THE ULTIMATE GENIE

HYDROGENIE®

Intelligent Control Valve Pilot

THE HYDROGENIE® GRANTS ALL YOUR WISHES TO CONTROL YOUR NETWORK. THE ALL-IN-ONE HYDROGENIE® PILOT BRINGS INTELLIGENCE TO OPTIMISE YOUR NETWORK CONDITIONS:

LESS PRESSURE

LESS DAMAGE

LESS MAINTENANCE

FLEXIBILITY

The HYDROGENIE® pilot can be configured to combine several control modes: Pressure-Flow-Level.

Autonomous with its integrated sensors and solenoid or remotely controlled via ModBUS communication.

PERFORMANCE

Step-by-step pressure or flow regulation thanks to the HYDROGENIE® controller with its incorporated pressure sensors and solenoid valves.

RELIABILITY

Maintenance reduction of the pilot circuit filters, by an innovative design allowing the elimination of the permanent flow and the choice of high-grade materials.

HYDROGENIE

CONTENT

Minimizing The Impact of Non-Revenue Water

Water management: How to minimize the impact of Non-Revenue Water.

Water is a vital resource for humanity to preserve, especially in the current context of global warming and population growth. The optimization of Non-Revenue Water is increasingly a challenge for network management. A proper management network must consider two aspects:

1) Limiting the impact of leakage
2) Detecting and repairing leakage

To limit the impact of leakage, pressure management of the network is a must.

As shown on **Graph 1**, the lower the pressure in the pipe, the less the leakage in the case of pipe damage. Management of the network pressure, by limiting the flow and pressure to the minimum necessary, will enable:

- Limiting the pumping risk to the network
- Preventing damage
- Limiting the impact of damage: **a reduction of 2 bar** in the network pressure permits **a reduction of more than 20%** of water volume in the case of leakage

As shown in **Pic 1**, having pressure management at the nearest point of usage enables reduction of pressure to the level necessary to ensure service to the end customer. This kind of management offers just the right amount of pressure when it is needed, and optimizes the network.

HYDROGENIE® is a pilot for a control valve which offers a different control method, with simultaneous control of pressure and flow, to permit optimal management of the pressure at the needed point of the network.
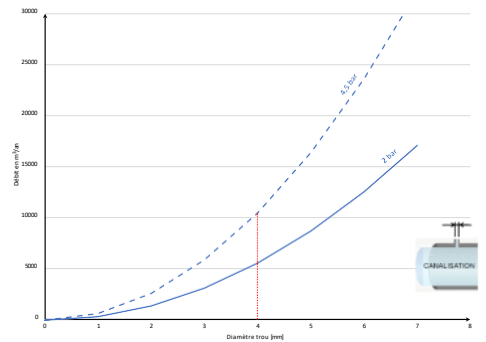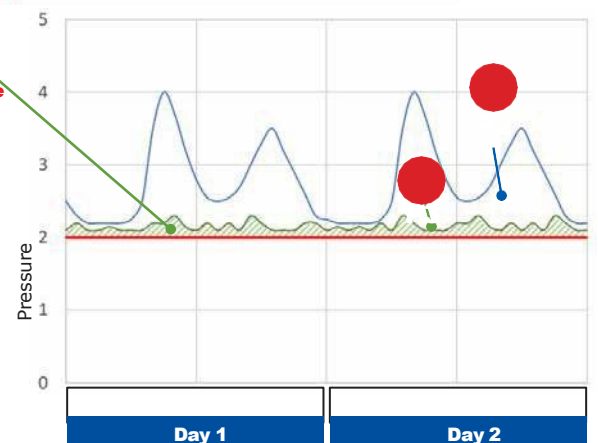

Graph 1 : impact of hole size on water quantity lost.

Pic 1: conventional and optimal pressure management control

Excessive pressure

Minimal needed P3

| Day 1 | Day 2 |
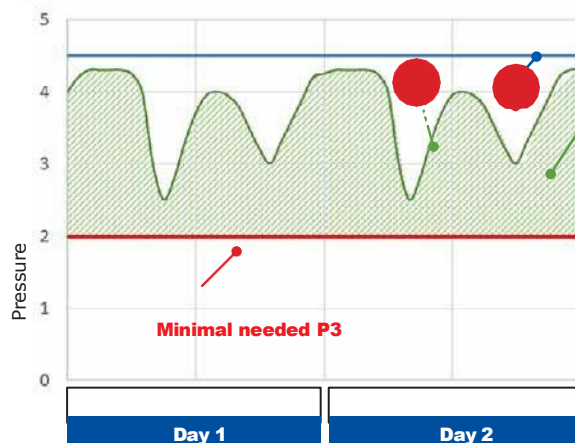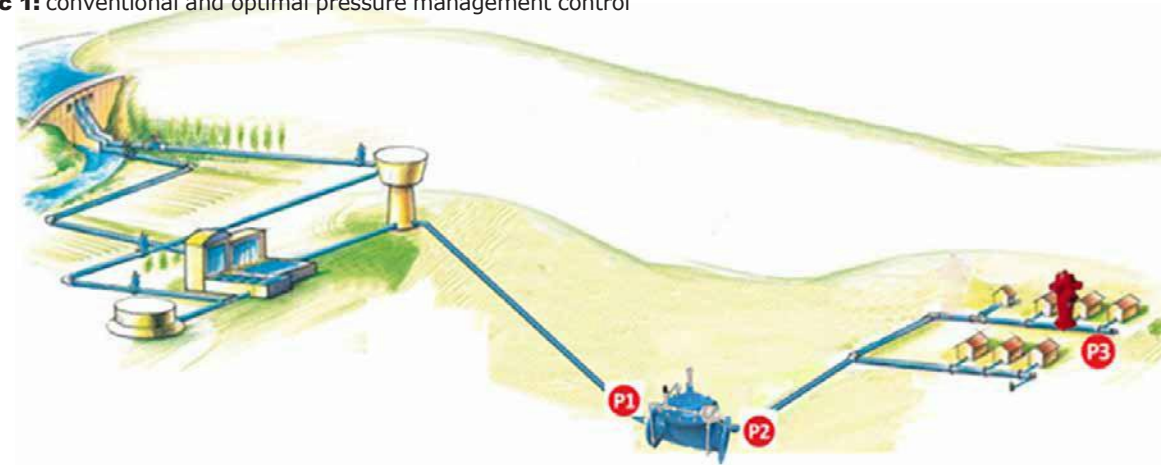
Case 1: conventional pressure management
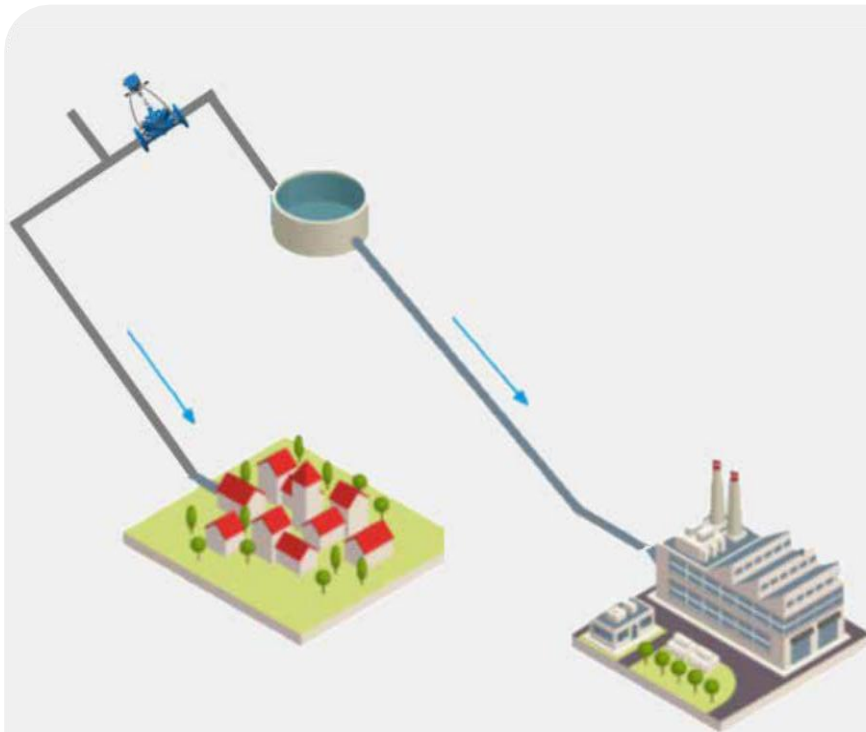
| Day 1 | Day 2 |

Case 2: optimal pressure management

Pressure & Flow Management Success Story

Our Success Story In Pressure and Flow Management

Case location: Al Ain city, United Arab Emirates

Need: bulk consumer node control

Type of valve: automatic control valve DN 80 to DN 400

Installed quantity: 180

Control mode: main function is flow limiting with pressure sustaining and pressure reducing

Benefit: the customer would like to control the flow for these bulk consumer nodes through a central SCADA, to ensure best utilization of pumping power. At any time the total flow from each node is adjusted, at the same time each valve must sustain an upstream pressure of 1.25 bar since the network combined potable and fire-fighting. The customer network is PN 10 rated, operating at 4 to 6 bar, not all bulk consumers piping systems can withstand such pressure, so the valve is also providing downstream pressure regulation at 2 bar.

Pressure & Flow Management Success Story

Our Success Story In Pressure and Flow Management

Case location: Bordeaux, France

Need: optimizing network performance

Valve type: automatic control valve DN 80, 100, 125 or 150

Quantity installed: 4 HYDROGENIE® and 4 two-stage hydraulics

Control mode: the main function is pressure regulation based on flow (need)

Advantage: the valve automatically adapts the pressure necessary to overcome network pressure losses which increase when flow rates increase. The pressure in the installation is adapted to the need. The average pressure in the installation is lower, the lifespan of the pipes is longer. In the event of a leak, the volumes of water lost are lower. The customer can monitor their network and optimize parameters remotely with central SCADA.
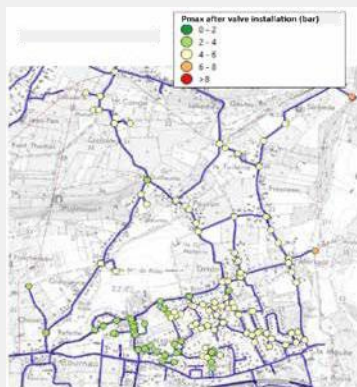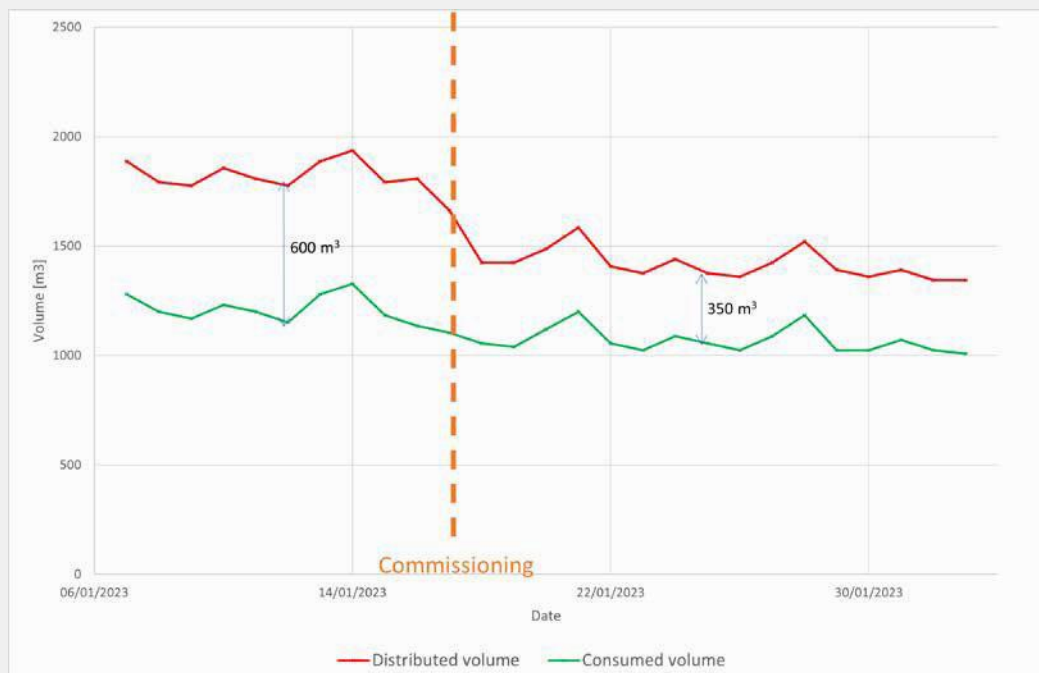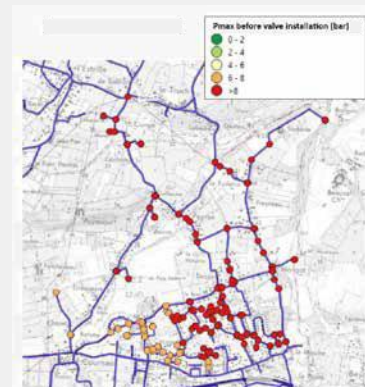

Pressure drops in the network
-3.5 bar

-42% reduction in volume of water lost in the sector

HYDROGENIE® control valve

HYDROGENIE® control valve

Any hydraulic control valve equipped with the HYDROGENIE® electronic controller can function independently, or be integrated with a SCADA system or IIoT platform for advanced control capabilities. The system is fully programmable to accommodate specific customer requirements.

Applications

Desalination   **Transport**   **Distribution**

Dam   **Water treatment**   **Industry**

Function

- Pressure control (pressure reducing and pressure sustaining)
- Flow control (flow limiting)
- Level control (water level in a tank)
- Step by step position control
- Temperature control

Main advantages:
performance and durability

- **Strength and durability** with a pilot circuit entirely made from stainless steel 316. The internal moving parts are entirely made from stainless steel 316 up to DN 200 mm - <u>unique solution on the market as standard</u> - provides high durability and performance even in harsh conditions of use, such as major upstream/downstream pressure differences.

- **Resistance to corrosion** by application of a minimum 250μm coating and the use of connecting pieces passing through the valve body

- **High performance and durability** ensured by the use of a new, high density, EPDM, <u>preformed diaphragm</u>

- **A precise pilot and regulating principle**

Compliance with standards:

- NF EN 1074-5
- Category A leak-tightness as per ISO 5208-2
- Compliance with Standard EN 12266
- Face-to-face dimensions NF EN 558-1 and ISO 5752-1
- Connection flange drilling as per EN 1092-2 and ISO 7005-2 ISO PN 10 as standard, ISO PN 16, ISO PN 25 or other drillings for DN 50 to 400 (please consult us)
- **Attestation of Sanitary Conformity (ACS)**

Technical Advantages of the HYDROGENIE® pilot system

The network genie

PERFORMANCE & FLEXIBILITY

- Combination of different regulation modes to optimise pressure and flow in the network
  - **Pressure**
  - **Flow**
  - **Level**
- With internal sensors or external sensors (4-20 mA signal or ModBus)

Built in pressure sensor and solenoid

PERFORMANCE

- Step-by-step pressure and flow regulation with its incorporated pressure sensors and solenoid valves
- Low consumption solenoid supply only in case of the modification of operating conditions

IP68

PROTECTION INDEX

- Solenoid and sensors integrated in IP68 box
- HYDROGENIE® delivered with cable and connector IP68

I/O

SIMPLICITY

- 24VDC supply
- ModBus communication
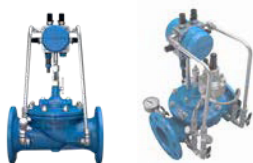- 3 analogue inputs
- 4 digital inputs
- 2 digital outputs

Easy setting

FLEXIBILITY

- **All in one system easy to connect with only one connector**
- Product delivered configured to order
- Setting on site with simple HMI via ModBus

Assembly possibility

Reduce maintenance

HIGH DURABILITY

- With the step-by-step function, no permanent flow in the pilot circuit, keeping the strainer clean and the circuit and solenoids free of particles (less filtration, less scaling)

Remote control

MODBUS COMMUNICATION

- Set point modification via ModBus communication
- Connection to data logger
- Connection to SCADA

General Operating Principle

The controller controls the opening and closing of the main valve with the 2 integrated solenoids:

- **SV1** for upstream, closes the valve when it is powered
- **SV2** for downstream, opens the valve when it is powered

The controller uses the integrated pressure sensor, to implement the chosen regulation:

- **P0** measures the chamber pressure
- **P1** measures the upstream pressure
- **P2** measures the downstream pressure
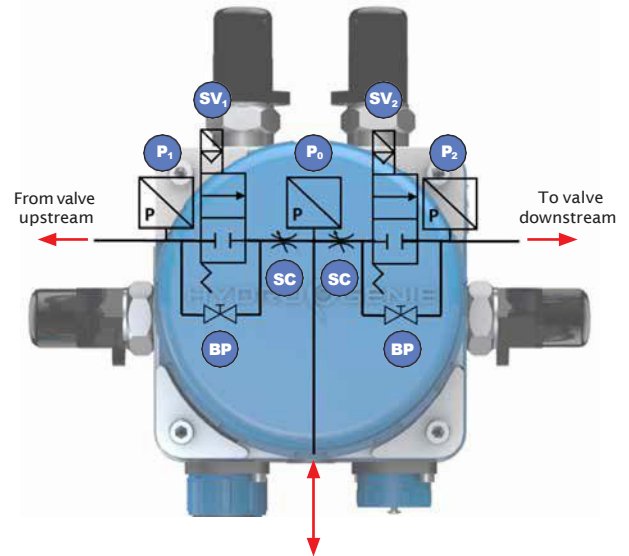
Valve chamber

The pressure in the chamber of the diaphragm **[P0]**, is used to calculate the "hydraulic capacity" and to implement the regulation, taking into account the network parameters. The hydraulic capacity calculation enables "intelligent actuation" of the step-by-step solenoid valve, with no activation of the valve unless necessary to achieve the purpose of actuating it.

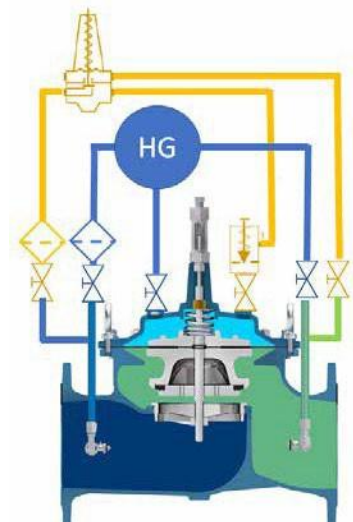This principle makes the system very power efficient and suitable for off-grid applications.

The controller uses PWM to adjust the speed of the valve, in order to achieve the best performance. An advanced algorithm was developed to ensure that the valve response is not affected by the change in differential pressure. The fail-safe mode of HYDROGENIE® is normally locked valve mode, due to the selection of 2 solenoids normally open.

LOCKED   OPEN   CLOSED
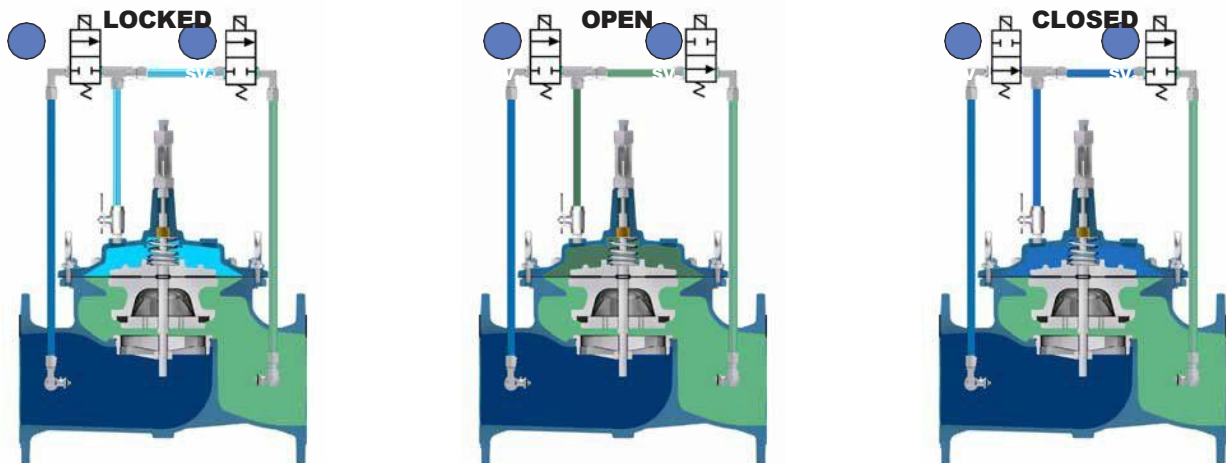
The HYDROGENIE® pilot can be the sole pilot to control the valve in the different available control modes (pressure, flow, level) or the product can be delivered with a safety circuit, as drawn in orange on the appended schematic.

This version will ensure that in case of any supply issue, the downstream pressure will never be above the set value on the hydraulic pilot 52P.

Other options are available on request.

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Technical Pilot Details

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Electrical power supply:	External 12-30V DC, 8W max power
Solenoid valves:	Built-in dual (swappable NC)
Valve speed control:	Built-in dual throttling valves
Pressure sensors:	Built-in upstream, downstream, valve chamber
Index of protection:	IP 68
Electrical connector:	Delivered with cable and 8 pins IP68 connector
Fail safe:	• Locked in place (standard) • Closed • Open
Communication:	ModBus (RS-485) slave compatible with SCADA connection via ModBus communication
Input:	• 3 analogue inputs (standard) • 4 digital inputs (standard) • 2 digital outputs (standard) • 2 pressure sensors (option)
Output (normalized):	• Upstream pressure • Downstream pressure • Valve utilization
Output (status):	• Fully utilized (hydraulic position) • Fully closed feed back

Extract of available control mode

• Stabilization and regulation of downstream pressure

• Maintaining upstream pressure

• Flow control:
  - External flowmeter through 4-20mA or ModBus
  - Internal measurement based on calibrated Differential Pressure (option)

• Regulation of downstream pressure combined with upstream pressure, maintaining and maximizing flow limitation

• Stabilization and regulation of specific network pressure:
  - External pressure sensor through 4-20mA or ModBus
  - Internal measurement based on optional pressure sensor

• Combined regulation of downstream pressure and flow

• Level regulation of a tank:
  - Level information through 4-20mA or ModBus
  - Level information with complementary pressure sensor (option)

• Temperature regulation

• Control as slave via ModBus communication

• Programming reactions (e.g. full opening or closing) in the event of reaching a restriction on one or more physical quantities
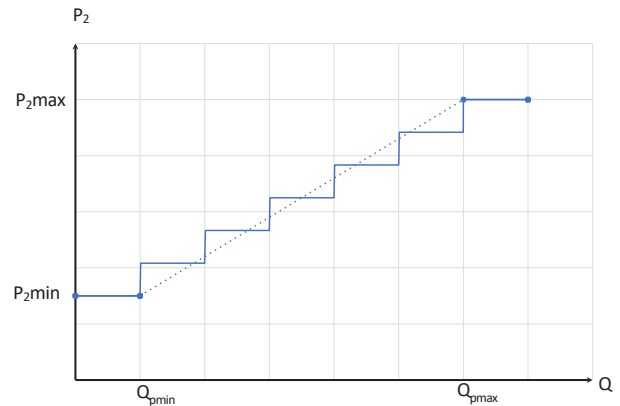
Example of combined flow pressure control

HYDROGENIE® HMI

The **HYDROGENIE®** application is intended to program and set all the necessary parameters to perform the desired functions of the control valve in standalone installation.
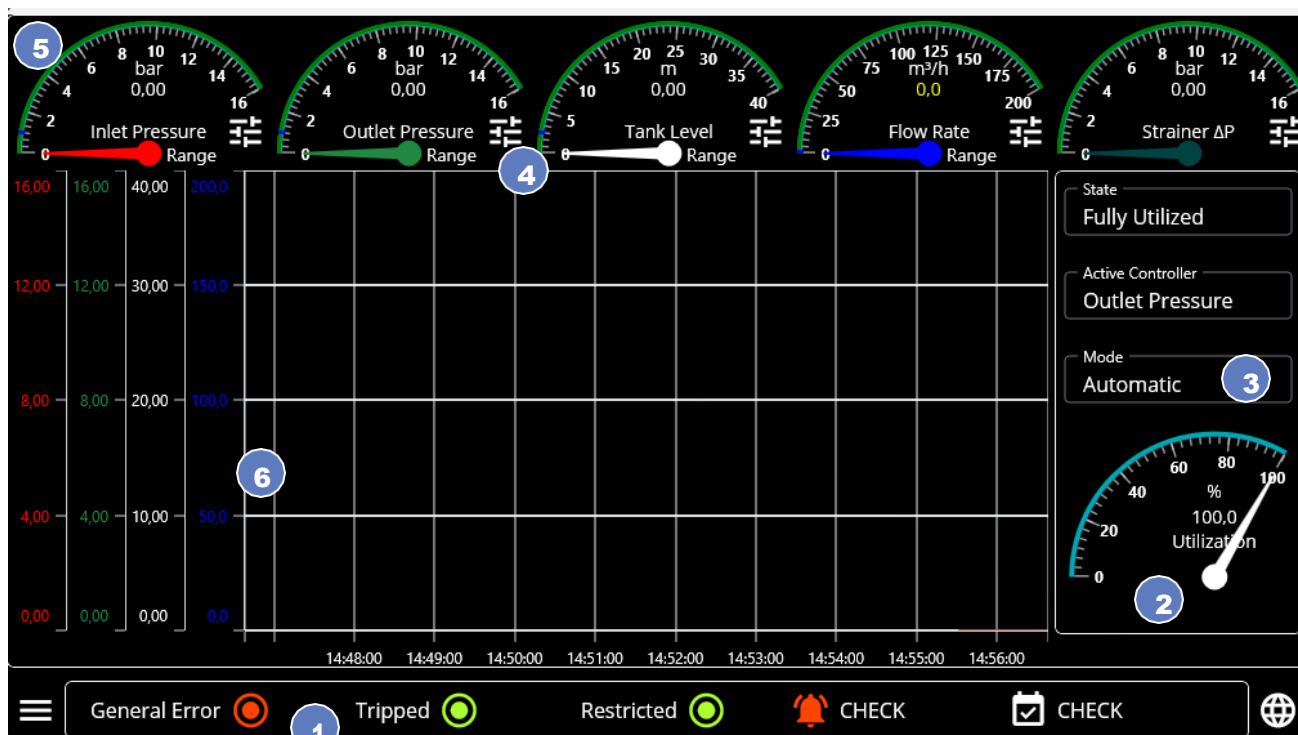
The user interface is divided into different sections:

1 Displays alarms, states of digital outputs and inputs

2 Visualizes the level of opening and use of the valve

3 Allows manual control forcing the opening or closing of the valve

4 Allows access to the change of operating point on the different physical quantities

5 Visualizes the current value of different physical quantities

6 Visualizes the evolution over the last 10 minutes of physical values

Value Added Offering: Midronix Integration

Midronix integrates with HYDROGENIE® to deliver smart, real-time monitoring and control for water systems.

A Smart Water Platform that compliments HYDROGENIE® in the field.

HYDROGENIE® brings powerful, autonomous control to valves, tanks, and pressure zones.
To fully realize its potential, it needs an innovative, centralized system to manage, monitor, and scale deployments.

Enter Midronix, a real-time IIoT platform built to supervise and orchestrate **HYDROGENIE®** enabled networks.

Midronix provides a unified layer of visibility, analytics, and control—turning raw data from **HYDROGENIE®** units into actionable insights and coordinated operations across the entire water infrastructure.

How Midronix Enhances HYDROGENIE®?

- Central Dashboards: Live flow, pressure, tank levels, and alerts.
- System Orchestration: Automates flushing, cycling, and leakage detection.
- Edge Resilience: Keeps field logic running even when offline.
- Open Integration: Connects with SCADA, GIS, billing, ERP, and legacy systems.
- Scalable & Multi-Tenant: Grows from small networks to national grids.

Integrated to Create the Perfect Unified Architecture

HYDROGENIE (Basic)	Midronix (Value-Added Offering)
Field autonomy	Central control
Local decisions	Global coordination
Real-time tuning	Historical analytics
Works offline	Cloud sync & alerts

Together, Midronix and HYDROGENIE® form a smart, adaptive water system—from the field to the cloud.