech.com.au

CONTROLLED DOCUMENT NOTE

This folder is a technical decision aid. Final design, product selection, settings, compliance and projected savings require project-specific engineering and approval by the participating utility.