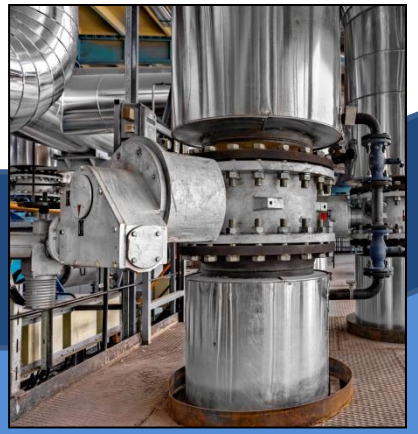
*Techni***BRIDGE** LLC

CBT Process Valve & Automation Learning



Course Description
Material Contents
Learning Slide Samples

*Techni*BRIDGE LLC

Welcome to "Valve & Automation Learning 2.0"

*Techni*BRDIGE has provided the highest level of industrial process valve and automation training on the market since 2012. Hundreds of students, including; engineers, instrument techs, mechanics and process unit operators have attended our on-site class room courses. Now we have reconfigured and enhanced our most popular course to a Computer Based Training (CBT) format. This brings the training to your employee's laptop and allows them to learn at their own pace, on their own schedule, within your groups learning matrix and systems.

Content, content and more content. Our valve and automation course contains 16 separate learning sessions, 226 slides, 154 cut-a-way drawings and 122 photographs of valves and valve accessories. This highly detailed and organized content allows the training administrator to segregate the learning needs of various facility personnel. Access to the content can also be used for in-house class room training, or equipment specific education, or to supplement existing in-house training programs.

Learning goals. Primary learning goals from the training are;

1) How each type valve and automation equipment is designed, why and the typical applications for each.
2) How each type of valve and automation equipment cycles, how they can be damaged.
3) SAFETY, how certain aspects of flow control equipment can injury your employees.

Budget considerations. One of the biggest benefits for our customers from our new CBT format is an extremely low "cost per student". On-site class room learning is expensive. Our CBT learning format provides our users with an inexpensive alternative. Annual site licensing provides our customers the ability to train ALL their employees. 24-7 access to our training portal means flexibility for you and your employees.

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Valve & Automation Learning 2.0 Session Content

1 Introduction
Upstream / Downstream
Delta P
Cv
Flow Direction
Linear / Rotary
Leakage Rates
Open-Close Rotation
Open-Close Indication
Torque / Position Seated
Component Design

2 Gate Valves
Wedge Gate
Wedge Designs
Seat Designs
Back Seats
Bonnet Designs
Bonnets / High Pressure
Non-Rising Stem
DCU Unheading
Media Cavities
Steam Purges
Through Conduit
NRS vs RS
Through Conduit vs
Full Port

3 Globe Valves
Design Fundamentals
Traditional Designs
Stop-Check Variations
Y Pattern
Angle Globe
High Pressure
Variations

4 Check Valves
Design Fundamentals
Swing Check
Double Door
Piston Check
Lever Assist
Spring Assist
Principles

5 Diaphragm Valves
Design Fundamentals
Operation / Cycling
Secondary Bonnet
Seals

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Valve & Automation Learning 2.0 Session Content

6 Hand Wheel / Linear
OS&Y Direct & Bevel Gear
Gear Reduction Assemblies
Hammering Hand Wheels
Extensions

7 Ball Valves
Design Fundamentals
Floating Ball Designs
Trunnion Mounted
Semi-Trunnion Mounted
Linear Stem Designs
Segmented Ball
Steam Purge
End Entry
3- Way

8 Plug Valves
Design Fundamentals
Sleeved / Lined
Lubricated
Expanding Plug
Severe Service Designs

9 Butterfly Valves
Design Fundamentals
Zero Offset
Single Offset
Double Offset
Triple Offset
Offset Interference Guide
Bearing Protectors
Flange variations

10 Hand Wheel / Rotary
Lever
Worm
Thread-Screw-Block
Gear Deduction Assemblies
Travel Stops

11 Double Block & Bleed
Definitions
Dual Element
Single Element
Piping Configuration

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Valve & Automation Learning 2.0 Session Content

12 Control Valves

12.1 Electric Motor Operators

Electric General
MOVs How They Work
Linear Valves
Electric Actuator Components
Rotary Valves
Torque & Travel Limit Switches

12.2 Modulating

Design Fundaments
Actuator Component
Linear Pneumatic
Fail Position
Valve Component
Positioner Component
Component Assemblies

12.3 On-Off

Design Fundamentals
Actuator Component
Rotary Pneumatic
Scotch Yoke
Rack & Pinion
Vane
Linear Pneumatic – RS
Design Variations
Travel Stops
Hydraulic
Valve Component
Signaling Component
Position Indication
Component Assemblies
I-P & P-I Transducers
Regulators

12.4 Manual Over Rides

Electric Motor Operators
Pneumatic / Gear Box
Pneumatic / Jack Screw
Pneumatic Hydraulic
Diaphragm Jack Screw

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Valve & Automation Learning 2.0 Session Content

13 Pressure Relief Valves
Spring Activated
Pilot Activated
Components
Lifting Gear
Pressure Vacuum Vents
ASME Tags

14 Packing & Bellows Systems
Purpose
Conventional Ring Packing
Spring Pack Additions
Bellows Designs

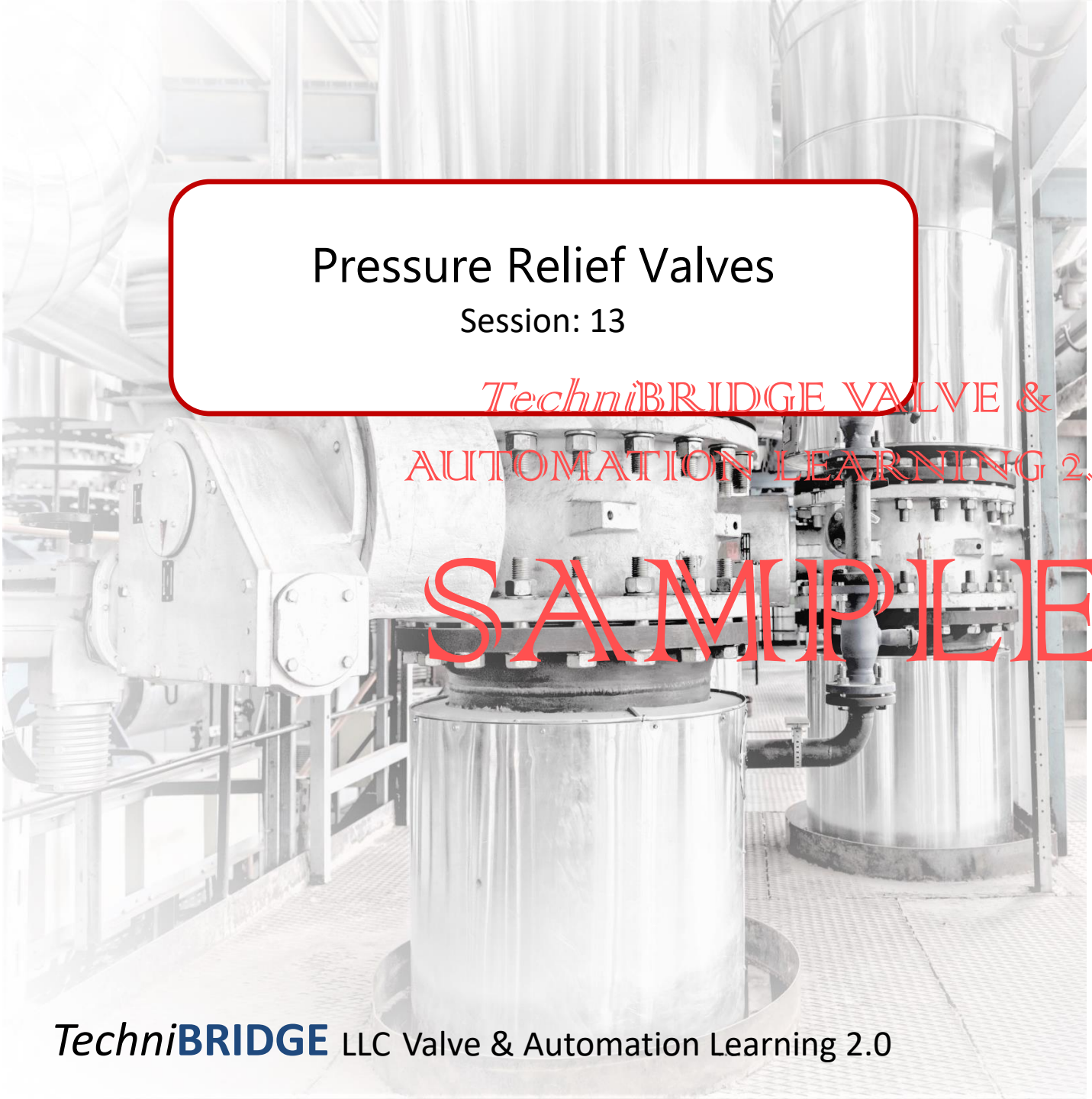
15 Valve Safety
Actuators
Automated Valve Assemblies
Packing Glands
Body Bolting
Back Seats
Lock-out / Tag-out
OHSA Highlights
Trapped-Stranded Process
  Blind Flange & PRV
By-Pass Assemblies
Hammering / Surge
ASME Seals
PRV Lifting Gears
Resistance to Operate

16 Why Valves Fail
Valve Packing
Valve Stem Buildup
Valve Type Selection
Material Selection
Temperature Variations
Temperature Migration
Cavitation

Valve & Automation Learning 2.0

Sessions Dashboard

1) Introduction
2) Gate Valves
3) Globe Valves
4) Check Valves
5) Diaphragm Valves
6) Hand Wheels / Linear Valves
7) Ball Valves
8) Plug Valves
9) Butterfly Valves
10) Hand Wheels / Rotary Valves
11) Double Block & Bleed
12) Control Valves
13) Pressure Relief Valves
14) Packing & Bellows
15) Valve Safety
16) Why Valves Fail



Pressure Relief Valves

Session: 13

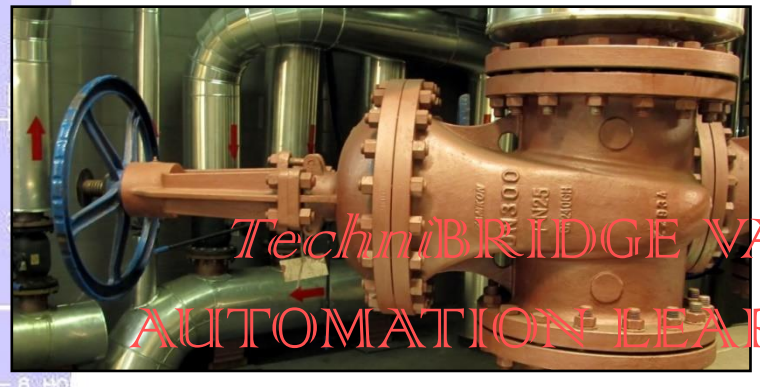
General Overview
Definitions
Spring Operated
Spring Operated - Components
Pilot Operated
Pressure – Vacuum Vents
ASME Notes
Manual Over Ride – Lifting Gear

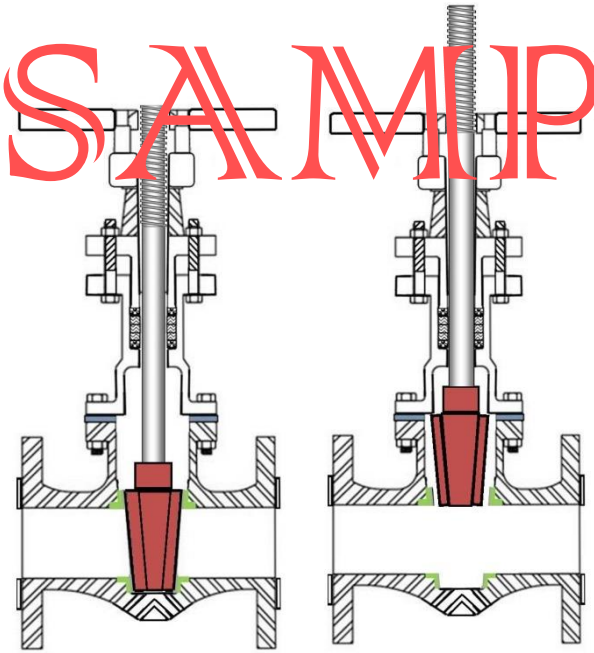
Control Valves

ON-OFF SERVICE / PNEUMATIC SIGNALING / SOLENOID

- Signaling components used in on-off applications are commonly simple solenoid valve assemblies.
- Solenoids can be thought of as miniature "on-off" electrical powered valves.
- Positioners can also be used in on-off applications. Some OEMs have developed on-off specific positioners with multiple functions suited to on-off applications.
- Namur (ISO standardized) mounting pattern is now common to many solenoids designed for valve actuators, which allows for direct mounting onto the actuator housing. This eliminates tubing and additional brackets. The solenoid typically seals to the actuator with O-rings. This system is commonly found on rack and pinion type actuators.

Gate Valves





Closed Open

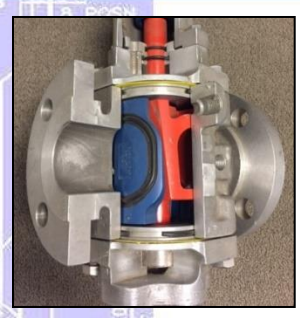
WEDGE GATE VALVES / RISING STEM

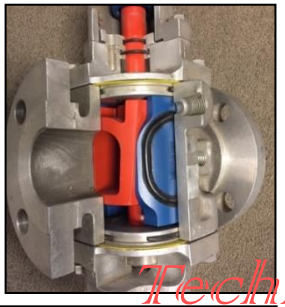
Typical Size Options: 1" - 54"
Typical Pressure Ratings: AWWA 125 - 250, ANSI 150 - 4500
Flange Options: Flat faced, raised face, RTJ, butt weld, socket weld.
Characteristics:
- Low Dp and high Cv.
- Poor throttling characteristics, designed for on-off applications.
- ***Stem does not rotate as valve cycles, only rises and lowers.***
- **Not designed to provide zero seat leakage.**

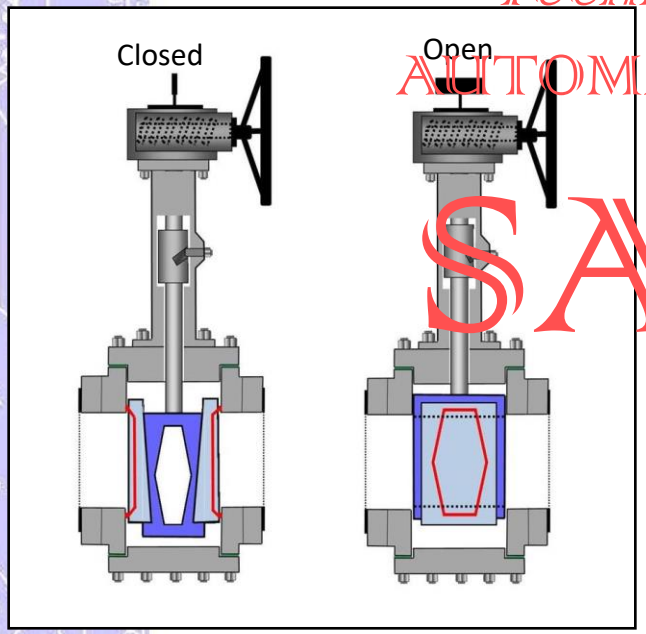
Packing Type: Conventional compression ring, or bellows.
Typical Services: Steam, gas, liquids, high temperature, chemicals, acids, water, oil
Applications: Isolation (non-throttling). Clean or dirty service .
Flow: Bi-directional.
Motion: Linear
Actuation: Manual, electric, hammer blow manual, Hydraulic or pneumatic.
Typical Seats: Metal, many are hard faced.
Seating Method: Torque

NOTE: One of the most common valve designs found in process industries.

Plug Valves







THE PLUG VALVE / EXPANDING WEDGE

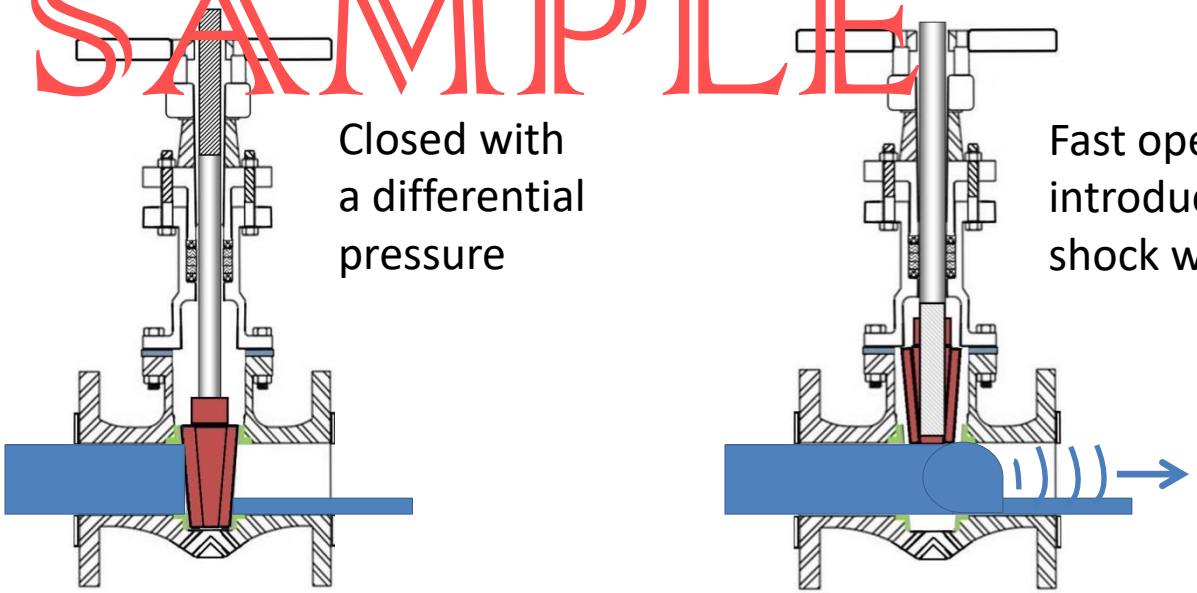
- Narrow application range, typically hydrocarbons
- Isolation only applications.
- Pipe line station and custody transfer manifold applications, some may be found in process units.
- Soft seated valve with oblong O-ring type seals bonded to the seal plates (O-ring shown in **RED**).
- Easily automated with electric motor operators due to integral worm gear design.
- High DP design, some better flowing designs available in full port options.
- Wedge section moves both rotational and linear (Shown in **Dark Blue**)
- Sealing plates commonly referred to as “dove tail slips” (shown in **Light Blue**).
- Slips are replaceable by removing the tail, or bottom plate from the valve body.
- The plug lowers and forces the sealing slips into the seats as the valve cycles closed.
- Due to the combined linear and rotary action of the valve, they are both ***TORQUE & POSITION*** seated.

Wedge element moves both rotational and linear. Sealing plates are commonly referred to as “dove tail slips”. Seals are bonded onto the dove tail slips which are replaceable. Internal body bore may be chrome plated to resist corrosion. Unique worm gear actuator allows for multi-turn actuation, while only cycling the plug elements 90 degrees.

Valve Safety

Hammering / Process Shock Wave

- **Valves should be partially opened to allow the process to equalize within the lines slowly, to avoid a "hammering" effect on the process.**
- Opening a valve too quickly can introduce pressure shock waves into the system potentially causing damage to piping and/or process equipment.
- Once the system has equalized, the valve can be cycled to the full open position.
- Rapid closing can also introduce shock waves into the process.
- **Rotary valve are particular susceptible to introducing a shock wave, as they may operate much faster.**

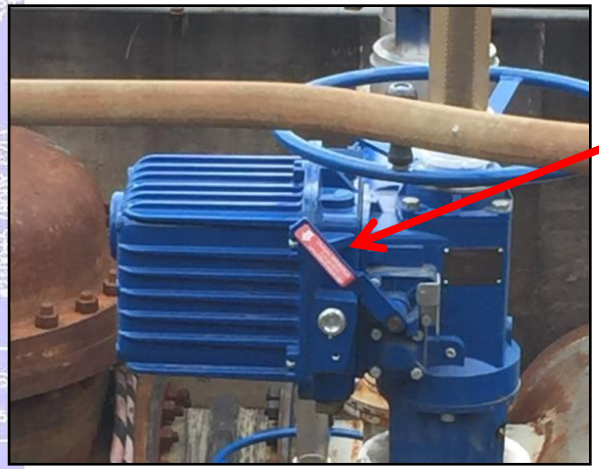


Closed with a differential pressure

Fast open introducing a shock wave

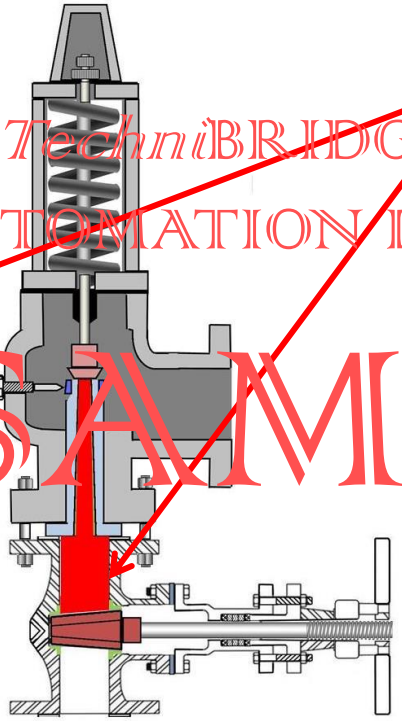
Control Valves

MOTOR OPERATORS / MANUAL OVER RIDE



- Modern electric operators are equipped with manual over ride capabilities.
- Most come with an engagement lever assembly or de-clutch shaft.
- (If equipped) the manual lever disengages the electric motor and engages the hand wheel, which becomes directly engaged to the valve's stem.
- (If engaged), the valve can be cycled manually via the hand wheel.
- Some units have buttons that trigger an internal engagement and allows the unit to be cycled manually.
- Some units (more common) have levers.
- Like manual hand wheels, over ride hand wheels are commonly ***CLOCKWISE*** **to close and** ***COUNTER-CLOCKWISE*** **to open on electric motor operator hand wheels.**

Valve Safety



Trapped Process Media (Relief Valves)

- The cavity between the isolation valve and the relief valve can trap process media.
- The trapped media "may" remain pressurized after the line pressure has been neutralized.
- ***ALWAYS follow asset owner procedures when removing relief valves and use extreme caution.***

Areas process media can become trapped between relief valve and block, or isolation valve in **RED.**

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Contact *Techni*iBRIDGE today to find out how affordable world class CBT valve training can be.

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