

# Leading the way in pressure relief technology



## Product Overview - Pressure Relief Valves

The premier option for pressure relief devices, providing advanced, reliable and efficient overpressure protection.

Europe Only



# Meeting all your Pressure Relief Needs

Emerson has the most comprehensive range of pressure relief devices, designed for applications from gas to steam, liquid and mixed phases, from deep cryogenic temperatures to super-critical boilers. We have developed pressure relief devices to protect all your assets, backed by global support to help keep your plant operating safely, consistently and economically.

When you want a main valve partner who can help you operate safely, improve reliability and optimize plant performance, you can be sure that Emerson has the complete solution.





## Pressure Relief Devices for all applications

As part of the Final Control portfolio, Emerson's pressure relief devices provide a complete range of standard and customized solutions, whatever demand you have for pressure protection.

### Global performance

Emerson is an industry leader in pressure relief valve technology. A single point provider, we offer an extensive product line for reliable performance with lower valve life-cycle costs and unique solutions. Our unmatched engineering and technical expertise provides you with the pressure management products, application solutions and services that will positively impact your business.

### Test facilities

Our Texas and Massachusetts combined testing and development facilities have been the catalyst in continuing many years of product development and industry leadership.

Adding more testing and research facilities in UK, Germany and China, our engineering teams have designed testing equipment and procedures that assure optimum valve performances under all service conditions. Featuring full cryogenic flow testing capabilities down to  $-196^{\circ}\text{C}$ , and full flow steam testing, these facilities are amongst the largest in the world and are used for research, experimentation, and control of emissions on relief devices. Our testing laboratories are also ASME designated to conduct certification flow testing.

### Contents

Spring Loaded Safety Valves	4
Pilot Operated Safety Valves	8
Steam & Power Safety Valves	10
Low Pressure Relief Valves	14
Bursting Discs	16
Speciality Valves	18
Lifecycle Services	20
QuickShip Program	21
Training	22
Testing and Monitoring	22
Sizing Tools	22
Certifications	23

# Spring Loaded Safety Valves

Emerson manufactures a complete range of spring loaded safety relief valves from general pressure protection to extreme conditions. Designed, certified and tested in accordance to most codes and standards around the world like ASME, PED, CU-TR, AD-2000, API, EN. They are available in a large array of materials, from carbon steels to nickel alloys, duplexes, titanium, brass, with cast, forged or HIPS bodies.

With metal or soft seats, threaded, flanged, welded or hub connections, the largest range of spring safety relief valves builds on many decades of experience from our main brands.

Anderson Greenwood  
Crosby  
Sempell



## Anderson Greenwood Series 60

The type 63B is a small sturdy safety valve with soft seat as standard for low and medium pressure gas and liquid thermal relief applications.

Brass construction.

### Technical Data

#### Sizes:

DN 15 x 25 to 20 x 25  
½" x 1" to ¾" x 1"

#### Set Pressures:

2.0 to 36.6 barg [30 to 531 psig]

#### Temperature Range:

-196 to +205°C [-320 to 400°F]

#### Connections:

Threaded NPT

### Applications

Low to medium pressure gas and liquid.

Thermal relief applications.

CO<sub>2</sub> systems, natural gas transmission.



## Anderson Greenwood Series 81 & 83

The types 81 and 83 soft seated safety valves provides repeatable leak-free performances with low cost maintenance. With instantaneous pop opening and externally adjustable blowdown.

Soft seat as standard:

Type 81: plastic seat.

Type 83: O-ring seat.

### Technical Data

#### Sizes:

DN 15 x 20 to 50 x 80  
½" x ¾" to 2" x 3"

#### Set Pressures:

1.4 to 690 barg [20 to 10,000 psig]

#### Temperature Range:

-253 to +288°C [-423 to 550°F]

#### Connections:

Threaded NPT  
Flanges ANSI or EN  
Hub connections

### Applications

Cryogenic gases or liquid in thermal expansion.

Oxygen service.

Hard-to-hold gases.

High pressure services.



### Anderson Greenwood Series 81P

The type 81P is specifically designed for liquid applications. Naturally balanced against backpressure, its stabilising ring prevents destructive chattering, common on liquid applications. Soft seat as standard (PTFE, PCTFE).

#### Technical Data

##### Sizes:

DN 15 x 25 to 50 x 80  
½" x 1" to 2" x 3"

##### Set Pressures:

3.4 to 414 barg [50 to 6,000 psig]

##### Temperature Range:

-54 to +205°C [-65 to 400°F]  
Special version available to -196°C [-320°F]

##### Connections:

Threaded NPT  
Flanges ANSI or EN  
Hub connections

#### Applications

Low to medium pressure gas and liquid.  
Thermal relief applications.  
CO<sub>2</sub> systems, natural gas transmission.



### Crosby Styles JOS-E & JBS-E

Conventional and balanced bellows spring loaded pressure relief valves built in accordance with API Standards 526 and 527 for gases and steam. Styles JLT JOS-E and JLT JBS-E for liquid service and two phase applications.

API Std 526, flanged connections.

Single nozzle ring.

Metal and soft seats available.

Multiple options, configurations and accessories.

#### Technical Data

##### Sizes:

DN 25 x 50 to 300 x 400  
1" x 2" to 12" x 16"

##### Set Pressures:

0.34 to 414 barg [5 to 6,000 psig]

##### Temperature Range:

-268 to +538°C [-450 to 1000°F]

##### Connections:

Flanges ANSI 150# to 2,500#, EN  
Hub connections

#### Applications

Medium to high pressure gas and liquid relief applications.  
Oil & gas, refining, chemicals.



### Crosby Styles 900 OMNI-Trim®

Single trim design, fixed blowdown for medium flow of gas, steam or liquid applications.

Metal or soft seat.

Gasket-less design.

#### Technical Data

##### Sizes:

DN 15 x 25 to 50 x 50  
½" x 1" to 2" x 2"

##### Set Pressures:

0.34 to 345 barg [5 to 5,000 psig]

##### Temperature Range:

-268 to +399°C [-450 to 750°F]

##### Connections:

Threaded NPT, BSP  
Flanges ANSI 150# to 2,500#, EN  
Hub connections

#### Applications

Low to medium flow applications.  
Liquid in thermal expansion.  
Gas, liquid and steam.



**Crosby**  
**Styles BP OMNI-Trim®**

Balanced piston, single trim design for gas, liquid and mixed-phase applications involving variable back pressure. With O-ring seat as standard.

Balanced piston design for high backpressure applications.

**Technical Data**

**Sizes:**

DN 20 x 25 to 25 x 25  
 ¾" x 1" to 1" x 1"

**Set Pressures:**

3.4 to 103 barg [50 to 1,500 psig]

**Temperature Range:**

-28 to +205°C [-20 to 400°F]

**Connections:**

Threaded NPT  
 Flanges ANSI or EN  
 Hub connections

**Applications**

Low flow applications with variable backpressure.

Liquid in thermal expansion.



**Sempell**  
**Type S**

Conventional and balanced bellows spring loaded pressure relief valves built in accordance to AD-2000 (S-DIN) or API Std 526 (S-API) for gases, steam, liquid and mixed-phase applications.

Flanged connections ANSI, or DIN.

With or without single nozzle ring.

Metal and soft seats available.

Multiple options, configurations and accessories.

**Technical Data**

**Sizes:**

DN 25 x 50 to 200 x 250  
 1" x 2" to 8" x 10"

**Set Pressures:**

1 to 427 barg [15 to 6,200 psig]

**Temperature Range:**

-268 to +700°C [-450 to 1300°F]

**Connections:**

ANSI 150# to 2,500#,  
 DIN PN10 to 400, EN  
 Welded connections

**Applications**

Medium to high pressure gas and liquid relief applications.

Oil & gas, refining, chemicals.



**Sempell**  
**Type MAXI S**

High flow safety relief valves for gas, steam, liquid and mixed-phase applications.

Allows the reduction in number of safety valves to protect low to medium pressure equipment.

Metal or soft seat.

Extra-large capacities within a very compact low-profile valve.

Balanced bellows available.

**Technical Data**

**Sizes:**

DN 250 to 600  
 Inlet 10" to 24"

**Set Pressures:**

0.3 to 24 barg [4 to 350 psig]

**Temperature Range:**

-50 to +700°C [-58 to 1300°F]

**Connections:**

Flanges DIN, EN or ANSI  
 Welded connections

**Applications**

High capacity flow applications.



### Sempell Type Mini S

Single trim design, fixed blowdown for small flow of gas, steam, liquid and mixed phase applications.

Metal or soft seat.

Balanced bellows available.

#### Technical Data

##### Sizes:

DN 15 x 25 to 25 x 25

½" x 1" to 1" x 1"

##### Set Pressures:

1 to 52 barg [15 to 750 psig]

##### Temperature Range:

-200 to +200°C [-330 to 390°F]

##### Connections:

Threaded

Flanges DIN, EN or ANSI

#### Applications

Low to medium flow applications.

Liquid in thermal expansion Including applications with high backpressure.



### Sempell Type VSEO

Conventional relief valve for low flow and high pressure applications. Single trim design for gas, steam, liquid and mixed-phase applications.

304 stainless steel construction.

Metal or soft seat.

#### Technical Data

##### Sizes:

DN 15 x 25 to 25 x 25

½" x 1" to 1" x 1"

##### Set Pressures:

1 to 440 barg [15 to 6,400 psig]

##### Temperature Range:

-196 to +205°C [-320 to 400°F]

##### Connections:

Threaded Metric, NPT

Flanges DIN, EN or ANSI

#### Applications

Low flow high pressure applications.

Liquid in thermal expansion.



# Pilot Operated Safety Valves

With the broadest range of pilot operated safety valves, Emerson is able to solve the most arduous pressure protection challenges, providing reliable protection at low operating costs.

With pop or modulating action, from cryogenics to high temperatures, designed, certified and tested in accordance to most codes and standards around the world, our pilot operated safety valves are available in many materials and configurations to suit all applications, including dirty fluids, while reducing weight, enabling in-line checking and maintenance for lower cost of ownership.

The configurations and options available provide the perfect match for any application that requires highly reliable protection and flexibility

## Anderson Greenwood



### Anderson Greenwood Series 200

The pop action 200 is still the standard of reference for pilot operated safety valves. With soft seat and a non-flowing pilot, it is perfectly suited for gas and some mixed phase applications, including cryogenic services. It is also suitable for services with dirt, hydrates or high levels of moisture.

Soft seat, elastomer or plastic.

API Std 526 fully compliant or with full bore orifices.

Field test connection and complete scope of accessories and configurations.

#### Technical Data

**Sizes:**

DN 25 x 50 to 250 x 350  
1" x 2" to 10" x 14"

**Set Pressures:**

1.7 to over 425 barg [25 to over 6,170 psig]  
Up to 689 barg [10,000 psig] on request

**Temperature Range:**

-253 to +315°C [-423 to 600°F]

**Connections:**

Threaded NPT 1" & 1½", DN 25 & 40  
Flanges ANSI and API  
Hub connections

#### Applications

Gas and vapors.

Liquefied gases.

Oxygen service.

High pressure compressors.

Marine gas carriers.



### Anderson Greenwood Series 400

A non-flowing, fully modulating valve, the Series 400 is ideal on gas, liquid and mixed phase, including heavily dirty applications. Its perfect modulating action ensures a fully proportional opening to eliminate destructive effects of liquid hammer, reduce emissions, while providing a stable operation even with high inlet losses.

The Series 400 is the most suitable safety valve for mixed phase applications.

Soft seat, elastomer or plastic.

API Std 526 fully compliant or with full bore orifices.

Field test connection and complete scope of accessories and configurations.

#### Technical Data

**Sizes:**

DN 25 x 50 to 250  
1" x 2" to 10" x 14"

**Set Pressures:**

1 to 102 barg [15 to 1,480 psig]

**Temperature Range:**

-54 to +315°C [-65 to 600°F]  
Also to -196°C [-320°F] on request

**Connections:**

Threaded NPT 1" & 1½", DN 25 & 40  
Flanges ANSI and API  
Hub connections

#### Applications

Gas, vapor, liquid and mixed phase.

FCCU full protection.

Marine gas carriers.





### Anderson Greenwood Series 400 ISO-DOME

The non-flowing ISO-DOME specific configuration of the Series 400 pilot provides full protection of the critical pilot internals from highly viscous, dirty, waxy or polymerising process media. It enables to benefit from the full modulating pilot operated safety valve accuracy and dependability even on the most difficult process fluids.

Soft seat, elastomer or plastic.

API Std 526 fully compliant or with full bore orifices.

Field test connection and complete scope of accessories and configurations.

#### Technical Data

##### Sizes:

DN 25 x 50 to 250 x 350  
1" x 2" to 10" x 14"

##### Set Pressures:

1 to 102 barg [15 to 1,480 psig]

##### Temperature Range:

-54 to +315°C [-65 to 600°F]  
Also down to -196°C [-320°F] on request

##### Connections:

Threaded NPT 1" & 1½", DN 25 & 40  
Flanges ANSI and API  
Hub connections

#### Applications

Viscous fluid, gas, vapor, liquid and mixed phase.

Polymerizing service.

Dirty service, hydrates.



### Anderson Greenwood Series 500

This unique modulating pilot operated safety valve is specifically designed to handle hot water, steam, hot hydrocarbons vapors or liquids and other aggressive fluids, using only inert plastic soft goods.

All plastic soft goods, seats and seals.

API Std 526 fully compliant or with full bore orifices.

Field test connection and complete scope of accessories and configurations.

#### Technical Data

##### Sizes:

DN 40 x 50 to 250 x 350  
1½" x 2" to 10" x 14"

##### Set Pressures:

1 to 50 barg [15 to 720 psig]

##### Temperature Range:

-54 to +268°C [-65 to 515°F]  
Also down to -196°C [-320°F] on request

##### Connections:

ANSI Flanges

#### Applications

Hot water and process steam.

Aggressive media, gases, liquids or mixed phases.



### Anderson Greenwood Series 800

The Series 800 is the higher pressure version of the Series 400. It is ideal on gas, liquid and mixed phase, including dirty applications, with a full modulating action up to 425 barg [6,170 psig].

The Series 800 is the most suitable safety valve for high pressure mixed phase applications.

Soft seat, elastomer or plastic.

API Std 526 fully compliant or with full bore orifices.

Field test connection and complete scope of accessories and configurations.

#### Technical Data

##### Sizes:

DN 25 x 50 to 100 x 150  
1" x 2" to 4" x 6"

##### Set Pressures:

102 to 425 barg [1,481 to 6,170 psig]

##### Temperature Range:

-54 to +315°C [-65 to 600°F]

##### Connections:

Threaded NPT 1" & 1½", DN 25 & 40  
Flanges ANSI and API  
Hub connections

#### Applications

High pressure gas, vapor, liquid and mixed phase.

# Steam & Power Safety Valves

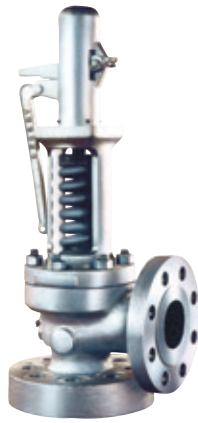
Protecting steam processes against over-pressure has always been one of the most challenging duties for engineers. Spring loaded, pilot operated or power assisted, with certifications from ASME I & VIII, PED, TÜV, CU-TR, SELO, LRS and others, Emerson has built on more than 150 years of experience to provide the safety valve that will fit your exact requirements to reliably protect assets.

From low pressure steam to super-critical boilers, each safety valve is supported with some of the largest steam testing facilities in the world. Also available is a complete range of portable test equipment to maintain protection and reduce operation costs.

Anderson Greenwood

Crosby

Sempell



## Crosby Style HSJ

Full nozzle safety valve for saturated and superheated steam service. The Style HSJ is the work-horse for medium pressure boilers. It is also certified for economizer applications when a spring loaded safety valve is preferred.

Two control rings design FLEXI-DISC® seat to ensure a flat and tight seal.

High flow coefficient of discharge for most economical valve selection.

Certified per ASME I.

### Technical Data

#### Sizes:

DN 40 x 50 to 150 x 200  
1½" x 2" to 6" x 8"

#### Set Pressures:

Up to 186 barg [2,700 psig]

#### Temperature Range:

Up to 538°C [1,000°F]

#### Connections:

ANSI flanged 150# to 2,500#

### Applications

Medium pressure boilers.

Steam accumulators.

Economiser.

Process steam systems.



## Crosby Style HE IsoFlex®

The HE is a high capacity safety valve, specifically designed for boiler drum service, saturated steam applications. The backpressure-assist combined with the IsoFlex® seat design provides premium operation and seat tightness on these highly critical applications.

Seat tightness 93% of set pressure.

Two control rings design.

Backpressure-assist closing feature and patented educator control to ease adjustments.

Weld end valves shipped as two assemblies to minimize installation time and labor.

Certified per ASME I.

### Technical Data

#### Sizes:

DN 65 x 150 to 100 x 200  
2½" x 6" to 4" x 8"

#### Set Pressures:

Up to 211 barg [3,060 psig]

#### Temperature Range:

Up to 399°C [750°F]

#### Connections:

ANSI flange inlet and outlet

Butt-weld inlet with ANSI flange outlet

### Applications

Boiler drums.

Saturated steam.



### Crosby Style HCI IsoFlex®

The HCI provides exacting protection for boiler drums and super-heaters, reheaters or any other high pressure steam applications. Available with restricted lift for full flexibility according to the needs of the application.

Seat tightness 93% of set pressure or higher.

Two control rings design.

IsoFlex® seat design technology.

Weld end valves shipped as two assemblies to minimize installation time and labor.

Restricted lift from 100% to 30% (HCI-R).

Full flexibility to balance the relieving capacity requirements between the boiler valves.

Certified per ASME I.

#### Technical Data

##### Sizes:

DN 40 x 80 to 150 x 250

1½" x 3" to 6" x 10"

##### Set Pressures:

Up to 207 barg [3,000 psig]

##### Temperature Range:

Up to 604°C [1,120°F]

##### Connections:

ANSI flange inlet and outlet

Butt-weld inlet with ANSI flange outlet

#### Applications

Boiler drums and super-heaters, reheaters.

Saturated and super-heated steam.



### Crosby Style HCA IsoFlex®

Super-critical boilers need particular design considerations for their very demanding pressure protection.

The HCA has been specifically developed for super-critical steam applications, building on the extensive experience and tests accumulated by our engineers.

Seat tightness 93% of set pressure or higher.

Two control rings design.

IsoFlex® seat design technology.

Weld end valves shipped as two assemblies to minimize installation time and labor.

Restricted lift to match exactly the capacity required to flow.

Certified per ASME I.

#### Technical Data

##### Sizes:

DN 65 x 150 and DN 80 x 200

2½" x 6" and 3" x 8"

##### Set Pressures:

Up to 345 barg [5,000 psig]

##### Temperature Range:

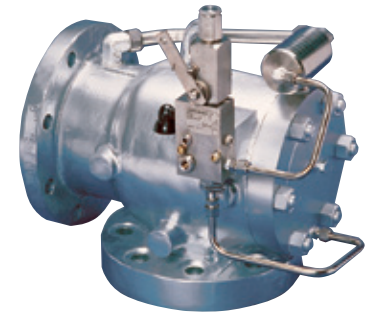
Up to 593°C [1,100°F]

##### Connections:

Butt-weld inlet with ANSI flange outlet

#### Applications

Super-critical steam.



### Anderson Greenwood Series 727

With a full metal seat configuration both in the main valve and the pilot, the Series 727 is a unique pop action pilot operated safety valve to handle any hot gas or process steam application.

Full metal configuration.

Dampening functions to increase life cycle.

Adjustable blowdown 3 to 15%.

Manifolded dual pilot configuration available for ease of maintenance and operation.

Field test connection, and complete scope of accessories and configurations.

#### Technical Data

##### Sizes:

DN 50 x 80 to 200 x 250

2" x 3" to 8" x 10"

##### Set Pressures:

3.5 to 83 barg [50 to 1,200 psig]

##### Temperature Range:

Up to 538°C [1,000°F]

##### Connections:

ANSI flange inlet and outlet

#### Applications

Process steam.

Steam turbine extractions.

High temperature gas.

Reduced foot-print.



**Anderson Greenwood  
Series 5200**

Developed specifically to address economiser applications requiring premium performance on both steam and hot water mixed phase.

Being a fully modulating pilot operated safety valve, the Series 5200 is the ideal solution to this difficult application.

Metal seat tightness to 96% of set.

Non-flowing full modulating pilot.

Unique condensate trap to handle changing service conditions between steam and water.

Field test connection, and complete scope of accessories and configurations.

Certified per ASME I.

**Technical Data**

**Sizes:**

DN 40 x 25 to 200 x 250  
1½" x 2" to 8" x 10"

**Set Pressures:**

Up to 431 barg [6,250 psig]

**Temperature Range:**

Up to 538°C [1,000°F]

**Connections:**

ANSI flange inlet and outlet

**Applications**

Economiser.

Saturated steam.

Hot water.

**Sempell  
Type SOH / SOT**

These Controlled Safety Pressure Relief Systems (CSPRS) use an actuator to provide perfectly controlled performance in pressure protection in full compliance of EN and TRD requirements.

These valves can be fully customized to perfectly suit the requirements of the application for seat tightness, overpressure and blowdown performances.

Helical spring (Type SOH) or disc spring (Type SOT) for larger valves.

Combined with STE4 electro-pneumatic control unit or STE5 pneumatic control unit, with redundancies and in-line checks.

TÜV type-tested to PED & EN4126-5.

**Technical Data**

**Sizes:**

SOH: DN 80 to 300 - 3" to 12"  
SOT: DN 150 to 600 - 6" to 24"

**Set Pressures:**

10 to 500 barg [145 to 7,250 psig]

**Temperature Range:**

Up to 700°C [1,300°F]

**Connections:**

Flanges, ANSI or DIN/EN  
Butt-welded inlet and outlet

**Applications**

EN12952 and TRD boilers.

Saturated super-heated and super-critical steam.

Also suitable for specific gas applications where full control is required.

**Sempell  
Type EPRV**

This power-actuated relief valve provides venting capacity as required for ASME I boilers.

The SEP valve is pneumatically actuated by the STE8 control unit for total control of the performances of the valve.

Forged body construction.

Helical or disc spring.

Adjustable small opening and closing pressure difference.

Adjustments and checks possible without lowering the system pressure.

Easy in-line maintenance.

Certified per ASME I.

**Technical Data**

**Sizes:**

DN 65 x 100  
2½" x 4"  
with 3 different nozzle sizes available

**Set Pressures:**

Up to 500 barg [7,250 psig]

**Temperature Range:**

Up to 700°C [1,300°F]

**Connections:**

Flanges, ANSI or DIN / EN  
Butt-welded inlet and outlet

**Applications**

Steam boilers venting.

High pressure steam venting.



### Sempell Type VS99

Developed specifically for large and critical overpressure protection of power plants, the VS99 is a pilot operated safety valve certified for gas and steam (also mixed phase for nuclear power service).

Its downward flow path enables the full system pressure to ensure a perfectly tight seating that cannot be achieved with other technologies.

Usually fitted with 3 independent impulse lines, from one pilot valve and two solenoid valves for in-line testing while retaining full redundancy.

TÜV type-tested to PED

CU-TR certified and GOST compliant

#### Technical Data

**Sizes:**

DN 100 to 750

4" to 30"

**Set Pressures:**

Up to 320 barg [4,640 psig]

**Temperature Range:**

Up to 700°C [1,300°F]

**Connections:**

Butt-welded inlet and outlet

#### Applications

Steam boilers and steam line in compliance to EN12952, TRD and/or GOST.



# Low Pressure Relief Valves

Designed for extremely accurate low pressure protection with configuration flexibility for ease of maintenance and enhanced reliability. The soft seats are specially designed to provide extreme tightness even under the lowest pressures. These valves feature very large capacities for the most economical configuration. Type 9000 valves can provide protection for both pressure and vacuum, while the 96A vacuum breaker brings unrivalled extra large capacities for protecting the largest storage tanks.

Designed, certified and tested in accordance to most codes and standards like ASME VIII, PED, CU-TR, API 2000, IMO rules they are available in carbon steels, stainless steel and aluminium.

## Anderson Greenwood



### Anderson Greenwood Types 9300 & 9300H

Full bodied valves to pipe away the discharge, types 9300 & 9300H are fully balanced against back-pressure. The modular concept allows them to be used in the pilot operated pressure relief mode and simultaneously provides vacuum relief, either via weight load or with a specific vacuum pilot. They can also be used for pressure only (blocked on vacuum) or vacuum only (blocked on pressure).

The 9300H version has been optimized for very large flows, providing economical reduction in size of valves and piping, or in the number of valves required for large storage tanks, onshore and offshore. Each size has been flow tested and certified. Field Test Connection, and complete scope of accessories and configurations.

#### Technical Data

**Sizes:**

DN 50 x 80 to 350 x 450  
2" x 3" to 14" x 18"

**Set Pressures:**

10 mbarg to 3.5 barg [4"wc to 50 psig], pilot operated

**Set Vacuum:**

-4.3 mbarg [-1 oz] full open, weight loaded  
-5 to -345 mbarg [-2" wc to -5 psig], pilot operated

**Temperature Range:**

-196 to +93°C [-320 to 200°F]

**Connections:**

ANSI flanges with studded inlet

#### Applications

Refrigerated and cryogenic storage tanks including LNG, vapour recovery systems, LPG, ethylene, ammonia, LNG and LPG carriers, F-LNG, FSRU.

Low pressure processes where discharge is piped away or connected to a flare or recirculation system.



### Anderson Greenwood Type 9200

The type 9200 operates like the 9300 but discharges directly to atmosphere and has no provision to be piped away. Its vent configuration provides enhanced flow capacities.

PTFE & FEP seat, seals and diaphragms.

Aluminium or stainless steel construction.

Field Test Connection, and complete scope of accessories and configurations.

#### Technical Data

**Sizes:**

DN 50 to 300  
2" to 12"

**Set Pressures:**

10 to 345 mbarg [4"wc to 50 psig], pilot operated

**Set Vacuum:**

-4.3 mbarg [-1 oz] full open, weight loaded  
-5 to -345 mbarg [-2" wc to -5 psig], pilot operated

**Temperature Range:**

-196 to +93°C [-320 to 200°F]

**Connections:**

Studded ANSI inlet flange

#### Applications

Air separation cryogenic storage tanks, LOX, LIN, LAR.

Air blowers.

Non-hazardous low pressure gas.



### Anderson Greenwood Type 93

The type 93 pilot operated pressure relief valve is designed with elastomer seats and seals for accurate and reliable low pressure protection in petrochemical and chemical processes and storage tanks.

If required, the fully modulating pilot can easily be adjusted to pop action.

Elastomer seats and seals.

Elastomer or PTFE diaphragms.

Pressure protection only.

Field Test Connection, and complete scope of accessories and configurations.

#### Technical Data

##### Sizes:

DN 50 x 80 to 300 x 400  
2" x 3" to 12" x 16"

##### Set Pressures:

7.5 mbarg to 3.5 barg [3"wc to 5 psig]

##### Temperature Range:

-162 to 149°C [-260 to 300°F]

##### Connections:

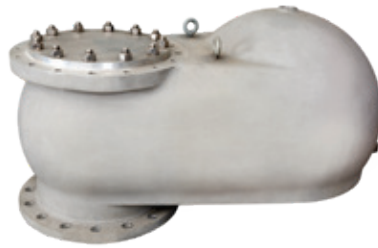
ANSI flange inlet and outlet

#### Applications

Low pressure application where accuracy, fast opening and premium seat tightness is required.

Low pressure gas piping.

Chemical storage tanks.



### Anderson Greenwood Type 96A

The 96A is a weight loaded vacuum breaker designed to complement pressure relief products, especially when seeing high positive operating pressure.

Its enhanced seat design provides premium tightness very close to the opening point.

The internal flow path has been optimized to provide the largest flow capacities.

Special dual soft seat.

Weight-loaded vacuum protection only.

Studded top enables to mount a pressure valve if needed.

Extra-large capacities for economical vacuum protection.

Standard vacuum set to match API tank design standards.

#### Technical Data

##### Sizes:

DN 100 to 400  
4" to 16"

##### Set Vacuums:

-2.2 mbarg [-1/2 oz/in<sup>2</sup>], standard  
-6.6 mbarg [-1 1/2 oz/in<sup>2</sup>], optional

##### Maximum Allowable Positive Pressure:

Up to 5.9 barg [85 psig]

##### Process Temperature Range:

-196 to 148°C [-320 to 300°F]

##### Connections:

ANSI flange

#### Applications

LNG & LPG storage tanks.

Vacuum protection where large capacities are required.



### Anderson Greenwood Type MLCP

Modulating Large Capacity Pilot safety valve designed for low pressure gas and vapour service. The internal pressure sensing and integrated pilot makes it a very compact, simple, high performance and cost effective valve.

Internal pressure sensing.

FKM soft seats and seals.

Full bore orifices for maximum flow.

Field test connection as standard.

#### Technical Data

##### Sizes:

DN 50 x 80 to 150 x 200  
2" x 3" to 6" x 8"

##### Set Pressures:

0.2 to 1.0 barg [3 to 14.99 psig]

##### Temperature Range:

-29 to 204°C [-20 to 400°F]

##### Connections:

ANSI Flanges

#### Applications

Gas distribution pipelines.

Positive displacement blowers.

# Bursting Discs

The Marston range of bursting discs provides reliable and cost-effective pressure protection for any pressurized system, particularly in chemical, oil and gas, pharmaceutical, plastics and rubber industries.

With a broad range of material options and accessories, these can be used as primary safety device to give almost instantaneous pressure protection, in parallel with other pressure safety devices, or also to protect a safety valve against corrosive or viscous process media.

Designed, certified and tested in accordance to most codes and standards like ASME VIII, PED, CU-TR.

## Marston



### Marston Type CS

The type CS are composite slotted forward acting bursting discs. They cover a very wide array of gas, liquid or mixed phase applications.

Ideally suited to applications where the operating pressure can be up to 80% of the burst pressure.

All materials from PTFE, aluminium and stainless steels, including nickel, tantalum. Can be non-fragmenting.

Special bore diameters available to meet specific constraints.

Burst indicator available, wired or wireless, as also excess flow valves, J-bolts.

#### Technical Data

**Sizes:**

DN 3 to 350  
1/8" to 14"  
(larger sizes on request)

**Burst Pressures:**

0.04 to 125 barg [0.58 to 1810 psig]

**Temperature Range:**

-200 to +600°C [-328 to 1,110°F]

**Holders:**

Screwed NPT or BSP 1/4" to 1 1/4" - DN 6 to 32  
Insert or full face type to fit flanges per ANSI or DIN/EN standards

#### Applications

Primary safety device.



### Marston Type RBH

The type RBH are reverse buckling discs mainly suited for steam, gas and liquid applications.

They can accept operating pressures of up to 95% of the burst pressure. They are also excellent under cycling conditions and vacuum applications (style LRB).

All materials from aluminium to stainless steels, including nickel, tantalum.

Non-fragmenting.

Special bore diameters available to meet specific constraints.

Burst indicator available, wired or wireless, as also excess flow valves, J-bolts.

#### Technical Data

**Sizes:**

DN 25 to 350  
1" to 14"  
(larger sizes on request)

**Burst Pressures:**

0.5 to 100 barg [7 to 1,450 psig]

**Temperature Range:**

-200 to +600°C [-328 to 1,110°F]

**Holders:**

Insert or full face type to fit flanges per ANSI or DIN/EN standards

#### Applications

Primary safety device.

Secondary device protecting safety valve.



# Monitoring Solutions for Pressure Safety Valves

For these PSV, critical for the safety and good-running of your plant, Emerson has also developed a complete array of monitoring solutions that can be added to any Emerson pressure safety or relief valves.

Taking advantage of Emerson's monitoring and sensing technology and experience, PSV can be easier to manage with Monitoring through wireless HART communications and non-intrusive sensing. These complete solutions from the valve to the terminal in the control room enable easier compliance with emission regulations, reducing unplanned shutdowns, globally reducing operating costs through predictive maintenance.



<p style="text-align: center;"><b>All PRVs Non-Intrusive</b></p> <p>Rosemount™ 708 Wireless Acoustic Transmitter</p> <ul style="list-style-type: none"> <li>• Event Timestamp and Duration</li> <li>• Leakage Detection</li> </ul>	<p style="text-align: center;"><b>Direct Spring PRVs</b></p> <p>Fisher™ 4320 Wireless Position Monitor</p> <ul style="list-style-type: none"> <li>• Event Timestamp and Duration</li> <li>• Volumetric Release</li> </ul>	<p style="text-align: center;"><b>Pilot-Operated PRVs</b></p> <p>Rosemount 2051/3051 Wireless DP Transmitter</p> <ul style="list-style-type: none"> <li>• Event Timestamp and Duration</li> <li>• Volumetric Release</li> </ul>	<p style="text-align: center;"><b>Connectivity and User Interface</b></p> <p>WirelessHART® Interface</p> <ul style="list-style-type: none"> <li>• Modbus® RTU/TCP, OPC and EtherNet/IP™</li> <li>• DeltaV™, AMS™, Plantweb™ Insight and More</li> </ul>
--	---	---	---



Wireless Solution	Rosemount 708 Wireless Acoustic Transmitter	Fisher 4320 Wireless Position Monitor	Rosemount 2051/3051 Wireless Differential Pressure Transmitter
<b>Valve Type</b>	All Valves	Crosby™ J-Series Direct Spring Valves	Anderson Greenwood™ High and Low Pressure Pilot Valves
<b>Installation</b>	Non-intrusive, install on pipe	Relief Valve OEM Mounting Kit	Relief Valve OEM Mounting Kit
<b>Relief Detection</b>	Time and Duration	Time, Duration and Lift	Time, Duration and Lift
<b>Relief Event</b>	Yes	Yes	Yes
<b>Passing / Leakage</b>	Yes	Yes (Valve not reseating)	No
<b>Volumetric Release</b>	No	Yes	Yes
<b>Application / Use</b>	Gas, Liquid and Steam	Gas, Liquid and Steam	Gas, Liquid and Steam
<b>Detection Principle</b>	Acoustic and pipe surface temperature	Movement of valve stem down to 1/10 <sup>th</sup> in.	Differential pressure between inlet and dome
<b>Update Rate</b>	1 sec to 60 minutes	1 sec to 60 min.	1 sec to 60 min.
<b>Update Method</b>	Continuous	Triggered by valve movement	Continuous
<b>Time to Detect Open</b>	Same as update rate	Same as update rate or as fast as 1/2 second sampling	Same as update rate
<b>Power Module Life</b>	3.8 years @ 4 second update rate	4.0 years @ 4 second update rate (standard)	2.2 years @ 4 second update rate
<b>Connectivity/GUI Through WirelessHART® Gateway</b>	Plantweb Insight app; AMS; Modbus RTU/TCP, OPC and EtherNet/IP	AMS; Modbus® RTU/TCP, OPC and EtherNet/IP	AMS; Modbus® RTU/TCP, OPC and EtherNet/IP

# Speciality Valves

In addition to pressure relief valves and bursting discs, Emerson's portfolio has been complemented over the years with safety devices further enhancing the safety of your assets and personnel.

## Internal Tank Valve

Fail-safe shut-off valve for cryogenic storage tank withdrawal, the ITV meets the requirements set forth by the NFPA 59A, and provide high flowing capacities for economical selection.

## Reserve Capacity Relief Valve

The RCRV provide huge additional flowing capacities with almost instantaneous opening for emergency situations.

## Safety Selector Valve

The SSV is a compact switchover valve with very high flow efficiency.

It meets the mandatory requirements of ASME VIII UG-135, AD-2000-A2 and can also be used on boilers per ASME I Code Case 2254.

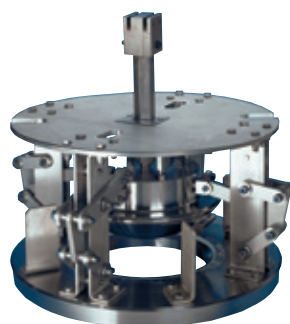
## BlockBody Safety Valves

With the BlockBody concepts, Emerson has been able to extend the limitations of safety valves for more cost-effective solutions, and higher material integrity.

## Type 95 Safety Valve

A full modulating low-to-medium pressures pilot operated safety valve, the 95 can harness aggressive gas applications under a wide range of process temperatures.

Anderson Greenwood  
Crosby  
Sempell



## Anderson Greenwood Type ITV

The Internal Tank Valve is a fail-safe isolation valve for bottom or side withdrawal specifically developed for lifelong protection of cryogenic storage tanks like LNG, LPG, NH<sub>3</sub>, LOX, LIN.

Full cryogenic construction, seat plate of same grade as tank bottom to ensure thermal and weld full compatibility.

Redundant manual open cable in case of loss of power.

Pressure equalizing pilot valve and actuator settings to limit forces on tank top and bottom.

Bottom mounted pivot or plug design, and side mounted pivot design available.

Actuators, control panel also available.

## Technical Data

### Sizes:

Bottom Pivot ITV:  
DN 100 to 450  
4" to 18"

Bottom Plug ITV:  
DN 150, 300, 600 and 750  
6", 12", 24" and 30"

Side Pivot ITV:  
DN 300 to 450 - 12" to 18"

### Temperature Range:

Cryogenic down to -196°C [-320°F] and lower

### Connections:

Seat plate welded to tank bottom

## Applications

Refrigerated and cryogenic storage tanks.

LNG, LPG, ethylene, ammonia, LOX, LIN.



## Anderson Greenwood Type RCRV

The Reserve Capacity Relief Valve has been designed to provide overpressure protection on large low pressure refrigerated and cryogenic tanks when large volumes of vapour are generated by unusual conditions.

Uses a frangible link to achieve almost instantaneous full opening.

An Inconel spring enables the valve to reclose with around 50% blowdown.

Nitrile soft seat.

Aluminium construction with stainless trim.

Bubble-tight to 95% of set.

Full open at set pressure.

Very large capacities to reduce quantity of valves on tank.

## Technical Data

### Sizes:

DN 600 and 900  
24" and 36"

### Set Pressures:

24": 103 to 345 mbarg [1.5 to 5.0 psig]  
36": 103 to 207 mbarg [1.5 to 3.0 psig]

### Connections:

24": 150# flange ANSI B16.5  
36": 125# flange ANSI B16.1

## Applications

LNG or LPG storage tanks.

Emergency venting from overflow, mechanical failure, rollover or loading error.



### Anderson Greenwood SSV

Safe and efficient method for switching from an active safety valve to stand-by safety valve. In accordance to all international standards and codes recommendations, the SSV creates much less than 3% inlet pressure losses to the active API Std 526 safety valve. Tandem inlet and outlet SSV assembly are available which allow positive and simultaneous switching while maintaining overpressure protection at all time. Soft seated with minimal maintenance requirements. Very high Cv values, with no oversizing in a compact body. Bleed valves as standard for safe removal of the isolated safety valve. Clear, positive indication of the active safety valve. Simple operation with built-in seat pressure equalisation. Allows safety valve maintenance without process shut-down.

#### Technical Data

##### Sizes:

DN 25 to 250  
1" to 10"

##### Pressure Range:

Up to 425 barg [6,170 psig]

##### Temperature Range:

-253 to +427°C [-423 to 800°F]

##### Connections:

ANSI flanges 150# to 2,500#

#### Applications

Gas, steam, liquid and mixed phase. 'Active and Stand-by' safety valves installations.



### BLK Block Body Safety Valves

Where set pressure requirements exceed the industry standards, on offshore applications right to power plants, Anderson Greenwood, Crosby and Sempell have designed spring loaded and pilot operated safety valves as block body valves to provide cost-effective alternatives to multiple high pressure smaller sizes relief valves.

The forged body construction allows an extensive array of sizes, pressure ratings and connections, to suit the application.

Most materials available from carbon steels to high temperature alloys, duplexes or nickel alloys.

Spring loaded, pilot operated or power actuated CSPRS designs.

For some alloys, Hot Isostatic Pressed (HIP) body/bonnet can also be used.

#### Technical Data

##### Sizes, Pressures, Temperature Range, and Connections:

As per requirements and needs of the application

#### Applications

Customized safety valves to reduce quantities on high pressure and/or large flow processes.

Specific metallurgical requirements.



### Anderson Greenwood Type 95

A unique pilot operated safety valve, originally developed for protecting the cargo tanks for LPG ships, it is very rugged with a wide chemical compatibility range for all these hard-to-solve aggressive low-to-medium pressure applications.

FFKM and PTFE seats and seals.

Full stainless steel construction as standard.

Bubble-tight to 95% of set.

Full modulating pilot (can be also set to pop if desired).

Wide temperature range.

#### Technical Data

##### Sizes:

DN 50 x 80 to 150 x 200  
2" x 3" to 6" x 8"

##### Set Pressures:

0.35 to 10.3 Barg [5 to 150 psig]

##### Temperature Range:

-107 to +205°C [-160 to 400°F]

##### Connections:

ANSI flanges

#### Applications

Marine LPG storage tanks.

Low or medium pressure applications on aggressive chemicals like VCM.

Low pressure steam.



## Continuous support in the face of changing market and operating conditions

Emerson leads the way with industry-defining end-to-end digital service experiences, helping you achieve superior outcomes through our maintenance, reliability, and performance offerings. The tools we've developed support the digital transformation of the process and hybrid

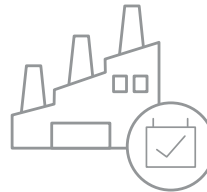
industries, providing the confidence to extract the maximum value from your service and technology investments. Our teams partner with you across the globe to help you maintain safe operation, improve reliability, and optimize plant performance. With over 100 regional service centers and

60+ mobile service centers worldwide, local experts are available to work with you to understand your unique challenges and help you find a solution. Our broad portfolio of service offerings allows us to tailor our support to align with your specific business goals.



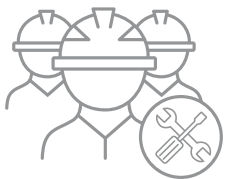
### Connected Services

Leverage smart valve technology and Emerson expertise to help your workforce make informed performance and reliability decisions at speed.



### Outage Services

Identify, prioritize, and plan long term plant reliability improvements to reduce maintenance events and improve generation performance.



### Education and Training

Train new hires, improve your current workforce skills, and help your team adapt to new technology or products.



### Startup and Commissioning

Certified technicians meticulously work through approvals, calibration, testing, and certification to deliver a comprehensive handover, on time and on budget.



## Emerson QuickShip Supports your projects and operations effectively

### Fast, reliable production and shipment services to suit your needs

You need speed and reliability from your technology suppliers to manage your projects and operations effectively, but finding a vendor you can count on when timing matters isn't always easy.

With Emerson's QuickShip fulfillment program, you'll have access to a range of fast, dependable production and shipment options for pressure relief and safety valves and parts replacement where you need it, when you need it.

QuickShip is a world-class fulfillment program offered by Emerson Automation Solutions that allows for fast shipment of pressure relief and safety valves and parts to maximize speed and responsiveness. It leverages our global infrastructure, local presence and commitment to service to help you avoid downtime, stay on schedule, respond to the unexpected, and control costs in today's challenging environments.

### QuickShip Everyday

For fast, easy and reliable shipment of standard items at no extra charge.

### QuickShip Expedite

To meet your required delivery date for any product with flexible price premiums.

### QuickShip Emergency

For the fastest possible order, shipment and delivery of critical parts or products.

Put Emerson's wealth of resources and expertise to work for you to resolve all your part and product shipping needs, no matter the circumstances.



## Expert support from the pressure relief specialists

### Testing

#### **SPVD-Set Pressure Verification Device**

A system for in-situ testing, classified as a 'calibrated assist device' per ASME PTC 25. Computer driven to testing safety valves, portable or permanently mounted.

Emerson has developed various types of in-situ testing devices, to suit the needs and requirements of the plant: boiler safety valves, including super-critical applications, general applications or offshore installations.

#### **VPI - Valve Position Indicator**

Provides direct, continuous, remote indication of the valve spindle position. Permits safe monitoring of safety valves located in hostile environment. Transducer qualified Class 1E. Qualified to IEEE-344.

#### **LISA—Lift Indicator Switch Assembly**

Valve position indicating device with fully encased magnetic proximity sensors. Indication of valve closed, mid and fully-open position. Qualified to IEEE-344.

### Emerson PRV<sup>2</sup> SIZE and BABS

Pressure Relief Device Sizing and Selection Software.

PRV<sup>2</sup>SIZE incorporates over 140 years of experience and engineering expertise in selecting the right safety devices for your application. Users and engineers can address numerous applications, in accordance to the ASME code and API and EN standards, including the latest developments in mixed-phase flow sizing.

- User-Friendly Interface
- Sizing calculations can be saved at any point
- Multiple tags can be opened simultaneously
- Sorting data through a variety of parameters
- Fully configured product selection
- Fire sizing applications following API RP 521 methodology
- Export and import tools
- Reaction force and noise level

BABS is the dedicated sizing and selection tool for Sempell safety valves, incorporating requirements from ASME but also AD-2000 and other codes and standards.

- Integrated Water and Steam tables
- Sizing per ASME VIII, API 520, AD2000-A2, BS6759, TRD 421
- Noise level per API or VDMA
- Flashing water per multiple methods

### Training and Support

At Emerson we deal with pressure safety devices every day. We review designs, applications, installations and participate to standards and codes committees.

We can support your teams by providing seminars and trainings tailored to your needs, on any subject related to pressure protection, safety devices and their installation, maintenance, theory, sizing, etc. being for one hour as a 'lunch-and-learn' opportunity or for several days for complete training of a team of engineers.

Seminars and training can be arranged at your premises, or in our state-of-the-art training facilities.



# Certification and Approvals

Certifications and approvals are critical when working with safety devices. Emerson's extensive range of Pressure Relief Devices are available with the following certifications and approvals.

- AD 2000 - A2
- ASME Code Section I (V)
- ASME Code Section VIII (UV)
- ATEX 2014/34/EU (replaces 94/9/EC)
- Canadian Registration (CRN)
- China Manufacturer License (SELO)
- CU TR 012
- CU TR 032
- EN ISO 4126
- Korea Gas Safety Corporation
- PED 2014/68/EU (replaces 97/23/EC)
- Type approvals for Marine liquefied gases and/or Offshore, ABS, BV, DNV-GL, LRS
- TRD 110



# Pressure relief valves, providing advanced, reliable and efficient overpressure protection

## Emerson Automation Solutions

### Americas

McKinney, Texas 75070 USA  
T +1 800 558 5853  
T +1 972 548 3574

Stafford, Texas 77477 USA  
T +1 281 274 4400

### Europe

T +39 051 419 0611

### Asia Pacific

T +65 6777 8211

### Middle East / Africa

T +971 4811 8100

 [webadmin.regulators@emerson.com](mailto:webadmin.regulators@emerson.com)

 [Emerson.com](http://Emerson.com)

 [Facebook.com/EmersonAutomationSolutions](https://Facebook.com/EmersonAutomationSolutions)

 [LinkedIn.com/company/emerson-automation-solutions](https://LinkedIn.com/company/emerson-automation-solutions)

 [Twitter.com/emr\\_automation](https://Twitter.com/emr_automation)

D352738X012 © 2018,2020 Emerson Electric Co. All rights reserved 04/2020.

Anderson Greenwood, Crosby and Sempell are marks owned by one of the companies in the Emerson Automation Solutions business unit of Emerson Electric Co.  
The Emerson logo is a trademark and service mark of Emerson Electric Co. All other marks are property of their respective owners.  
VCPBR-08579-EN 20/04



CONSIDER IT SOLVED™