Advanced Pressure Control

Introduction

Mains replacement is an expensive process which leads to significant highway disruption and is usually considered as a last resort. Wherever possible, water companies have sought to maintain their networks at an acceptable efficiency and performance level to defer replacement.

Whether gravity fed or pumped, a mains network can only deliver sufficient pressure to its extremities given there is enough pressure at the supply point(s) and sufficiently low resistance to flow. The following effects can all contribute to worsening low pressure problems:

- As the mains age, their internal surfaces become increasingly roughened by corrosion build-ups, which increases frictional losses.
- Without any intervention, the leakage in a network naturally rises with time, which introduces additional flow within the network and corresponding head loss.
- Domestic demand for water has risen substantially. In addition, recent historic droughts have taken demand to record levels. Networks designed some 30 or 40 years ago may well be inadequately sized for today's demand.

It is generally acknowledged that reducing pressure in the mains reduces leakage rates and frequency of bursts. Although research work is still proceeding to quantify the effects of pressure reduction, its effectiveness is no longer in doubt.

Whilst pressure reduction is beneficial, high pressure may need to be fed into districts to counteract the increasing 'head loss' due to ageing pipes, naturally rising leakage and growth in demand. The challenge in pressure management is to address these two conflicting requirements by applying the optimum pressure within the network at all times.

Technolog Limited,
Ravenstor Road,
Wirksworth,
DE4 4FY, United

+44(0)1629 823611
technolog@
technolog.com
www.technolog.com

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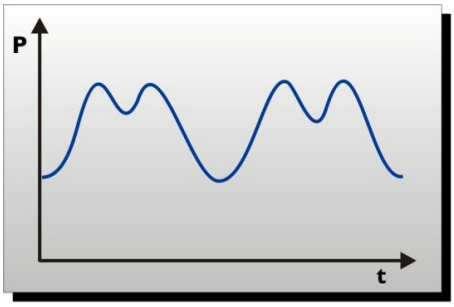
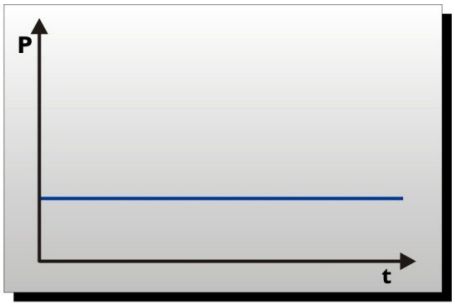
In an ideal distribution system, the regulator device supplying the district should supply only sufficient pressure to maintain the necessary minimum pressure at the critical node. A Pressure Reducing Valve (PRV) controller can accurately achieve this by monitoring network parameters, and control the PRV accordingly, as shown below:





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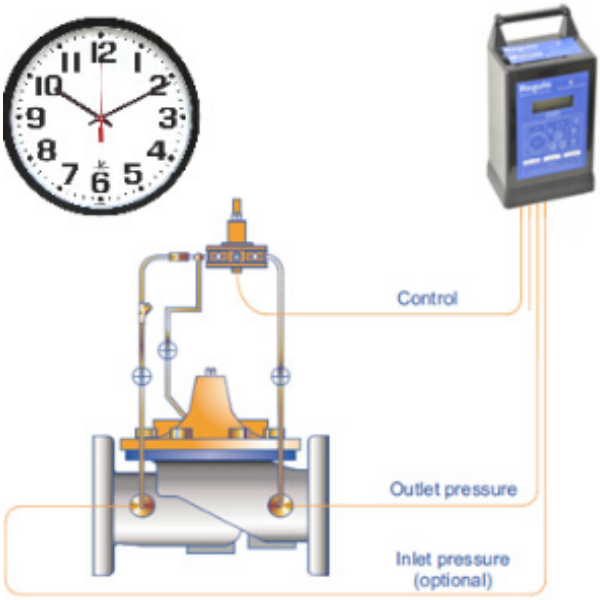
When used in conjunction with a PRV, three typical control modes can be used to optimise network pressure:

(a) **Time-based profile modulation:** The controller monitors the PRV outlet pressure at frequent intervals and adjusts the PRV outlet pressure with respect to the time of day.



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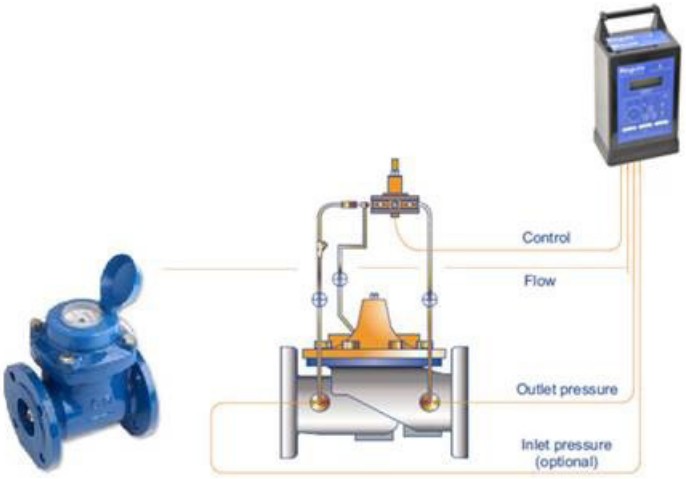
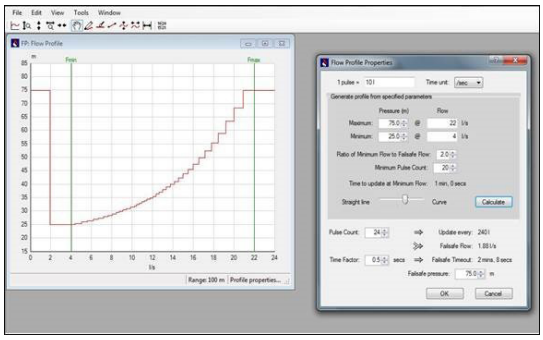
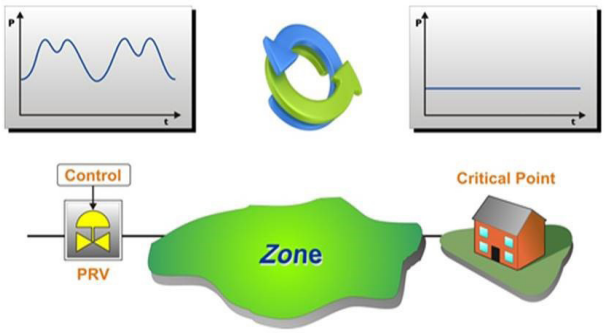
(b) **Flow based modulation:** The controller monitors the flow rate and adjusts the PRV outlet pressure with respect to flow rate according to a 'flow rate vs pressure' profile entered by the user.





(c) **Closed Loop:** Here the controller is permanently connected to the communication network. The controller is capable of modulating the outlet pressure of a PRV by receiving alarm messages DIRECTLY from one or more data loggers located at critical points within the network.

Closed loop control may be performed without the need of a central server.



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Product Technical Matrix

	Regulo PRV Controller
Service	Water
Mode of Communication	Local / 2G
User Accessible SIM	Yes
User Replaceable Battery	Yes
Available Channels	8
Optional Pressure Inputs	2
Supported Pressure Recording Strategies	I / A / S
Optional Temperature (PT-100) Inputs	0
Available Digital Inputs	2
Available Analogue Inputs	0
Internal / External Supply	Internal & External
Powering of Third Party Sensors	No
WITS Compliance	Yes
Intrinsically Safe	No
Protection Class	IP 68
Level Monitoring Capability	Float Switch

Key : Pressure Recording Strategy (I - Instantaneous / A - Average / S - Statistical / T - Transient)

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