New & Exciting Capabilities of Modern Control Valves
Types of Automatic Control Valves

- Hydraulic
- Electronic
- Electronic with Hydraulic Back-Up
Line Pressure to Open

100 psi

Inlet

Outlet

6 in²

100 psi × 6 = 600 lbs.
Line Pressure to Close

Closing Force: 100 x 10 = 1000 lbs.
Opening Force: 100 x 6 = 600 lbs.
Difference: 400 lbs.
Control Valve Applications

- Pressure Reducing
- Pressure Relief/Sustaining
- Pump Control
- Rate-of-Flow Control
- Level Control
- Cavitation Control
- Surge Anticipation
- Electronic Control
- Metering
- Valve-Based Power Generation
Pressure Reducing Valves

• Reduces a higher inlet pressure to a constant downstream pressure regardless of demand and supply pressure fluctuations
• Enables delivery of water at safe pressures and adequate levels for customer needs
• Installations:
  – Main line feeds
  – Distribution zones
  – Fire systems
  – Irrigation systems
Pressure Relief/Pressure Sustaining Valves

• Relieves excess pressure while maintaining a minimum upstream pressure
• Prevents downstream demand from sacrificing supply of an upstream zone
• Installations:
  – In-line distribution piping
  – At booster pump stations
50-01 Pressure Relief Pressure Sustaining Valve

Flow Meter: 1000 gpm

Flow Meter: 1 gpm
Rate of Flow Control Valves

- Maintains a maximum flow rate setting downstream regardless of pressure changes
- Installations:
  - Within distribution systems
  - Filter applications
  - Process control applications
Example: Electronic Pressure Reducing

- **Application:** Electronic Pressure Reducing/Pressure Sustaining Valve in packaged vault
- Equipped with electronic actuator
- Feeds community and elevated tank located 2+ miles from vault
Hydraulic Level Control Valves

- Designed to shut-off when the reservoir reaches a high level setting
- Float or floatless configurations
- Installations:
  - Elevated tanks
  - Above and underground storage tanks and reservoirs
Altitude Valve Variations

ONE WAY FLOW
ONE WAY FLOW WITH DIFFERENTIAL OPENING
TWO WAY FLOW
TWO WAY FLOW WITH DIFFERENTIAL OPENING
SENSE LINE
This insures that water fills the tank, only when desired-time clock, or command from SCADA.
Cavitation Control

- Cavitation is common in applications with high pressure differentials or high flow rates
- Cavitation damage can be catastrophic
- Automatic Control valves can be equipped with special trim to prevent cavitation, without removal of the valve from the pipeline
- Integral cavitation protection is one of the easiest and most effective ways to prolong valve life
Anti-Cavitation Valve Applications
Pump Control Applications

[Diagram of pump control applications]

- Booster Pump Control Valve 60 Series
- Pressure Relief or Surge Control Valve 50 or 52 Series
- Altitude Control Valve with Remote Shut-Off 210 Series
- Finished Water Storage Tank
- Flow from Finished Water Storage Tank
- Electronic Level Control Valve with Metering and Hydraulic Override 131/133 Series
- Finished Water Booster Pump Station
Pump Control Valves

• Booster Pump Control Valve:
  – Pump starts against a closed valve
  – Valve opens slowly as pump starts, gradually increasing line pressure to full pump head
  – Valve closes gradually when pump is signaled to shut-off
  – Prevents reverse flow and water hammer
Powercheck Main Valve

Model 100-03
Built-In lift type
check valve

Spring in cover 10” and smaller
Installation: Rialto, CA
What is Surge?
Research Test Set-Up

50-01 Pressure Sustaining Valve - 6"

50-01 Pressure Relief Valve - 2-1/2"

Gate Valve - 2-1/2"

138-01 Quick Closing Solenoid Valve - 6"

1200' 6-inch pipe in loop
Test Curve With No Relief Valve

Simulated Power Failure With No Surge Protection

Pressure $p$^1^ Simulated power failure (flow 600 gpm)

Seconds

120 psi
80 psi
40 psi
0 psi

145 psi Peak
50 Series Pilot System unmodified

X42-N2 Strainer & Closing Speed Control

CRL Pilot Control

Inlet

Main Valve

Outlet
Test Curve With 50 Series Relief Valve

Simulated Power Failure with 2-1/2” 50 Series Pressure Relief Valve

Main Valve Open

Main Valve Stem

Main Valve Closed

Pressure $p^1$

Simulated power failure
(flow 600 gpm)

seconds

80 psi

40 psi

0 psi
50 Series Pilot System with Modification
Test Curve With Modified 50 Series Relief Valve

Simulated Power Failure with 2-1/2” 52 Series Surge Control Valve

- Main Valve Stem
- Main Valve Open
- Main Valve Closed

Pressure $p^1$

Simulated power failure (flow 600 gpm)

seconds
52-03 Surge Anticipator Control Valve
Surge Anticipator Control Valve
SCADA Interface
Electronic Control Valves can do it all

- On / Off Control
- Pressure Control
- Flow Control
- Level Control
- Blending Control
- Valve Position Control
- Combinations
- System Status

Automatic Control
Enhancing Control Capabilities
You can get the control you need

Ball and Butterfly valves ...
• ...have limited range, limited capabilities
• ...are less durable
• ...are more expensive to maintain

The best solution is Cla-Val
Advantages of Cla-Val Automatic Control Valves over actuated ball valves and butterfly valves

1. Greater range of control in modulating applications
2. Infinite positioning capabilities
3. Less susceptible to cavitation
4. Field retrofittable anti-cavitation trim for existing valves
Advantages of Cla-Val Automatic Control Valves over actuated ball valves and butterfly valves

5. Do not rely on external device to operate
6. Back-up hydraulic functionality
7. Less costly to maintain
8. Can perform multiple functions, such as pressure reducing and metering in a single valve
Example: Electronic Pressure Reducing with Metering

- **Application**: PRV station with two valves feeding drinking water system and filling two elevated tanks downstream of station
- Electronic pressure reducing valves provide a wider range of pressure control as compared to actuated ball valves
- Electronic control valves were equipped with integral metering capability
Electronic Control Valve Capabilities

• Automatic and Electronic Control Valves are smarter than ever
• They can be configured to perform multiple functions with one valve
• They become the “brains of the operation” when it comes to equipment
• Control valve manufacturers have the capability of creating custom solutions to meet unique requirements
Electronic Control Valves

• Designed for applications where remote control is desired
• Can be set-up to perform one or multiple functions
• Can be combined with hydraulic control for fail-safe operation
• Easy interface with SCADA
133-01 Flow Metering Kit

- Add to any NEW or existing Cla-Val control valve
- 131VC-3T Programmed for all Cla-Val valves
- Built-in local display and retransmission to SCADA
- Custom-made and easy to install
133-01 Metering & Control Valve
Filter Backwashing

Conventional Backwash System
Improved Filter Backwashing

- Raw Water
- Backwash Line
- Electronic Metering Valve with Anti-Cavitation Trim
- WTP Filter
- High Pressure Water Source
- Finished Water
Example: Electronic Modulating Level Control

- **Application**: Single valve controls flow and performs metering
- Interfaces with plant’s control system
- Alleviates the need for separate metering devices
- Maintains a constant level in tanks & reservoirs
- Helps meet regulatory requirements
- Takes less space than other options
Example: Electronic Modulating Level Control
Example: Electronic Reservoir Fill Valves

- **Application**: Filling of multiple above ground reservoirs
- Equipped with electronic pilot system for sustaining control
- Completely self-sufficient solution for reservoir filling
Example: Electronic Reservoir Fill Valves

- **Application**: Filling of underground reservoir
- Electronic communication from level transmitters to valve controllers to open and close valve in accordance with filling requirements
- Provides completely remote filling with or without SCADA
Example: Electronic Flow Control
Example: Electronic Source Blending with Metering

Application:
A combination of automatic control valves are used to control a blend ratio from two water sources:
- One treated
- One raw

- Flow meters on each line provide feedback to an electronic valve controller, which modulates the ratio control valve
- A cap flow control valve serves to limit the well maximum output and control startup surges
For partial treatment blending, an electronic ratio control valve is used to proportionally split the flow so that one portion is treated to remove undesirable compound (such as arsenic) and the remaining raw water is remixed after the treatment process to provide water for the distribution system that meets regulatory requirements.
Austin TX Filter Butterfly valve replacement with Cla-Val 133 Series Electronic Control Valve
The Best of Both Worlds: Electronic Control with Hydraulic Back-Up
Position Control Valve
Example: Electronic Position Control
Battery-Powered Timer Controlled Bypass

Inactive gate valve bypass
Valve-Based Onsite Power Generation
Typical Application
Valve-Based Power Generation

• Provides power by using the pressure drop across a PRV to run a generator
• Compact design easily adapts to small, pre-existing vaults or new installations
• No down time due to cloudy days
• Applications include powering electronic control valves, RTUs, monitoring equipment, sump pumps, lighting, and for pressure management
On the drawing board...
Flow Meter Alternative

- Alleviates the need for a separate metering device
- Can be retrofitted to existing, installed automatic control valves
- Takes less space and is less costly than other metering option
Questions?

Thank you for attending our presentation