

**Fully integrated solutions for
improving safety, emissions control
and product integrity**



Total Tank Protection - Inside and Out



Your tank pressure suddenly increases and you don't know why

The safety of your personnel relies on an effective emergency preparedness plan. While protecting your employees, you also have the added pressure making certain you don't lose any assets. Over and under pressurization of your tanks can lead to damage or even failure, so ensuring all pressure setpoints are correct and compatible becomes your mission 24/7.

The risks are great

Abnormal conditions can lead to an emergency event like an external fire, explosion damage and equipment failure. Protecting your personnel cannot take second place. You need to carefully consider the quality and value of the products you choose to protect your assets. When something does go wrong, you need fast information about all of your assets so you can quickly respond for a quick resolution.

"The average hourly cost of facility downtime is approximately \$12,500, but substantially higher at many continuous process facilities."
– ABC Advisory Group



"In fiscal year 2015, EPA enforcement actions required companies to invest \$7 billion in actions and equipment to control pollutions and clean up contaminated sites..."
–U.S. EPA, Enforcement Annual Results for Fiscal Year (FY) 2015





Low Cost-to-Protection Ratio

Protect your investment. Proper venting and safety equipment costs only a small fraction of total capital expenditure required for building and installing storage tank facilities.

Protecting what you have

Unexpected downtime due to system failure costs time and money to repair and puts the integrity of your tanks and their content at risk. You not only need to extend the life of your hard assets but also the integrity of your gaseous and liquid assets. Minimizing oxidation and maintaining optimal tank pressure to reduce contamination is vital in preserving product integrity.

Optimal emissions control is not only to comply to the latest environmental regulations but limits product loss. This is achieved through accurate pressure control and a knowledgeable partner that can help you manage your total tank protection needs.

Over pressure

Emergency vent

High pressure

Pressure relief vent

Vapor recovery
(depad regulator)

Tank blanketing
system control

Low pressure

Tank blanketing
(pad regulator)

Vacuum relief vent

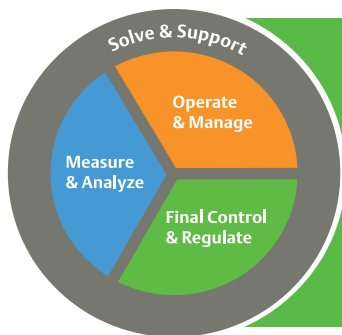
Under pressure

Emergency vacuum

Reduce emissions, limit product loss and protect the integrity of the products in your tanks



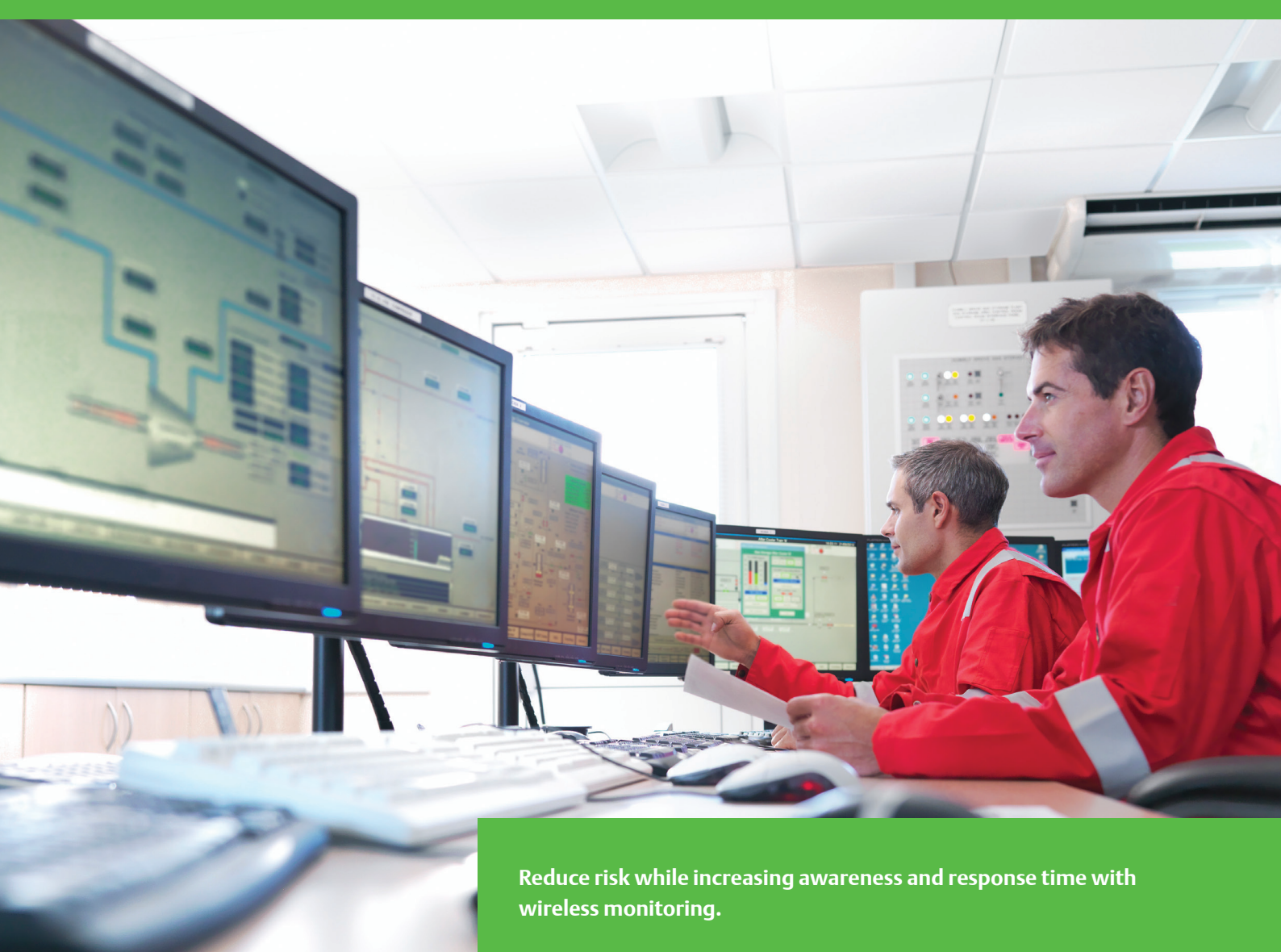
- **Reduce emissions and product loss by 15%⁽¹⁾** - This exceeds the most stringent standards for allowable leakage and provides excellent setpoint accuracy.
- **Reduce maintenance and improve service life** - Vents feature replaceable seats and arrestors that are easier to clean.
- **Reduce system cost** - Arrestors that are designed with flame cell openings that are 3 times larger than others in the industry, reducing pressure drop and blower cost.
- **Reduce your tank blanketing expense by 50%⁽²⁾** - Regulators that provide low-setpoint technology which allows only the amount of blanketing gas required, delivered to the tank, minimizing this expense.



Emerson, the world leader in total tank management technology, provides the products, engineering and service that successful tank management requires. Fully integrated solutions advance safety, control emissions and maintain the integrity of tank contents.

Actuation • Control Valves • Isolation Valves
Regulators & Relief Valves • Valve and Instrumentation & Accessories

1. Based on 1 SCFH leakage at 90% setpoint vs. standard 1 SCFH leakage at 75% setpoint.
2. Based on lowering the tank blanketing regulator setpoint from 2 to 1-in. w.c. pressure.



Reduce risk while increasing awareness and response time with wireless monitoring.

Gain visibility to prevent problems

Emerson's wireless-ready tank monitoring equipment detect device and system malfunctions in advance, to help reduce your risk of equipment damage and operational emergencies. Expanded data collection capabilities can help improve operational efficiencies, lower costs and aid in making more informed decisions.

- Monitor tanks from the safety of a remote control room
- Reduce the need to climb tanks to monitor gauges
- Monitor regulator functions and receive malfunction notifications
- Respond immediately to safety and emissions events
- Monitor and control opening and closing of emergency pressure vacuum vents
- Detect the opening of pressure vacuum relief valves and the presence of flames
- Trace and compare nitrogen costs



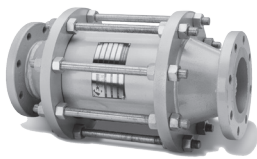
Flame and Detonation Arrestors

Deflagration Flame Arrestors Enardo™ 7 Series



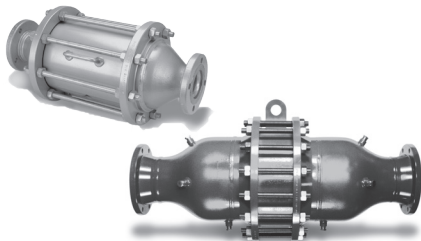
- Concentric/Eccentric
- Bi-Directional Design
- Size 1 to 36 in. / 25 to 900 mm
- Aluminum, Carbon steel, 304 Stainless steel and 316 Stainless steel
- Gas Groups D (IIA), C (IIB3), B (IIC)
- FM Approved-Group D (IIA) Gases 2 to 12 in. / 50 to 300 mm
- ISO-16852 Certified D (IIA), C (IIB3) 1 to 12 in. / 25 to 300 mm

High Pressure Deflagration Flame Arrestors Enardo 8 Series



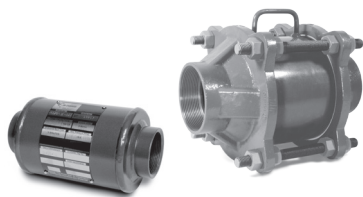
- Concentric/Eccentric
- Bi-Directional Design
- Size 2 to 24 in. / 50 to 600 mm
- Carbon steel, 304 Stainless steel and 316 Stainless steel
- Gas Groups B, C and D

Detonation Flame Arrestors Enardo DFA Series



- Concentric/Eccentric
- Bi-Directional Design
- Size 1 to 48 in. / 25 to 1200 mm
- Carbon steel, 304 Stainless steel and 316 Stainless steel
- Gas Groups D (IIA), C (IIB3) and B (IIC)
- U.S. Coast Guard Approved D and C 1 to 24 in. / 25 to 600 mm
- ATEX Approved-IIA and IIB3 1 to 24 in. / 25 to 600 mm

Threaded In-line Flame Arrestors Enardo IL Series



- Bi-Directional Design
- Size 2 to 4 in. / 13 to 100 mm
- Gas Group D (IIA)
- Aluminum, Carbon steel, 304 Stainless steel and 316 Stainless steel

Free Vent Flame Arrestors Enardo FVFA Series



- Size 3/4 to 36 in. / 20 to 900 mm
- Aluminum, Carbon steel, 304 Stainless steel and 316 Stainless steel
- Gas Groups D (IIA), C (IIB3) and B (IIC)
- ISO-16852 Certified 2 to 12 in. / 50 to 300 mm D (IIA) and C (IIB3)

Vent Stack Flame Arrestors Enardo 8800, Enardo 9900

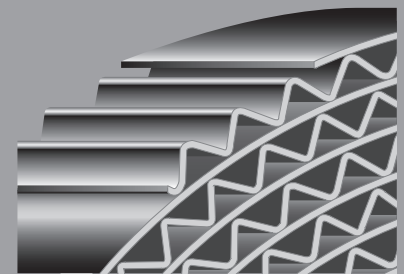


- Size 1 to 6 in. / 25 to 150 mm
- Aluminum, Carbon steel, 304 Stainless steel and 316 Stainless steel
- Gas Groups D (IIA)

Features and Benefits

Larger Crimp Size

- Less pressure drop
- Less maintenance
- Easier cleaning

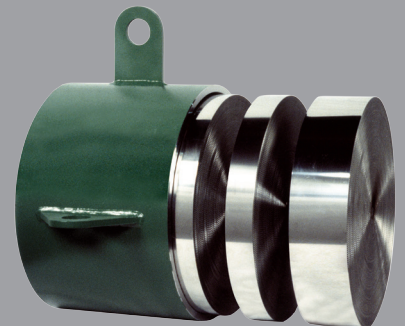


Fluoropolymer Coated Hardware

- Provides outstanding corrosion and chemical resistance

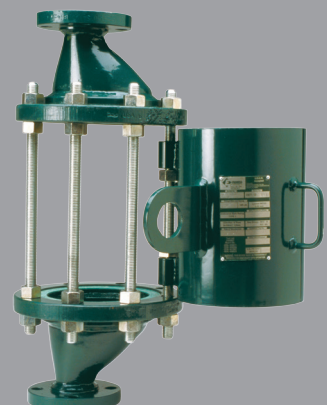
Removable Element

- Easily removable for cleaning and replacement



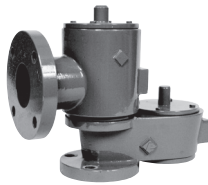
Hinged Element

- Facilitates easy access



Pressure and Vacuum Relief Valves (PVRV)

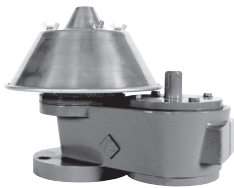
Pressure-Vacuum Relief Valve Pipe Away Enardo™ 450



- Size: 2 to 12 in. / 50 to 300 mm
- Pressure: 0.5 to 12 oz./sq. in.⁽¹⁾ / 2.0 to 52 mbar⁽¹⁾
- Vacuum: 0.5 to 12 oz./sq. in.⁽¹⁾ / 2.0 to 52 mbar⁽¹⁾
- Aluminum, carbon steel and stainless steel
- EN 13463-1 and EN 13463-5 Certified

1. May be lower for some sizes – consult factory

Pressure-Vacuum Relief Valve Vent-to-Atmosphere Enardo 550



- Size: 2 to 12 in. / 50 to 300 mm
- Pressure: 0.5 to 12 oz./sq. in.⁽¹⁾ / 2.0 to 52 mbar⁽¹⁾
- Vacuum: 0.5 to 12 oz./sq. in.⁽¹⁾ / 2.0 to 52 mbar⁽¹⁾
- Aluminum, carbon steel and stainless steel
- EN 13463-1:2001 and EN 13463-5:2003 Certified

1. May be lower for some sizes – consult factory

Pressure-Vacuum Relief Valve Pipe Away Enardo 850, Enardo 850/MVC, Enardo 860



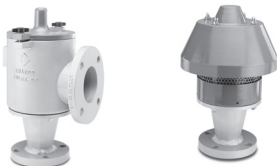
- Size: 2 to 12 in. / 50 to 300 mm
- Pressure: 0.5 to 32.0 oz./sq. in. / 2.0 to 138 mbar
- Vacuum: 0.5 to 32.0 oz./sq. in. / 2.0 to 138 mbar
- Aluminum, ductile iron, carbon steel and stainless steel
- EN 13463-1 and EN 13463-5 Certified

Pressure-Vacuum Relief Valve Vent-to-Atmosphere Enardo 950, Enardo 960



- Size: 2 to 12 in. / 50 to 300 mm
- Pressure: 0.5 to 32.0 oz./sq. in. / 2.0 to 138.0 mbar
- Vacuum: 0.5 to 32.0 oz./sq. in. / 2.0 to 138.0 mbar
- Aluminum, ductile iron, carbon steel and stainless steel
- EN 13463-1 and EN 13463-5 Certified

Pressure Relief Valve Enardo 851, Enardo 951, Enardo 861, Enardo 961



- Size: 2 to 12 in. / 50 to 300 mm
- Pressure: 0.5 to 32.0 oz./sq. in. / 2.0 to 138.0 mbar
- Aluminum, ductile iron, carbon steel and stainless steel
- EN 13463-1 and EN 13463-5 Certified

Pressure Relief Valve Enardo 851, Enardo 952, Enardo 952/MVC, Enardo 953, Enardo 861, Enardo 962, Enardo 963



- Size: 2 to 12 in. / 50 to 300 mm
- Vacuum: 0.5 to 32.0 oz./sq. in. / 2.0 to 138.0 mbar
- Aluminum, ductile iron, carbon steel and stainless steel
- EN 13463-1 and EN 13463-5 Certified

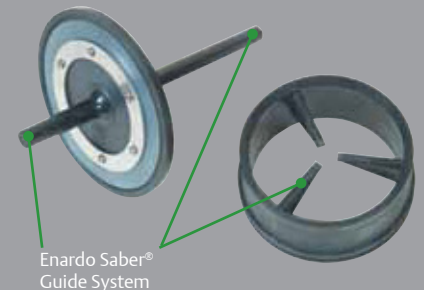
Features and Benefits

Economical

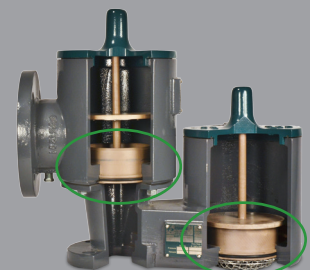
- Replaceable seat
- Stainless steel pallet with FEP Teflon® seal
- Excellent flow characteristics
- High performance coating for harsh environments

Superior Performance

- Enardo Saber® dual pallet guide system reseats the valve in the same spot each time retaining the valve's seal characteristics



- Anti-freeze and non-stick design
- Replaceable seat reduces maintenance cost and extends valve life



Replaceable Seat

- Advanced composite - Polyphenylene Sulfide (PPS) pallet and seat that provides superior corrosive resistance to chemical attack and non-stick surface

Vent Valves and Emergency Vents

In-Line and Stack Vent Valves

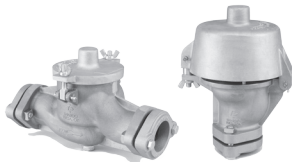
Enardo™ 800-SO, Enardo 800-PSO, Enardo 900-SO



- Size: 2, 3 and 4 in. / 50, 80 and 100 mm
- Pressure: 1.0 to 16 oz./sq. in. in 0.5 oz./sq. in. increments / 4.3 mbar to 69.0 mbar in 2.2 mbar increments
- Vacuum: 0.4 oz./sq. in. / 1.7 mbar
- Aluminum

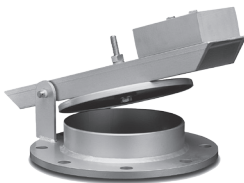
In-Line and Stack Vent Valves

Enardo ES-800-SO, Enardo ES-800-PSO, Enardo ES-900-SO



- Size: 2, 3 and 4 in. / 50, 80 and 100 mm
- Pressure: 1.0 to 16 oz./sq. in. in 0.5 oz./sq. in. increments / 4.3 mbar to 69.0 mbar in 2.2 mbar increments
- Vacuum: 0.4 oz./sq. in. / 1.7 mbar
- Aluminum

Emergency Relief Vent Enardo 2000



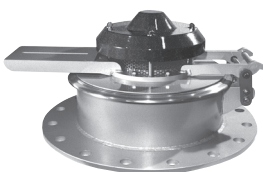
- Size: 4, 8, 10, 12, 16, 18, 20 and 24 in. / 100, 200, 250, 300, 400, 450, 500 and 600 mm
- Pressure: 2 to 32 oz./sq. in. in 0.5 oz./sq. in. / 8.6 mbar to 138.0 mbar in 2.2 mbar increments
- Carbon steel, 304 Stainless steel and 316 Stainless steel
- Optional Remote Monitoring
- EN 13463-1 and EN 13463-5 Certified

Emergency Relief Vent Enardo 2100



- Size: 16, 20 and 24 in. / 400, 500 and 600 mm
- Pressure: 0.7 to 8.0 oz./sq. in. in 0.5 oz./sq. in. increments / 3.0 mbar to 34.0 mbar in 2.2 mbar increments
- Aluminum/Carbon steel, 304 Stainless steel and 316 Stainless steel

Emergency Relief Vent Enardo 2500



- Size: 16, 20 and 24 in. / 400, 500 and 600 mm
- Pressure: 4 to 16 oz./sq. in. in 0.5 oz./sq. in. increments / 17.2 mbar to 69.0 mbar in 2.2 mbar increments
- Vacuum: 0.5, 0.75, 1.0 and 2.0 oz./sq. in. / 2.2, 3.2, 4.3 and 8.6 mbar
- Carbon steel, 304 Stainless steel and 316 Stainless steel
- EN 13463-1 and EN 13463-5 Certified

Free Vent Enardo 4000, Enardo 4100



- Size: 2, 3, 4, 6, 8, 10 and 12 in. / 50, 80, 100, 150, 200, 250 and 300 mm
- Aluminum, Carbon steel, 304 Stainless steel, 316 Stainless steel

Rim Vent



- Size: 6 in. / 150 mm
- Pressure: 0.5, 1, 2, 4, 8 and 12 oz./sq. in. / 2.2, 4.3, 8.6, 17.2, 34.5 and 51.7 mbar
- Aluminum
- EN 13463-1 and EN 13463-5 Certified

Features and Benefits

Time Proven Performance

- Economical production storage tank applications



Emergency Relief

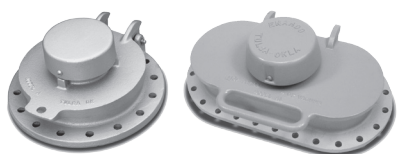
- Provides emergency venting relief per API 2000. Used in conjunction with pressure vacuum relief valves
- Provides superior relieving capacity for emergency conditions
- Increased level of tank safety in emergency conditions
- Highest relief settings available

Non Pressure Relief

- High capacity flow for non-flammable or non-volatile storage tanks
- Prevents foreign matter from entering tank

Gauge and Thief Hatches

Enardo™ A and Enardo A-L Hatches



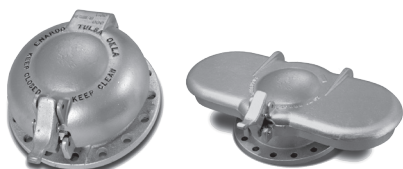
- Nominal 8 in. / 200 mm API Bolt pattern (Model Enardo A)
- Nominal 8 x 18 in. / 200 x 450 mm API Bolt pattern (Model Enardo A-L)
- Pressure: 2, 4 and 6 oz/sq. in. / 8.6, 17.2 and 26.0 mbar
- Vacuum: 0.4 oz/sq. in. / 1.7 mbar
- Aluminum and ductile iron

Enardo 200 Hatch



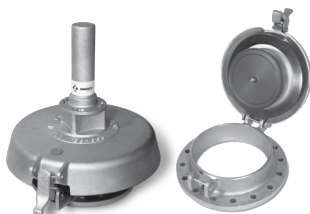
- Nominal 8 x 22 in. / 200 x 550 mm API Bolt pattern (Model Enardo A-L)
- Pressure: 1, 2, 3, 4 and 6 oz. / 4.3, 8.6, 12.9, 17.2 and 26.0 mbar
- Vacuum: 0.4 oz. / 1.7 mbar
- Aluminum and ductile iron

Enardo 660, Enardo 660B, Enardo 660-L, Enardo 660-LB



- Nominal 8 in. / 200 mm API Bolt pattern
- Pressure: 2, 4, 6, 8, 12, 16, 24 and 32 oz. / 8.6, 17.2, 26.0, 34.4, 52.0, 69.0, 103.0 and 138.0 mbar
- Vacuum: 0.4, 0.9 and 3.5 oz. / 1.7, 3.9 and 15.0 mbar
- Aluminum

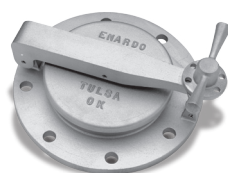
Enardo ES-660, Enardo ES-660-B, Enardo ES-660-L, Enardo ES-660-LB, ES-660-HF



- Nominal 8 in. / 200 mm API Bolt pattern
- Pressure: 4, 6, 8, 12, 16, 24⁽¹⁾ and 32⁽¹⁾ oz. / 17.2, 26.0, 34.4, 52.0, 69.0, 103.0⁽¹⁾ and 138.0⁽¹⁾ mbar
- Vacuum: 0.4, 0.9 and 3.5 oz. / 1.7, 3.9 and 15.0 mbar
- Aluminum

1. Not available on Model Enardo ES-660-HF

Enardo 1000 Lock Down Hatch



- API/ANSI Bolt pattern size: 8 in. / 200 mm
- ANSI Bolt pattern size: 8 in. / 200 mm
- Aluminum, carbon steel and stainless steel

Features and Benefits

Economical Dead Weight Hatches

- Large volume tank venting at low pressure
- Access for tank gauging
- Field replaceable gaskets
- “Sour gas” models available



Economical Spring Loaded Tank Hatch

- Multiple relief settings
- “Sour gas” models available

High Performance

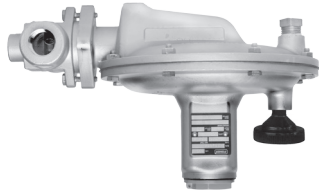
- Tank hatch minimizes product losses. Envelope gasket provides superior sealing quality over conventional flat gaskets. Lowest leakage rate (1.0 SCFH at 90% set pressure) in the industry.
- “Sour gas” models available

Tank Access for Inspection and Gauging

- Vapor tight seal prevents leakage and evaporation losses
- “Sour gas” models available

Tank Blanketing and Vapor Recovery Regulators

Tank Blanketing Regulator Fisher™ Type T205 Series



- **Body Size:** NPS 3/4 and 1 / DN 20 and 25
- **Control Pressure Range:** 1 in. w.c. to 7 psig / 2.5 mbar to 0.48 bar
- **Maximum Inlet Pressure:** 200 psig / 13.8 bar
- **Flow up to:** 24,765 SCFH / 663 Nm³/h of Nitrogen
- **Operation Method:** Direct-Operated
- **Body Material:** Cast iron, steel and stainless steel
- **Bulletin No.:** 74.1:T205
- **Compact size** is ideal for blanketing small tanks and vessels

Features and Benefits

Ideal for Blanketing Small Tanks and Vessels

- Compact size
- Easy to install and maintain

Tank Blanketing Regulator Fisher Type T205B



- **Body Size:** NPS 3/4 and 1 / DN 20 and 25
- **Control Pressure Range:** 1 in. w.c. to 7 psig / 2.5 mbar to 0.48 bar
- **Maximum Inlet Pressure:** 200 psig / 13.8 bar
- **Flow up to:** 19,388 SCFH / 519 Nm³/h of Nitrogen
- **Operation Method:** Direct-Operated
- **Body Material:** Cast iron, steel and stainless steel
- **Bulletin No.:** 74.1:T205B

Balanced Blanketing Regulator

- Fully balanced design
- Reduces inlet pressure sensitivity
- Accurately controls tank pressure at low pressure settings on tank blanketing systems

Tank Blanketing Regulator Fisher Type Y692

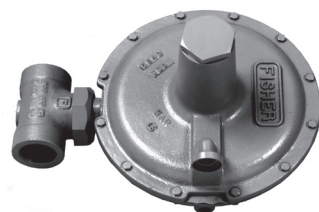


- **Body Size:** NPS 1-1/2 and 2 / DN 40 and 50
- **Control Pressure Range:** 1 in. w.c. to 10 psig / 2 mbar to 0.69 bar
- **Maximum Inlet Pressure:** 150 psig / 10.3 bar
- **Flow up to:** 19,820 SCFH / 531 Nm³/h of Nitrogen
- **Operation Method:** Direct-Operated
- **Body Material:** Cast iron, WCC steel and stainless steel
- **Bulletin No.:** 74.1:Y692

Accurate Pressure Control for Very Low-Pressure Blanketing Systems

- Provides quick response with downstream pressure sensed directly by the diaphragm
- Precise control even at low-pressure settings
- Pitot tube creates a dynamic boost that helps provide greater capacity

Tank Blanketing Regulator Fisher Type Y693



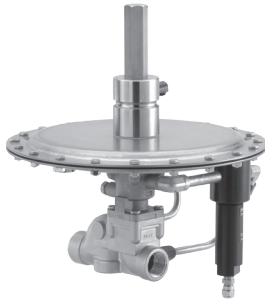
- **Body Size:** NPS 1-1/2 and 2 / DN 40 and 50
- **Control Pressure Range:** 0.5 in. w.c. to 10 psig / 1 mbar to 0.69 bar
- **Maximum Inlet Pressure:** 150 psig / 10.3 bar
- **Flow up to:** 26,700 SCFH / 716 Nm³/h of Nitrogen
- **Operation Method:** Direct-Operated
- **Body Material:** Cast iron, steel and stainless steel
- **Bulletin No.:** 74.1:Y693

The Accuracy of a Pilot-Operated Regulator in a Direct-Operated Design

- Balanced trim design and large diaphragm area provide high accuracy
- Minimal hysteresis
- Low inlet pressure sensitivity

Tank Blanketing and Vapor Recovery Regulators

Tank Blanketing Regulator Fisher™ ACE95 Series



- **Body Size:** NPS 3/4, 1, 1 x 2 and 2 / DN 20, 25, 25 x 50 and 50
- **Control Pressure Range:** -5 in. w.c. to 1.5 psig / -12 mbar to 0.10 bar
- **Maximum Inlet Pressure:** 200 psig / 13.8 bar
- **Body Orientation:** In-line or Angle
- **Flow up to:** 499,600 SCFH / 13,390 Nm³/h of Nitrogen
- **Operation Method:** Pilot-Operated
- **Body Material:** Stainless steel
- **Bulletin No.:** 74.1:ACE95

Features and Benefits

Accurate Pressure Control on Low-Pressure Systems

- Oversized actuator offers high sensitivity to changes in tank pressure
- High accuracy to pressure control
- Single pilot design minimizes issues with overlapping setpoints

Tank Blanketing Regulator Fisher Type 1190



- **Body Size:** NPS 1, 2, 3, 4, 6, 8 x 6 and 12 x 6 / DN 25, 50, 80, 100, 150, 200 x 150 and 300 x 150
- **Control Pressure Range:** 0.25 in. w.c. to 7 psig / 0.6 mbar to 0.48 bar
- **Maximum Inlet Pressure:** 400 psig / 27.6 bar
- **Flow up to:** 2,811,000 SCFH / 75,335 Nm³/h of Nitrogen
- **Operation Method:** Pilot-Operated
- **Body Material:** Cast iron, steel and stainless steel
- **Bulletin No.:** 74.1:1190

Very Accurate Pressure Control on Low-Pressure Systems

- High-capacity
- Very accurate
- Top-entry design reduces maintenance time and manpower requirements
- Not affected by changes in the pressure recovery system

Vapor Recovery Valve Fisher T208 Series



- **Body Size:** NPS 3/4 and 1 / DN 20 and 25
- **Control Pressure Range:** 2 in. w.c. to 7 psig / 5 mbar to 0.48 bar
- **Maximum Inlet Pressure:** 75 psig / 5.2 bar
- **Flow up to:** 2320 SCFH / 62.2 Nm³/h of Nitrogen
- **Operation Method:** Direct-Operated
- **Body Material:** Cast iron, steel and stainless steel
- **Bulletin No.:** 74.2:T208

Ideal for Small Vapor Recovery Systems

- Designed for use as a backpressure or relief valve

Vapor Recovery Valve Fisher Type 1290



- **Body Size:** NPS 1, 2, 3, 4, 6, 8 x 6 and 12 x 6 / DN 25, 50, 80, 100, 150, 200 x 150 and 300 x 150
- **Control Pressure Range:** 0.5 in. w.c. to 7 psig / 1 mbar to 0.48 bar
- **Maximum Inlet Pressure:** 12.5 psig / 0.86 bar
- **Flow up to:** 327,400 SCFH / 8774 Nm³/h of Nitrogen
- **Operation Method:** Pilot-Operated
- **Body Material:** Steel and stainless steel
- **Bulletin No.:** 74.2:1290

High-Capacity and Highly Accurate

- High-capacity
- Very accurate
- Opens when tank pressure increases above desired setpoint
- Not affected by changes in the pressure recovery system

Total tank protection from a single source



FISHER™ ENARDO™

Emerson's Single Source Protection integrates industry leading tank blanketing and vapor recovery regulators with top-rated flame arrestors, pressure-vacuum relief valves, emergency vents and tank hatches to deliver seamless compatibility. It's the latest step in our ability to provide the widest possible array of environmental protection and safety equipment, expertise and unparalleled service across a full range of oil and gas, chemical and other industries worldwide.

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