

# Technology for Power Generation



**tyco** | *Flow Control*



**Tyco Flow Control** is a diversified global designer, manufacturer, distributor, installer, and service provider of valves, actuators, instrumentation and related products which are used to transport, isolate, control and measure the flow of liquids and gases for a broad spectrum of markets including ...

### ***...The Power Generation Market***

Tyco Flow Control represents some of the world's most experienced and recognized brand names such as ...

Anderson Greenwood, Anderson Greenwood Instrumentation, Biffi Actuators, Clarkson, Crosby, Dewrance, Fasani, FCT, Gulf Valve, Hancock, Hovap, Intervolve, Keystone, KTM, Kunkle, L&M Valve, MCF Valves, Morin Actuators, Narvik, NeoTecha, Penberthy, Prince, Raimondi, Rovalve, Sapag, Sempell, Vanessa, Varec, Westlock and Yarway.

### ***We specialize in the complete steam power generation cycle***

Including boiler startup, operation, bypass and over pressure protection; superheater and reheater attemperation, isolation, and overpressure protection; main steam isolation, vents, drains, steam turbine startup, control and protection, steam turbine bypass and overpressure protection; circulation pump isolation, boiler feed pump and steam turbine drive control and protection, water treatment, feed water heater isolation, burner, slurry isolation and ash handling, flow control and bypass systems.

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# Actuators and Control Systems

Biffi, Keystone, Morin and Westlock

<b>Type</b>	Multi-turn, Quarter-turn, Linear
<b>Design</b>	Electric, Pneumatic, Hydraulic
<b>Standard</b>	ASME, DIN
<b>Form</b>	Forged, Cast, Fabricated
<b>Materials</b>	Aluminum, Carbon Steel, Alloy Steel
<b>Service</b>	ESD, On-Off, Turbine Trip, Modulating
<b>Sizes</b>	1/2 thru 60 inches [10 thru 1500 mm]



**Biffi ICON** - Intelligent, non-intrusive, multi-turn electric actuator.



**Westlock ICoT™** - 5200 LCD that allows for automated calibration of the positioner. System calibration is performed easily requiring only minutes to accomplish. An on-board microprocessor uses the calibration data to provide accurate operation over the full span of valve travel during normal operation.



**Keystone EPI2** - Electric actuator for quarter-turn valves and dampers. For output torques to 17,700 lb.in.



**Keystone MRP** - Direct mounting spring return and double acting pneumatic actuators. Compact rack and pinion design delivers maximum output torques in a small package. Output torques to 27,624 lb.in. (double acting) and to 10,155 lb.in. (spring return).



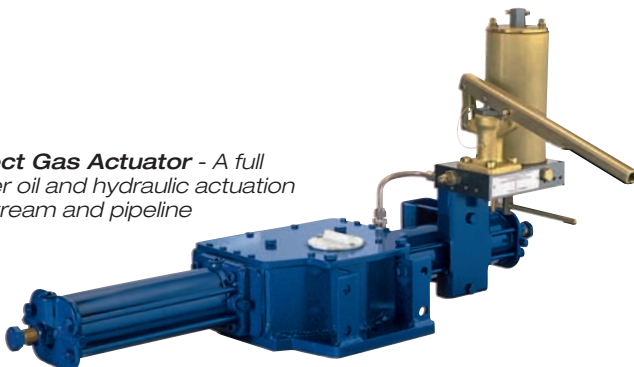
**Morin Series B or C** - Ductile iron/stainless steel quarter-turn, spring return and double acting actuators. Output torques to 240,000 lb.in.

**Morin Series S** - Stainless steel spring return and double acting pneumatic quarter-turn actuators. Output torques to 240,000 lb.in.



**Keystone 79U** - Spring return and double acting pneumatic actuators. Rack and pinion design for all types of quarter-turn valves.

**Biffi GIG Direct Gas Actuator** - A full line of gas over oil and hydraulic actuation for use in upstream and pipeline applications.



**Combined Cycle Plant**  
(see pages 26 - 27): 1 thru 19

**Conventional Power Plant**  
(see pages 30 - 31): 1 thru 27

# Blow-Off and Blowdown Valves

Hancock and Yarway

<b>Type</b>	Globe, Angle, Straightway, Unit Tandem
<b>Design</b>	Needle, Globe and Seatless
<b>Standard</b>	ASME
<b>Form</b>	Cast, Forged
<b>Materials</b>	Iron, Carbon Steel, Alloy Steel
<b>Pressure Class</b>	ASME Class 150 thru 2700 [PN 25 thru 290]
<b>Sizes</b>	1/2 thru 2 1/2 inches [10 thru 65 mm]



**Yarway Blow-off Valves** - Specially designed for the punishment of blow-off service in boiler systems with pressures of 3,206 psig; designed in conformance with all code requirements.



**Yarway 5800 Hy-drop** - Designed for continuous blowdown, but also works well for sampling, high pressure vents, boiler feed pump bypass relief, high pressure drop services.



**Hancock 5505** - Specifically designed to withstand the deleterious effects of continuous blowdown service that is so damaging to conventional valve types.

## Combined Cycle Plant

(see pages 26 - 27): 1

## Conventional Power Plant

(see pages 30 - 31): 1, 25

# Boiler Safety Valves

Anderson Greenwood and Crosby

<b>Type</b>	Safety, Controlled Safety, Relief Valves
<b>Design</b>	Spring, Pilot, Power Operated
<b>Standard</b>	ASME, DIN
<b>Form</b>	Cast, Forge, Block Body
<b>Materials</b>	Carbon, Alloy, Stainless, Duplex Steel
<b>Pressure Class</b>	ASME Class 150 thru 4500 [PN 25 thru 760]
<b>Sizes</b>	1/2 thru 30 inches [10 thru 750 mm]



**Crosby HCI** - High performance drum, superheater and reheater safety valve with unique ISOFLEX® disc design.

**Crosby HCA-118W** - Supercritical safety valve for start-up flash tanks, convection pass mix header, superheater and reheater for service to 5,000 psig [345 barg].

**Anderson Greenwood 727** - High temperature metal trim design with advanced reverse flow technology; dual pilots with safety selector valve manifold available; optional as remote actuated dump valve.



**Crosby HE** - Unique ISOFLEX® disc design and back pressure-assisted reseal features; meets the most stringent demands of capacity and reseal performance.

**Crosby HL** - Replaceable full nozzle with FLEXI-DISC® design; external blowdown bias adjustment for easier reseal setting.

**Crosby HSJ** - Replaceable full nozzle with FLEXI-DISC® design; open or closed bonnet selection; for application in low pressure steam generators.



**Anderson Greenwood 5100** - Modulating non-flowing pilot safety relief valve for economizer service with set pressures up to 6170 psig [425.40 barg].

**Combined Cycle Plant**  
(see pages 26 - 27): 1, 2, 3, 14

**Conventional Power Plant**  
(see pages 30 - 31): 1, 2, 3, 16

<b>Type</b>	Globe, Angle, Straightway, Wedge Gate, Ball, Needle
<b>Design</b>	T-Pattern, Y-Pattern, Full Bore, Reduced Bore
<b>Standard</b>	ASME, DIN
<b>Form</b>	Cast, Forged
<b>Materials</b>	Carbon Steel, Alloy Steel, Stainless Steel
<b>Pressure Class</b>	ASME Class 150 thru 4500 [PN 25 thru 760]
<b>Sizes</b>	3/8 thru 4 inches [10 thru 100 mm]



**Hancock 5525W-2 and 5535W-2** - Combination valves and flow control instrument valve.



**Hancock 7000** - T-pattern globe stop valve; direct contact, metal-to-metal seating. All valves feature no bonnet joint.



**Hancock 5500** - Reliable, leak-tight performance under high temperature and pressure conditions.



**Hancock 950** - An unobstructed flow passage and metal-to-metal seating makes this valve ideal for applications where high velocity or highly viscous fluids must be handled with minimum flow loss.



**Hancock 4000** - Flow is distributed evenly and simultaneously across the entire seating surface, protecting the seating surfaces from erosion.



**Yarway 5617** - Offers the power industry a value-engineered product with minimum maintenance and maximum service life resulting from its unique in-line renewability feature. The one-piece body eliminates all pressure welds, threads, and their related problems.

### Combined Cycle Plant

(see pages 26 - 27): 1, 2, 3, 4

### Conventional Power Plant

(see pages 30 - 31): 1, 2, 3, 4

# Butterfly Valves

Keystone

## Type

Butterfly Valve

## Design

High Performance, Resilient Seated

## Standard

ASME

## Form

Cast

## Materials

Cast Iron, Ductile Iron, Stainless Steel, Carbon Steel, Rubber Lined, Alloy Steel

## Pressure Class

Class 125/150, ASME 150, ASME 300

## Sizes

1 thru 102 inches



**Keystone Figure 106** – Large diameter double flanged valve offered in a variety of seat and disc materials to meet many service conditions. Fully rubber lined valves are available for abrasive services.



**Keystone Figure 990/920** – One piece thin profile disc/stem allows for molding of elastomer or polymer and is also available in stainless steel or alloy materials. Thin profile allows for high  $C_v$  and good control.



**Keystone Series 60** – Cartridge style seat used in applications with high pressure, vacuum, corrosive and erosive media. Disc are available in variety of metals as well as elastomer, polymer and Kynar®.



**Keystone Series 61** – Ideally suited for many general industrial valve applications such as cooling systems, water treatment, chemical, mining, food and beverage as well as bulk handling. Two-piece body with extended neck allows clearance for flanges and insulation.



**Keystone Figure AR1/AR2** – Dovetail retained rubber seat allows for easy field replacement. Available in a variety of body, disc and seat materials which provide solutions to many applications.



**Keystone K-LOK** – ASME Class 150 and 300 rated valves available with a soft seat, metal seat, or API 607 4th edition certified firesafe seat. Double offset design allows for high cycle life and less seat wear.



**Keystone Figure 221/222** – Molded-in seat allows for 250 psi tight shutoff and lug style is rated for bi-directional dead end service at full pressure.



**Keystone Dubex - RMI AWWA Butterfly Valves** – Torque seated: greater torque results in improved tightness. Closing torque is in direct relation with the shutoff pressure, which results in smaller actuator selections at lower pressures. The resilient disc seal is replaceable in-line.

## Combined Cycle Plant

(see pages 26 - 27): 2 - 6, 8, 10 - 13, 15 - 17

## Fossil Fired Plant

(see pages 30 - 31): 2 - 6, 8 - 10, 14, 15, 17, 18, 26, 27



**Type  
Design**

Angle, Three-Way Plug  
By-Pass, Changeover, Medium Operated,  
Spring Loaded

**Standard  
Form**

ASME, DIN  
Cast, Forged

**Materials**

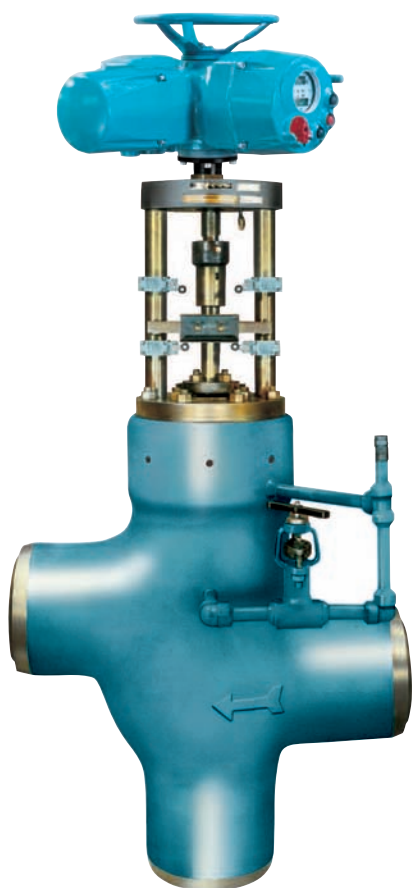
Carbon Steel, Alloy Steel

**Pressure Class**

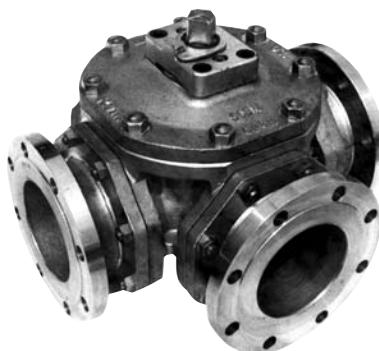
ASME Class 150 thru 4500 [PN 25 thru 760]

**Sizes**

2 1/2 thru 20 inches [65 thru 500 mm]



**Dewrance Feedheater By-Pass Valve** - Automatically allows by-pass of heater during tube failures.



**KTM 3-way** - A single KTM 3-way valve replaces several 2-way valves, saving valuable space and simplifying piping.



**Sempell Style DH** - Three-Way control valve for mixing or separating flow with low pressure drops.

**Combined Cycle Plant**

(see pages 26 - 27): 13

**Conventional Power Plant**

(see pages 30 - 31): 9, 15

# Check Valves

Dewrance, Gulf Valve, Hancock, Intervolve, Prince and Sempell

## Type Design

Check  
Non-Return, Lift Check, Piston, Swing,  
Tilting Disc, Wafer, Double-Door

## Standard Form

ASME, DIN  
Cast, Forged

## Materials

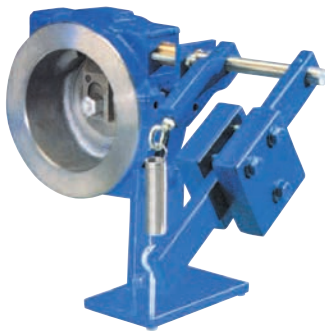
Carbon Steel, Alloy Steel, Stainless Steel

## Pressure Class

ASME Class 125 thru 4500 [PN 20 thru 760 ]

## Sizes

1/4 thru 36 inches [6 thru 900 mm]



**Prince Wafer Swing Disc Check Valve** - Provides smooth action during reverse flow conditions with or without weights, levers and damper options.



**Gulf Valve MB** - Double-door, spring loaded wafer check valve which offers low cracking pressure, and optimum space utilization.



**Sempell KR250** - Forged valve designed for high pressure and high temperature applications in the power and petrochemical industries.



**Dewrance HPTDCV** - Pressure seal tilting disc check valve designed to deliver quick opening and immediate closing with reverse flow.



**Intervolve Tilting Disc** - Equipped with a dome to balance weight, and a spring-assisted closure to avoid slamming.



**Hancock 4081** - Especially efficient in high pressure, high temperature steam, water and chemical applications.



**Hancock 5540** - Spring loaded valve may be installed in any position (horizontal or vertical piping applications). The spring also helps reduce noise and minimize the effect of pulsating flow.

## Combined Cycle Plant

(see pages 26 - 27): 1 - 19

## Conventional Power Plant

(see pages 30 - 31): 1 - 18, 24, 26

**Type**  
**Design**  
**Standard**  
**Form**  
**Materials**  
**Pressure Class**  
**Sizes**

Globe, Angle, Globe Offset, Quarter-turn  
 Cage Trim, Low Noise  
 ASME, DIN  
 Cast, Forged  
 Carbon Steel, Alloy Steel  
 ASME Class 150 thru 4500 [PN 25 thru 760]  
 1 thru 24 inches [25 thru 600 mm]



**Sempell Style 115** - Steam conditioning and turbine by-pass valves for HP, LP and IP applications.



Westlock ICoT Mounted



**Keystone K-LOK** - ASME 150 and 300 high performance butterfly valve incorporates a two-piece stem which allows higher  $C_v$  with increased range of control.

Biffi ICON Mounted



Morin B Series Mounted



**Vanessa QTL** - Quarter-turn, non-rubbing design with a unique, triple offset geometry that eliminates all seat-to-seat rubbing throughout the valve's 90° rotation.



**Clarkson C-Valve** - Provides both high performance and long life in the toughest environments and features a truly variable orifice for throttling control of abrasive slurries.



**Sempell Style 142** - Water control valve for boiler feedpump recirculation and spraywater control.



**Sempell Style 140** - Control valves for once-through supercritical boilers.

### Combined Cycle Plant

(see pages 26 - 27): 2 - 6, 8, 10 - 13, 15 - 17

### Conventional Power Plant

(see pages 30 - 31): 2 - 6, 8 - 10, 14, 15, 17, 18, 26, 27



**KTM Single V** - Rotary-valve design provides shearing action between the V-notch ball and the seat, promoting a smooth, non-clogging operation.



**KTM Dual V** - Unique Dual V-ball features a secondary (Small) V-notch allowing extremely small, accurate flow rates.

# Desuperheaters

Yarway

<b>Type</b>	Angle
<b>Design</b>	Multiple Nozzle Control
<b>Standard</b>	ASME, DIN
<b>Form</b>	Forged, Cast/Forged
<b>Materials</b>	Carbon Steel, Alloy Steel
<b>Pressure Class</b>	ASME Class 150 thru 2500 [PN 25 thru 420]
<b>Sizes</b>	1½ thru 4 inches [40 thru 100 mm]



**Yarway TempLow Series 4300** - For precise and economical control of steam temperature, automatically introduces cooling water into steam flow in response to a pneumatic or electric control signal.

The TempLowHT is the extension of the Yarway TempLow desuperheater design concepts into elevated temperature service, to 1100°F [593°C]. The TempLowHT is designed to eliminate sliding trim parts in the hot zone, while providing the traditional integral probe style desuperheater with isolation (stop) and water proportioning (control) in response to a temperature feedback control signal.

**A.T.S.A. Steam Assist Desuperheater** - During low flow or low velocity steam applications, the possibility of water fall-out and resultant pipe erosion can occur because the low mass of steam flow cannot carry the water long enough to insure proper evaporation.

In these cases, the A.T.S.A. steam assist design can be employed to insure rapid water evaporation by inducing high temperature, high pressure steam directly at the spray nozzles.

**Combined Cycle Plant**  
(see pages 26 - 27): 2, 3, 4

**Conventional Power Plant**  
(see pages 30 - 31): 2, 3, 4



# Globe Stop, Stop Check and Non-Return Valves

Intervalve and Raimondi

**Type**  
**Design**  
**Standard**  
**Form**  
**Materials**  
**Pressure Class**  
**Sizes**

Globe Stop, Screw Down Non-return  
T-pattern, Y-pattern and Elbow Down  
ASME, DIN  
Cast, Forged  
Carbon Steel, Alloy Steel  
600 thru 4500 [PN 100 thru 760]  
 $\frac{3}{8}$  thru 24 inches [10 thru 600 mm]



**Raimondi Raisteam** - Forged body globe valves for severe service isolation and non-return applications up to 24" end connections.



**Intervalve Y-pattern Stop Valves** - Full range of Y-pattern globe stop and non-return valves for power generation applications.



**Intervalve Elbow Down Stop Check Valve** - Specialty elbow down type body for boiler circ pump discharge and boiler outlet applications.



**Intervalve T-pattern Body** - Pattern globe and stop check valves through 6" sizes.

## Combined Cycle Plant

(see pages 26 - 27): 1, 3, 10, 13

## Conventional Power Plant

(see pages 30 - 31): 1, 3, 10, 14, 15

# Instrumentation Products

## Anderson Greenwood

**Type**  
**Design**  
**Standard**  
**Form**  
**Materials**

Globe, Plug, Needle  
Full and Reduced Bore  
ASME, DIN  
Barstock Extrusion, Cast  
Carbon Steel, Stainless Steel, Monel®,  
Hastelloy®  
ASME Class 150 thru 2500 [PN 25 thru 420]  
1/4 thru 1 inch [6 thru 25 mm]

**Pressure Class**  
**Sizes**



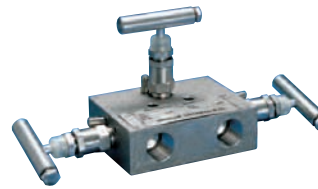
**Anderson Greenwood ADME** - Designed to distribute air for panel and cabinet instrumentation. Can easily be wall or pipestand mounted.



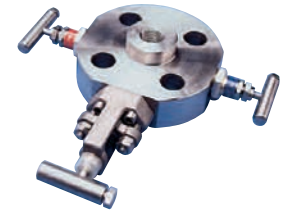
**Anderson Greenwood Keyblock Dual Threaded Connection** - Enables more versatile positioning of gauges or pressure switches; reduces the number of components required for installation.



**Anderson Greenwood M5YK-XP** - Versatile, dual outlet valve for use in gauge mounting or as root/primary isolation valve in differential pressure transmitter installations.



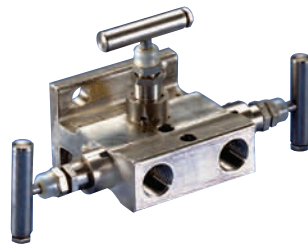
**Anderson Greenwood M1-XP** - Three-valve manifold designed to mount to signal lines and instrument when the instrument has connections different than 2 1/8" between signal taps.



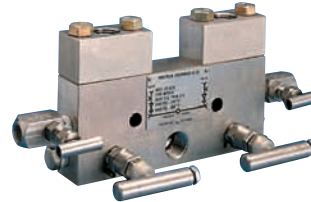
**Anderson Greenwood HD33MK** - Outside screw and yoke (OS&Y) bolted bonnet valve for first isolation service with a bore 'HD' globe style needle valves for second isolation service and intermediate venting service.



**Anderson Greenwood M24T-XP** - A five-valve manifold that enables instrument operation, isolation, zeroing and venting in a single unit.



**Anderson Greenwood M4T-XP** - Ideal for applications where direct coupling to orifice flanges is not desired.



**Anderson Greenwood MP2-XP** - Mounts two different pressure instruments simultaneously from a single pressure source; serves as both manifold and mount in one unit.



**Anderson Greenwood PT7-XP** - The shutoff valve, tee, calibration valve, and all immediate tubing/fittings are available in one simple manifold.



**Anderson Greenwood Enclosure Systems** - Provides protection against the effects of climate, dust and dirt, accidental damage, corrosion and tampering, without the need for extra bracketing.

**Combined Cycle Plant**  
(see pages 26 - 27): 1 - 19

**Conventional Power Plant**  
(see pages 30 - 31): 1 - 27

# Isolation Valves

Clarkson, Dewrance, Intervalle, Keystone, KTM, Raimondi and Vanessa

**Type**

Wedge Gate, Parallel Slide, Globe, Ball, Quarter-turn, Butterfly, Knife Gate

**Design**

Full Bore, Venturi, Reduced Bore

**Standard**

ASME, DIN

**Form**

Cast, Forged, Fabricated

**Materials**

Carbon Steel, Alloy Steel, Stainless Steel

**Pressure Class**

ASME Class 150 thru 4500 [PN 25 thru 760]

**Sizes**

3/8 thru 144 inches [10 thru 3500 mm]



**Raimondi Raisteam Valve** - Forged body position seated isolation valves for severe service and critical isolation applications. Zero leakage seating design eliminates thermal binding.



**Vanessa QTF 30,000** - Torque-seating action ensures continuous bi-directional, zero leakage performance.



**Dewrance Reheater Isolation Device** - Low pressure drop solution for reheat piping isolation during boiler hydrotest.



**Clarkson KGA** - Double-seated design provides bi-directional flow and shutoff; field replaceable elastomer sleeves.



**Dewrance Parallel Slide Gate Valve** - Unique technology offers low pressure drop, protected seats and long term repeatable shutoff for steam and water applications.



**Intervalle Flexible Wedge Gate Valve** - Conical shaped double flexible wedge gate design delivers reliable seating and even seat loading.



**Keystone Resilient Seat Butterfly Valve** - High quality molded-in seat allows for isolation and removal of downstream piping at full rated pressure.



**KTM OMNI II** - available in three basic styles of seats - soft, hard and metal-to-metal. Each offers a range of performance suitable to many applications.

**Combined Cycle Plant**

(see pages 26 - 27): 1 - 19

**Conventional Power Plant**

(see pages 30 - 31): 1 - 27

# Knife Gate and Slurry Isolation Valves

Clarkson, L&M Valve and Rovalve

## Type

Knife Gate, Slide Gate, Wedge Gate

## Design

Full and Reduced Bore

## Standard

ASME

## Form

Cast, Fabricated

## Materials

Carbon Steel, Alloy Steel, Stainless Steel

## Pressure Class

Vacuum to 2500 psig [Vacuum to 172 barg]

## Sizes

2 thru 144 inches [50 thru 3500 mm]



**Clarkson KGA** - Double-seated design provides bi-directional flow and shutoff; field replaceable elastomer sleeves.



**Clarkson KGD** - Wafer style slurry knife gate valve offering value and high performance in a compact package.



**Rovalve SB1700** - Revolutionary, state-of-the-art knife gate valve featuring a patented bolted-in-place perimeter seal.



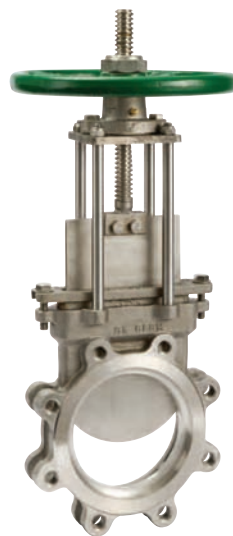
**L&M Valve M145** - The unique design benefits of the three-piece replaceable polymer liner offer reliability and long life in a wide variety of tough applications.



**L&M Valve M345** - Three-piece replaceable polymer liner provides all-around gate support, and prevents lateral movement of the gate.



**Rovalve 215** - Slide through, O-port gate design for severe service applications.



**Rovalve S17 and S20** - Cast stainless steel knife gate valve designed for performance and value with many added features.

## Combined Cycle Plant

(see pages 26 - 27): 5, 6, 9, 13, 14, 16

## Conventional Power Plant

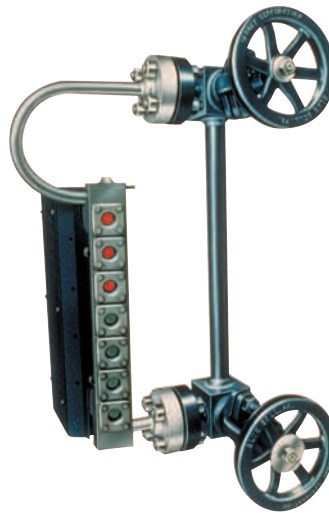
(see pages 30 - 31): 5, 6, 12, 13, 15 - 23, 25, 27



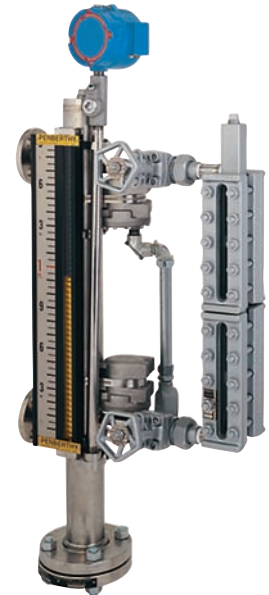
<b>Type</b>	Mechanical, Magnetic, Electric
<b>Design</b>	Gage, Probe Conductivity, Delta-P
<b>Standard</b>	ASME
<b>Technology</b>	Forged, Cast
<b>Materials</b>	Carbon Steel, Alloy Steel, Stainless Steel
<b>Pressure Class</b>	3000 psig max [207 barg max]



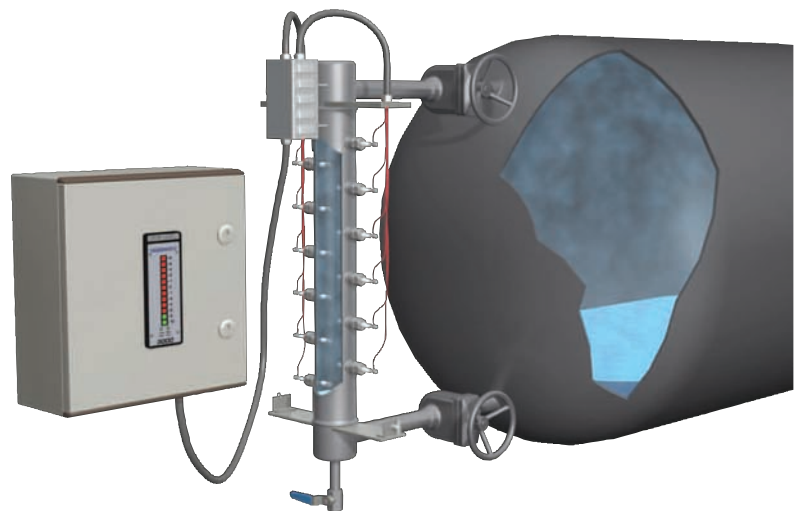
**Yarway 4400 RLLI** - Remote liquid level indicator.



**Yarway 4500 Colorport Gage** - Provides continuous indication of boiler water levels as required by the ASME Boiler and Pressure Code.



**Yarway Magnetic Level Gage** - Improved safety, convenience and versatility is possible by combining MULTIVIEW™ monitoring with an integrally-mounted armored gage.



**Yarway Electronic Liquid Level Indication** - Specially designed to meet increasing demand for a reliable, cost effective means of sensing water in various applications.

## Combined Cycle Plant

(see pages 26 - 27): 1, 2, 4, 11, 13, 15, 18

## Conventional Power Plant

(see pages 30 - 31): 1, 4, 7, 10, 11, 12, 15, 18, 24, 26

# Pilot Operated Pressure Relief Valves

Anderson Greenwood

<b>Type</b>	Safety Relief Valve
<b>Design</b>	Pilot Operated
<b>Standard</b>	ASME, DIN
<b>Form</b>	Cast, Forged, Block Body
<b>Materials</b>	Bronze, Carbon Steel, Alloy Steel, Stainless Steel, Duplex Steel
<b>Pressure Class</b>	ASME Class 150 thru 2500 [PN 25 thru 420]
<b>Sizes</b>	1/2 thru 20 inches [10 thru 500 mm]



**Anderson Greenwood 200 Series** - Balanced design of pilot operated valves ensures that proper valve operation and lift are unaffected by back pressure. Costly and fragile metal bellows are not required.



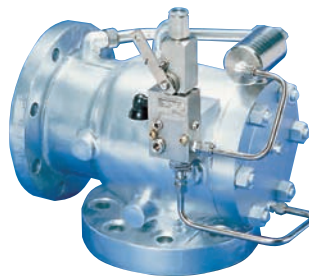
**Anderson Greenwood 400 Series** - Under process conditions, both pilot and main valve can be tight as high as 98 percent of set pressure.



**Anderson Greenwood Low Pressure 90 Series** - A high performance alternative to spring and weight-loaded relief devices for low pressure systems; eliminates product loss.



**Anderson Greenwood 500 Series** - A unique soft seated safety relief valve designed to decrease the leakage associated with metal-seated safety relief valves under extreme operating temperature conditions.



**Anderson Greenwood 700 Series** - All metal seated pilot and main valve extends the use of pilot technology to temperatures up to 1000°F [538°C]; suitable for steam and/or gas service.

## Combined Cycle Plant

(see pages 26 - 27): 3, 4, 14, 16, 18, 19

## Conventional Power Plant

(see pages 30 - 31): 4, 14, 16, 18, 27

# Pressure Relief Valves

## Anderson Greenwood and Crosby

**Type**  
**Design**  
**Standard**  
**Form**  
**Materials**

Safety Relief Valve  
 Spring, Weight  
 ASME, DIN  
 Cast, Forged, Block Body  
 Bronze, Carbon Steel, Alloy Steel,  
 Stainless Steel, Duplex Steel  
**Pressure Class**  
 ASME Class 150 thru 2500 [PN 25 thru 420]  
**Sizes**  
 1/2 thru 20 inches [10 thru 500 mm]



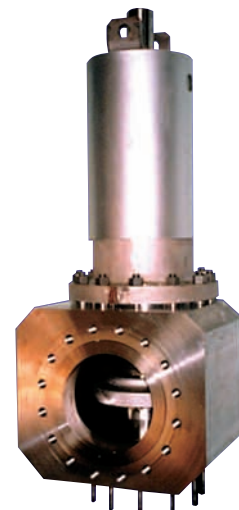
**Crosby OMNI-TRIM®** - Balanced piston design offsets the effects of variable back pressure on valve set pressure.



**Crosby JB** - Designed to eliminate the high costs of installation labor, inlet and discharge piping, maintenance and spare parts associated with the use of multiple, smaller API Standard 526 pressure relief valves.



**Crosby JOS-E** - Spring-loaded pressure relief valve engineered to provide high quality over-pressure protection for air, gas, steam, vapor, liquid and two-phase applications in a rugged, standardized design to the power industry.



**Crosby BlockBody** - For applications involving very high set pressures that exceed standard ranges.



**Anderson Greenwood 80 Series** - Direct spring operated pressure relief valve uses special internals and soft seats to provide optimum, accurate performance.

### Combined Cycle Plant

(see pages 26 - 27): 4 - 12, 15 - 19

### Conventional Power Plant

(see pages 30 - 31): 4 - 15, 18, 19,  
24, 26

# Pump Protection Products

Sempell and Yarway

## Type Design

Globe, Angle, Globe Offset, ARC  
Automatic Recirculation Valves  
(Check, By-Pass, Pressure Letdown),  
Pressure Reduction Valves

## Standard

ASME, DIN

## Form

Cast, Forged

## Materials

Carbon Steel, Alloy Steel

## Pressure Class

ASME Class 300 thru 4500 [PN 50 thru 760]

## Sizes

1/2 thru 12 inches [10 thru 300 mm]



**Yarway 9100 ARC Valve** - Recirculates only the flow required to assure a minimum flow through the pump at all times, thereby eliminating the need to oversize the pump and prime mover.



**Sempell Style 142** - Unique control valve trim and forged body design eliminates the potential for cavitation, high velocity and seat erosion for a long valve life.



**Yarway 5400** - Turbo cascade, minimum recirculation control valve.



**Yarway 7100 ARC Valve** - Provides the most economical and reliable system to protect pumps from the dangers of low and/or reverse flow; combines the functions of a check valve, flow sensing device, minimum flow control and pressure letdown into a single valve.



**Yarway 9200 ARC Valve** - Provides recirculation flow to the suction source of the pump, assuring a minimum flow for stable pump operation.



**Yarway 9300 ARC Valve** - For low energy, centrifugal pumps; only three connections; requires no external power source.

## Combined Cycle Plant

(see pages 26 - 27): 5 - 9, 13, 16, 17

## Conventional Power Plant

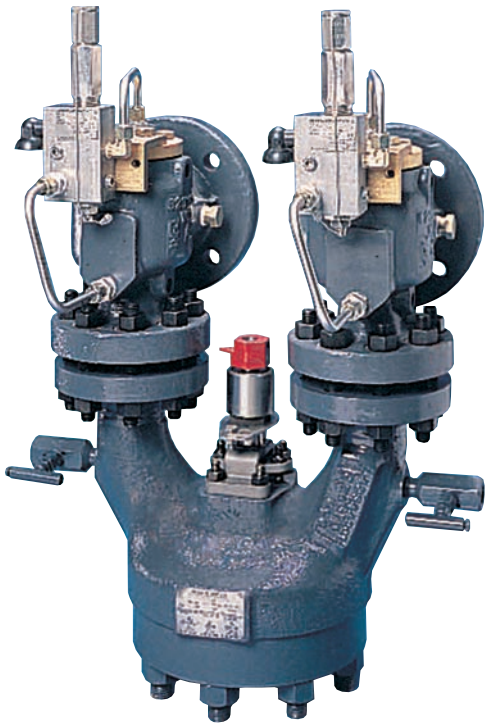
(see pages 30 - 31): 5 - 8, 12, 13, 14, 18



# Safety Selector Valves

Anderson Greenwood

<b>Type</b>	Rotary Isolation Disc
<b>Design</b>	Full Bore
<b>Standard</b>	ASME, DIN
<b>Form</b>	Cast, Forged
<b>Materials</b>	Carbon Steel, Alloy Steel, Stainless Steel
<b>Pressure Class</b>	ASME Class 150 thru 2500 [PN 25 thru 420]
<b>Sizes</b>	1 thru 10 inches [25 thru 250 mm]



**Anderson Greenwood Safety Selector Valve -**  
*Provides a safe, efficient method of switching from an active pressure relief device to a standby, maintaining system overpressure protection regardless of safety selector valve position. Suitable for ASME Section VIII and for ASME Section I to 800 psig MAWP.*

## **Combined Cycle Plant**

(see pages 26 - 27): 16, 18, 19

## **Conventional Power Plant**

(see pages 30 - 31): 18, 24

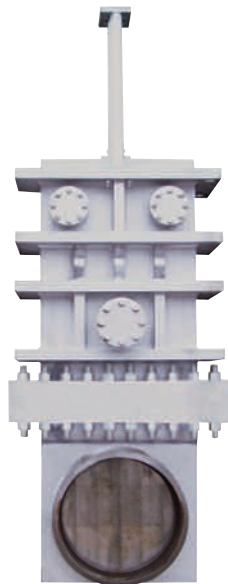
# Severe Service Valves

## Rovalve

<b>Type</b>	Choke, Knife Gate, Ball
<b>Design</b>	Full Bore, Reduced Bore
<b>Standard</b>	ASME, DIN
<b>Form</b>	Cast, Forged
<b>Materials</b>	Carbon Steel, Alloy Steel, Duplex Steel
<b>Pressure Class</b>	ASME Class 150 thru 4500 [PN 25 thru 760]
<b>Sizes</b>	1/2 thru 24 inches [10 thru 600 mm]



**Rovalve 215** - Slide through, O-port gate design for severe service applications.

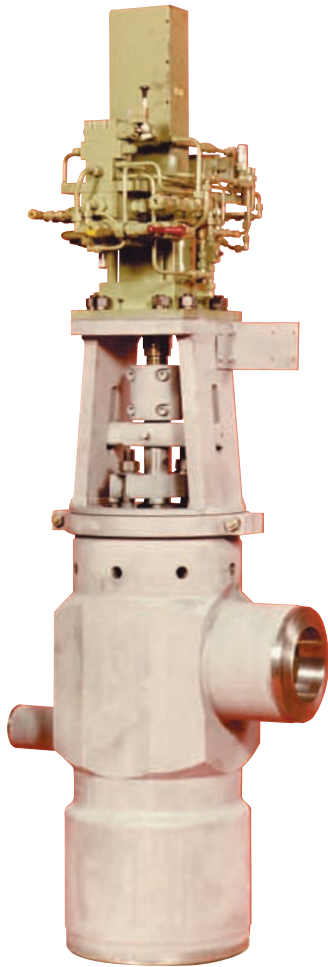


**Rovalve F220 Cold Reheat Isolation Valve** - A highly modified fully bonneted knife gate valve used for isolation in the reheat section of the boiler.

**Combined Cycle Plant**  
(see pages 26 - 27): 1, 4, 15

**Conventional Power Plant**  
(see pages 30 - 31): 1, 4, 19 - 23,  
25, 26, 27

<b>Type</b>	Globe, Angle
<b>Design</b>	Cage Trim, Low Noise, Continuous, Safety Function
<b>Standard</b>	ASME, DIN
<b>Form</b>	Forged, Cast
<b>Materials</b>	Carbon Steel, Alloy Steel
<b>Pressure Class</b>	ASME Class 150 thru 4500 [PN 25 thru 760]
<b>Sizes</b>	1/2 thru 24 inch [10 thru 600 mm]



**Sempell Style 115** - Unique steam atomized water injection system eliminates thermal shock and noise in turbine by-pass and steam conditioning valve applications.



**Sempell Steam Conditioning Valve** - Valve designs for HP, IP and LP turbine by-pass as well as steam export.



**Sempell High Pressure Steam Conditioning Valve** - Multi-stage, multi-channel pressure reduction including steam atomized water injection systems provide the best possible control.

## Combined Cycle Plant

(see pages 26 - 27): 2, 3, 4

## Conventional Power Plant

(see pages 30 - 31): 2, 3, 4, 14

# Steam Traps

Yarway

<b>Type</b>	Thermodynamic, Thermostatic, Mechanical
<b>Design</b>	Disc, Lever, Filled Thermal Element, Bi-Metallic
<b>Standard</b>	ASME
<b>Form</b>	Forged, Cast
<b>Materials</b>	Alloy Steel, Stainless Steel
<b>Pressure Class</b>	ASME Class 125 thru 4500 [PN 20 thru 760]
<b>Sizes</b>	3/8 thru 4 inches [10 thru 100 mm]



**Yarway Unibody Traps** - With integral strainer and blow-off.



**Yarway Steam Traps** - Provides efficient discharge of condensate; approaching zero steam loss.

**Combined Cycle Plant**  
(see pages 26 - 27): 1 - 19

**Conventional Power Plant**  
(see pages 30 - 31): 1 - 27



# Steam Turbine Protection Valves

Dewrance, Fasani and Sempell

<b>Type</b>	Stop/Control Valve	Non-Return Valve
<b>Design</b>	Fast Closing, Hydraulic Actuated	Swing and Tilting Disc Extraction/Induction
<b>Standard</b>	ASME	ASME, DIN
<b>Form</b>	Cast	Cast
<b>Materials</b>	Carbon Steel, Alloy Steel	Carbon Steel, Alloy Steel
<b>Pressure Class</b>	ASME Class 150 thru 2500 [PN 25 thru 420]	ASME Class 150 thru 1000 [PN 25 thru 160]
<b>Sizes</b>	3 thru 24 inches [80 thru 600 mm]	3 thru 40 inches [80 thru 1000 mm]



**Fasani Steam Non-return, Power Assist, Positive Closure Check Valve** - Designed to provide fast action closing before backflow and protect the steam turbine against reverse flow. Designed to B16.34 in sizes 6" through 60" and available with counterweights on sizes 10" and larger, if required.



**Sempell Control Swing Check Valve** - Designed in conjunction with a major steam turbine OEM to protect the turbine from reverse flow and overspend.



**Dewrance Extraction Steam Check Valve** - Unique design developed with major turbine OEM to solve the operating problems of typical swing check valves in extraction or reverse current applications.

## Combined Cycle Plant

(see pages 26 - 27): 4

## Conventional Power Plant

(see pages 30 - 31): 4, 14

# Tank Protection

Anderson Greenwood and Varec

## Type

Conservation, Vents, Pressure and Vacuum Relief, Blanketing Systems, Flame Arresters, Specialty Valves

## Design Standard

Weight Loaded, Spring Loaded, Pilot Operated  
API 2000/ASME Section VIII

## Form

Cast

## Materials

Aluminum, Carbon Steel, Stainless Steel, Monel®

## Pressure Class

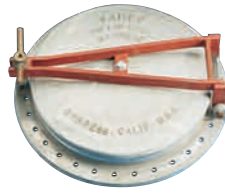
Vacuum thru ASME Class 300

## Sizes

1/2 thru 24 inches [10 thru 600 mm]



**Anderson Greenwood BV1** - An effective, economical way to regulate tank pressure.



**Varec 220 Manway Cover** - Designed for use on tanks where quick and easy personnel access is desired.



**Varec 7000** - Free vents typically used on atmospheric tanks which contain non-volatile liquids.



**Varec 221 Manway Cover** - Designed to provide emergency venting of low pressure storage tanks and vessels.



**Anderson Greenwood ITV** - A fail-safe isolation valve for bottom and side withdrawal tanks.



**Varec 180 Regulator** - For use on vapor recovery systems where sensitive control at low pressures is required.



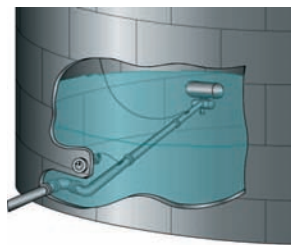
**Varec 5000 Flame Arrester** - Prevents the propagation of a flame into the system.



**Varec 4310 Cover** - Provides quick access for product gauging, temperature measurement or sampling.



**Anderson Greenwood 9300** - High performance alternative to spring and weight-loaded relief devices for low pressure systems.



**Varec 7700 Floating Suction Unit** - Designed for use on storage tanks where there is a need to draw off product from just below the surface of liquids stored in bulk.



**Varec 2440** - Protects low pressure storage tanks and processes from excess positive pressure and vacuum.

**Combined Cycle Plant**  
(see pages 26 - 27): 18

**Conventional Power Plant**  
(see pages 30 - 31): 24

## The Service Centers

Tyco Flow Control is your single-source for all of your flow control needs. Covering the Americas with unmatched inventory levels, proven service capabilities and the technical expertise and experience to help maximize your plant's performance, strategically located service centers – electronically integrated – combine our resources to meet customer demands, any time ... anywhere.

The Service Centers are owned and operated by Tyco Flow Control, the world leader in flow control technology, design and manufacturing. This gives you immediate access to industry experts and the information you need to positively impact your business – we have the answers before you need solutions.

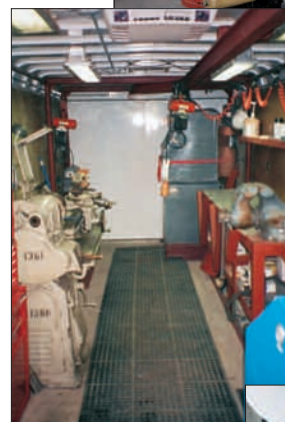


## Services

- Pressure Relief Valve Repair
- Line Valve Repair
  - Gate Valve - Butterfly Valve
  - Globe Valve - Control Valve
  - Check Valve - Plug Valve
  - Ball Valve
- Pump Protection Valve Repair
- Tank Vent Repair
- In-line Valve Testing and Repair
  - Section I and Section VIII applications
- 24/7 Repair and Field Service Support
- Mobile Units
- Valve and Inventory Management
- Training
- Steam Trap Surveys/Repairs

## Industries Served

- Brewery
- Chemical
- Commercial Construction
- Food and Beverage
- HVAC
- Iron and Steel
- Marine Gas Processing
- Mining
- Offshore
- Oil and Gas Pipeline
- Oil and Gas Production
- Petrochemical
- Plastics
- Pharmaceutical
- Power
- Pulp and Paper
- Refining
- Water and Waste Water



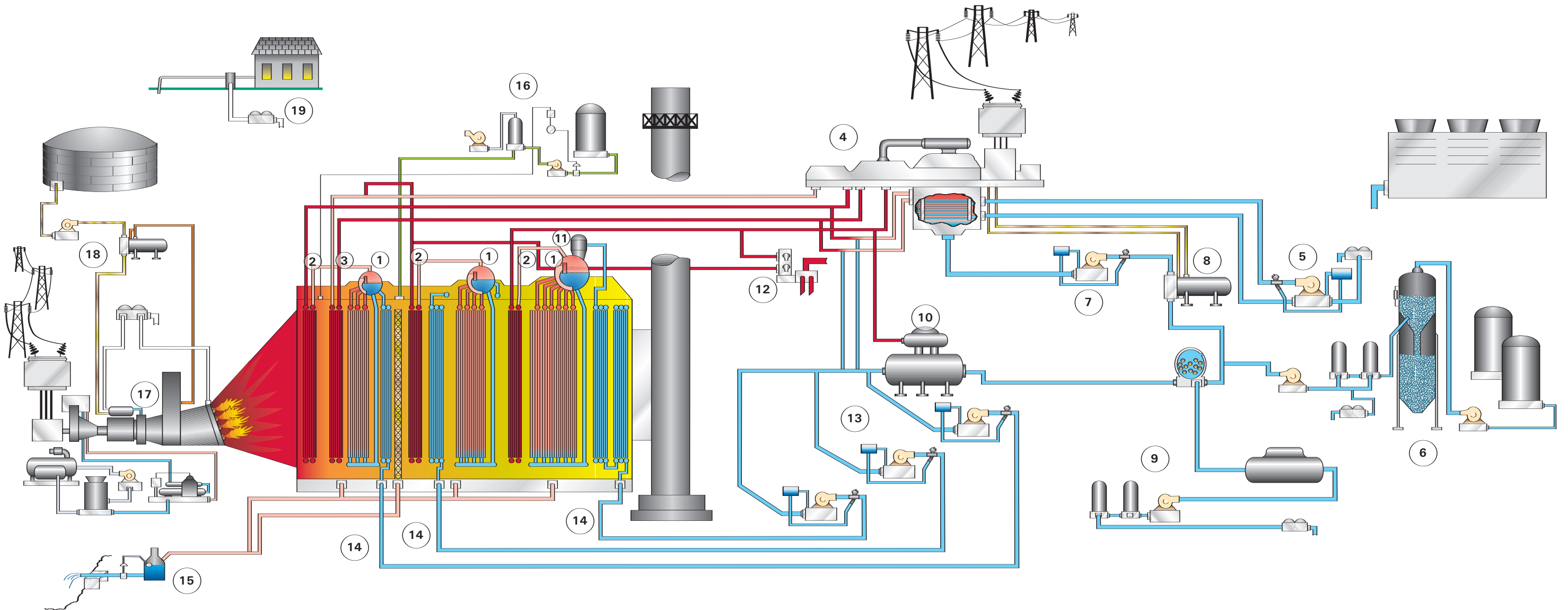
## Service AMS

- Simplifies the task of tracking hundreds or thousands of valves
- Helps you efficiently plan for future maintenance outages
- Live internet access for our customers
- Tracks your valves through the repair process
- Stores images/pictures so customer can see the damaged valve parts first hand
- Stores specific notes or comments from customer



**Tyco Flow Control Repairs ALL Manufacturers' Valves**

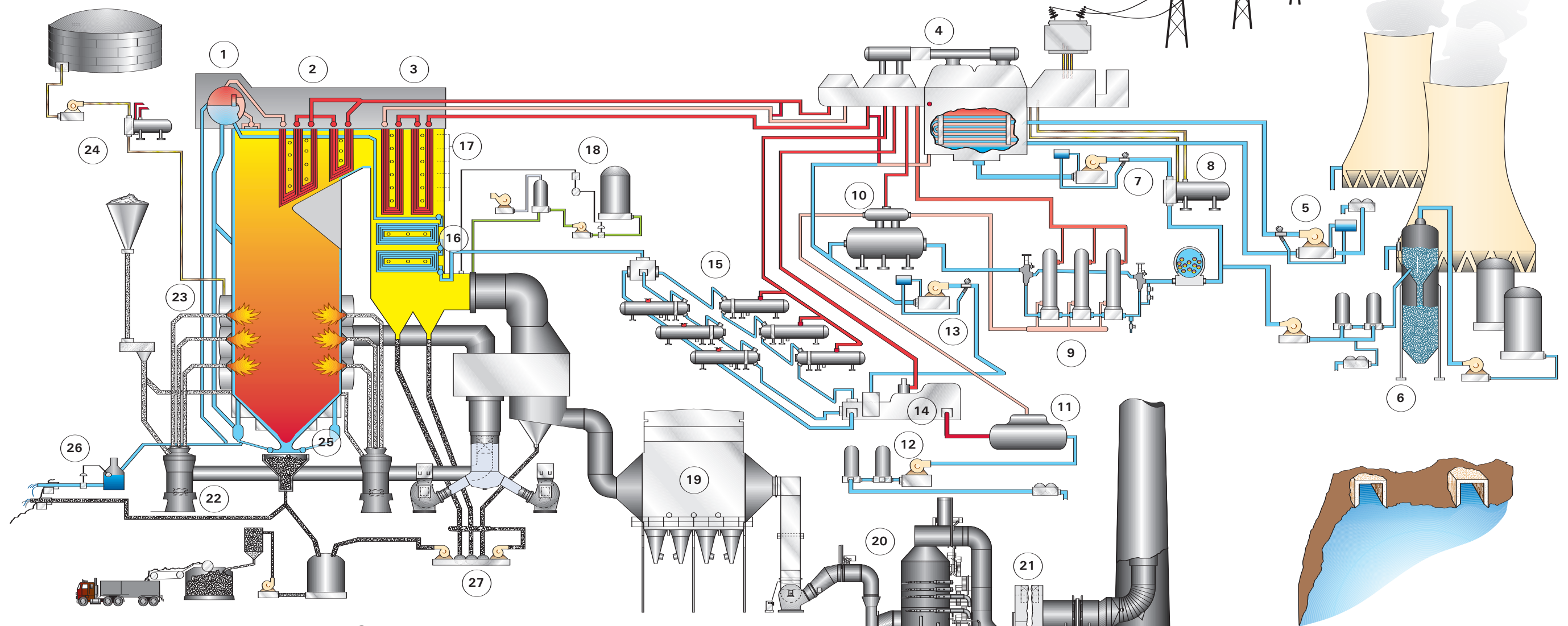
# COMBINED CYCLE PLANT



- ① Drum (HP, IP, LP)**
  - Blowdown Valves
  - Check Valves
  - Drain Valves
  - Elbow Down Valves
  - Electronic Relief Valves
  - Isolation Valves
  - Liquid Level Valves and Gauges
  - Safety Valves
  - Vent Valves
- ② Superheater (HP, IP, LP)**
  - Check Valves
  - Control Valves
  - Desuperheaters
  - Drain Valves
  - Electronic Level Detection
  - Electronic Relief Valves
  - HP By-pass Station
  - Safety Valves
  - Vent Valves
- ③ Reheater**
  - Check Valves
  - Control Valves
  - Desuperheaters
  - Drain Valves
  - Electronic Relief Valves
  - HRH By-pass Station
  - Isolation Valves
  - Isolation Device
  - Safety Valves
  - Vent Valves
- ④ Steam Turbine with Condenser**
  - Desuperheaters
  - Extraction/Induction Check Valves
  - Liquid Level Valves and Gauges
  - Main Steam Isolation
  - Pilot Operated Safety Relief Valves
  - Safety Relief Valves
  - Start-up/By-pass Valves
  - Turbine Drain Valves
  - Turbine Protection Valves
  - Vent Valves
- ⑤ Cooling Water Circulation**
  - Butterfly Valves
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves
  - Pump Protection Valves
  - Safety Relief Valves
- ⑥ Water Intake and Treatment**
  - Butterfly Valves
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves
  - Pump Protection Valves
  - Safety Relief Valves
- ⑦ Condensate Pumps**
  - Butterfly Valves
  - Check Valves
  - Drain Valves
  - Isolation Valves
  - Pump Protection Valves
  - Safety Relief Valves
- ⑧ Heat Exchanger**
  - Check Valves
  - Butterfly Valves
  - Drain Valves
  - Isolation Valves
  - Pump Protection Valves
  - Safety Relief Valves
  - Vent Valves
- ⑨ Make-up Water**
  - Butterfly Valves
  - Check Valves
  - Drain Valves
  - Isolation Valves
  - Liquid Level Valves and Gauges
  - Pump Protection Valves
  - Safety Relief Valves
- ⑩ Deaerator**
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves
  - Safety Relief Valves
  - Vent Valves
- ⑪ LP Drum Deaerator**
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves
  - Liquid Level Valves and Gauges
  - Safety Relief Valves
  - Vent Valves
- ⑫ Process and Export Steam**
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves
  - Safety Relief Valves
  - Vent Valves
- ⑬ Feed Water Storage and Distribution (HP, IP, LP)**
  - Butterfly Valves
  - By-pass System
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves
  - Liquid Level Valves and Gauges
  - Pump Protection Valves
- ⑭ Economizers (HP, IP, LP)**
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves
  - Safety Valves
  - Vent Valves
- ⑮ Flash Tank**
  - Check Valves
  - Discharge Control Valves
  - Drain Valves
  - Isolation Valves
  - Liquid Level Valves and Gauges
  - Safety Relief Valves
- ⑯ SCR Storage and Injection**
  - Butterfly Valves
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves
  - Liquid Level Valves
  - Pump Protection Valves
  - Pilot Operated Safety Relief Valves
  - Safety Relief Valves
  - Safety Selector Valves
- ⑰ Combustion Turbine**
  - Butterfly Valves
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves
  - Pump Protection Valves
  - Safety Relief Valves
- ⑱ Fuel Storage and Distribution**
  - Butterfly Valves
  - Check Valves
  - Detonation and Flame Arresters
  - Gauge Hatches and Manhole Covers
  - Internal Tank Valves and Operators
  - Liquid Level Valves and Gauges
  - Pilot Operated Pressure/Vacuum Valves
  - Safety Relief Valves
  - Tank Blanketing Regulators
- ⑲ Gas Pipeline (custody transfer station)**
  - Butterfly Valves
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves
  - Pilot Operated Safety Relief Valves
  - Safety Relief Valves
- ① thru ⑲**
  - Actuators
  - Enclosures
  - Hand Valves and Manifolds
  - Steam Traps



# CONVENTIONAL POWER PLANT



- 1 Drum**
  - Blowdown Valves
  - Check Valves
  - Drain Valves
  - Elbow Down Valves
  - Isolation Valves
  - Liquid Level Valves and Gauges
  - Safety Valves
  - Vent Valves
- 2 Superheater**
  - Check Valves
  - Control Valves
  - Desuperheaters
  - Electronic Level Detection
  - Electronic Relief Valves
  - HP By-pass Station
  - Safety Valves
  - Vent Valves
- 3 Reheater**
  - Check Valves
  - Control Valves
  - Desuperheaters
  - Drain Valves
  - Electronic Relief Valves
  - HRH By-pass Station
  - Isolation Valves
  - Isolation Device
  - Safety Valves
  - Vent Valves

- 4 Steam Turbine with Condenser**
  - Desuperheaters
  - Extraction/Induction Check Valves
  - Liquid Level Valves and Gauges
  - Main Steam Isolation
  - Pilot Operated Safety Relief Valves
  - Safety Relief Valves
  - Start-up/By-pass Valves
  - Turbine Drain Valves
  - Turbine Protection Valves
  - Vent Valves
- 5 Cooling Water Circulation**
  - Butterfly Valves
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves
  - Pump Protection Valves
  - Safety Relief Valves
- 6 Water Intake and Treatment**
  - Butterfly Valves
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves
  - Pump Protection Valves
  - Safety Relief Valves

- 7 Condensate Pumps**
  - Check Valves
  - Drain Valves
  - Isolation Valves
  - Pump Protection Valves
  - Safety Relief Valves
- 8 Heat Exchanger**
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves
  - Pump Protection Valves
  - Safety Relief Valves
  - Vent Valves
- 9 Low Pressure Heaters**
  - Butterfly Valves
  - By-pass System
  - Check Valves
  - Control Valves
  - Drain Valves
  - Electronic Level Detection
  - Isolation Valves
  - Liquid Level Indicators
  - Safety Relief Valves
  - Vent Valves
- 10 Deaerator**
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves

- Liquid Level Valves and Gauges
- Safety Relief Valves
- Vent Valves
- 11 Evaporator**
  - Butterfly Valves
  - Check Valves
  - Drain Valves
  - Isolation Valves
  - Liquid Level Valves and Gauges
  - Safety Relief Valves
  - Vent Valves
- 12 Make-up Water**
  - Butterfly Valves
  - Check Valves
  - Drain Valves
  - Isolation Valves
  - Liquid Level Valves and Gauges
  - Pump Protection Valves
  - Safety Relief Valves
- 13 Boiler Feed Booster Pumps**
  - Check Valves
  - Drain Valves
  - Isolation Valves
  - Pump Protection Valves
  - Safety Relief Valves

- 14 BFWP Turbine**
  - Check Valves
  - Desuperheater
  - Drain Valves
  - Isolation Valves
  - Pump Protection Valves
  - Pilot Operated Safety Relief Valves
  - Safety Relief Valves
  - Start-up Control Valves
  - Turbine Protection Valves
  - Vent Valves
- 15 High Pressure Heaters**
  - By-pass System
  - Check Valves
  - Control Valves
  - Drain Valves
  - Electronic Level Detection
  - Isolation Valves
  - Liquid Level Valves and Gauges
  - Safety Relief Valves
  - Vent Valves

- 16 Economizer**
  - Check Valves
  - Drain Valves
  - Isolation Valves
  - Safety Valves
  - Vent Valves
- 17 Soot Blowers**
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves
  - Safety Valves
  - Vent Valves
- 18 SCR Storage and Injection**
  - Check Valves
  - Control Valves
  - Drain Valves
  - Isolation Valves
  - Liquid Level Valves and Gauges
  - Pump Protection Valves
  - Pilot Operated Safety Relief Valves
  - Safety Relief Valves
  - Safety Selector Valves

- 19 Bag House**
  - Butterfly Valves
  - Isolation Valves
- 20 Scrubber**
  - Butterfly Valves
  - Isolation Valves
- 21 Precipitator**
  - Isolation Valves
- 22 Coal Pulverizers**
  - Isolation Valves
- 23 Burners**
  - Isolation Valves
- 24 Fuel Storage and Distribution**
  - Check Valves
  - Detonation and Flame Arresters
  - Drain Valves
  - Emergency Vent
  - Gauge Hatches and Manhole Covers
  - Internal Tank Valves and Operators
  - Isolation Valves
  - Liquid Level Valves and Gauges
  - Pilot Operated Pressure/Vacuum Valves
  - Safety Relief Valves
  - Tank Blanketing Regulators
- 25 Mud Drums**
  - Blow-off Valves
  - Continuous Blowdown Valves
  - Drain Valves
- 26 Flash Tank**
  - Check Valves
  - Discharge Control Valves
  - Drain Valves
  - Liquid Level Valves and Gauges
  - Safety Relief Valves
- 27 Ash Handling**
  - Butterfly Valves
  - Control Valves
  - Isolation Valves
  - Pilot Operated Safety Relief Valves
  - Transport Valves
- 1 thru 27**
  - Actuators
  - Enclosures
  - Hand Valves and Manifolds
  - Steam Traps



## Tyco Flow Control - Americas

With sales and distribution operations in strategic locations throughout the world, Tyco Flow Control is a global, single-source supplier of innovative flow control solutions.

### United States

#### **Anaheim, California**

Phone: 714-575-9201  
Fax: 714-575-9206

#### **Atlanta, Georgia**

Phone: 770-326-5654  
Fax: 770-326-2989

#### **Baton Rouge, Louisiana**

Phone: 225-751-9000  
Fax: 225-751-0130

#### **Chicago, Illinois**

Phone: 630-343-3333  
Fax: 630-343-3334

#### **Denver, Colorado**

Phone: 303-343-0425  
Fax: 303-343-0930

#### **Pasadena, Texas**

Phone: 832-261-2400  
Fax: 281-291-8801

#### **Philadelphia, Pennsylvania**

Phone: 610-296-2000  
Fax: 610-296-8038

#### **Seattle, Washington**

Phone: 425-398-2000  
Fax: 425-398-2001

#### **St. Louis, Missouri**

Phone: 314-428-3888  
Fax: 314-428-9829

### Canada

#### **Burlington, Ontario**

Phone: 905-319-3406  
Fax: 905-319-3529

#### **Calgary, Alberta**

Phone: 403-538-0090  
Fax: 403-279-8441

#### **Edmonton, Alberta**

Phone: 780-461-2228  
Fax: 780-461-6242

#### **Montreal, Quebec**

Phone: 450-978-6640  
Fax: 450-978-6641

### Latin America/Caribbean

#### **Argentina - Buenos Aires:**

*Argentina, Bolivia, Paraguay,  
Uruguay*

Phone: 54-11-4308-6444  
Fax: 54-11-4308-6445

#### **Brazil - Sorocaba-São Paulo**

Phone: 55-15-2102-8700  
Fax: 55-15-2102-8742

#### **Chile - Santiago:**

*Chile, Peru*  
Phone: 562-410-9000  
Fax: 562-538-0050

#### **Mexico - El Salto, Jalisco**

Phone: 52-33-3668-4099  
Fax: 52-33-3668-4012

#### **Miami Lakes, Florida:**

*Caribbean, Central America,  
Colombia, Ecuador, Guyana,  
Surinam, Venezuela*

Phone: 305-448-0059  
Fax: 305-448-1632

#### **Venezuela - Caracas**

Phone: 58-212-286-3735  
Fax: 58-212-285-3316



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