

# PROTECTION DEVICES

## for SAFETY, ENVIRONMENT AND ENERGY

- Air release valve
- Combination air release and vacuum breaker valve
- Vacuum breaker valve
- Surge relief valve
- Breather valve
- Flame arrester
- Emergency vent cover
- Gauge hatch cover
- High velocity Pressure / Vacuum relief valve
- Vapor Emission Control System
- Crankcase Explosion Relief valve
- Flameless explosion venting devices
- Solar Water Distiller



**PROSAVE**

# Surge Relief Valves

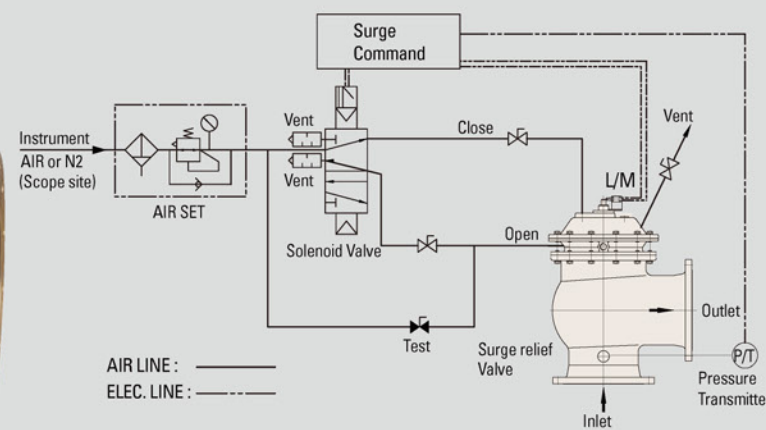
## SOLENOID VALVE OPERATING SRV-S-A/SRV-S-Y TYPE

### Introduction

Model SRV-S-A/SRV-S-Y consists of a main valve, solenoid valve, air set. It is completely assembled and tested as a unit and ready for field installation. Main Valve is closed tightly when normal operation is in state. When excessive pressure is coming, surge command from pressure transmitter operates the solenoid valve, and then main valve is open for protecting for surge effect (Water hammer).



### Typical Installation



### Benefits

#### Adjustable Opening and Closing Times

- In particular, Full opening time is less than 200 millisecond.
- Open and close time of SRV depends on field site.
- Quick open time and slight close time are adjustable.

#### Accurate and Precise Pressure Control

- Main valve of pressure control is provided by accurate and precise pressure of pneumatic solenoid valve.

#### Normal Open / Close Selectable

- SRV consists of solenoid valve, air receiver tank (optional) and air set. It enables Normal Open or Close of main valve.

# Surge Relief Valves

## N2 LOADED OPERATING SRV-N2-X TYPE

### Introduction

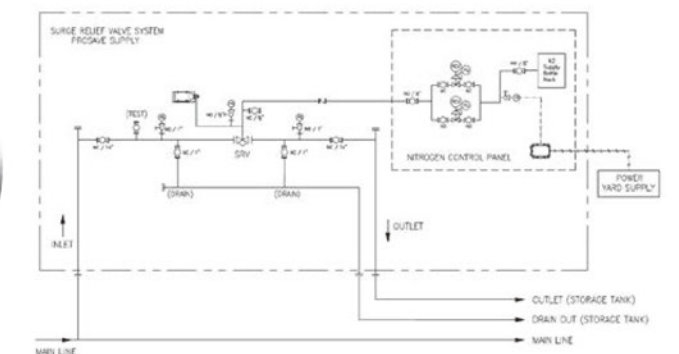
N2 Loaded Surge Relief Valves are engineered to track unabated surge-wave pressure transients-open quickly, then closes without slamming shut. The "speed of response" in surge valves is defined as the ability of the valve/valves to relieve peak wave surge flow in the time stated in a hydraulic transient surge analysis. Although this time varies with each application, timed responses is less than 100 milliseconds

N2 Loaded Surge Relief Valve operation is simple. The cavity behind the valve disc is filled with nitrogen gas to affect proper relief set pressure of the valve. This cavity loading force seats the valve and opposes the force generated by line pressure in front of the valve. The valve remains closed until surge wave pressure exceeds the force behind the disc (set pressure).

N2 Loaded Surge Relief Valve then opens quickly to track the unabated surge wave. The closing cycle responds directly to pressure decay in the upstream piping in front of the surge relief valve.



### Typical Installation



### Benefits

#### High flow capacities

High flow capacities (Cv) mean you can use smaller and/or fewer valves to provide the surge protection you need. Save on installation cost and save weight.

#### Accurate and Precise Pressure Control

Response time is less than 100 millisecond.

#### Non-Slam

Fast response-rapid open/closing without slamming shut-allows the valve to "track the surge."



# Surge Relief Valve

## PILOT OPERATING SRV-P-A/SRV-P-Y TYPE

### Introduction

Model SRV-P-A/SRV-P-Y consists of a main valve, low and high pilot valve, and accessories.

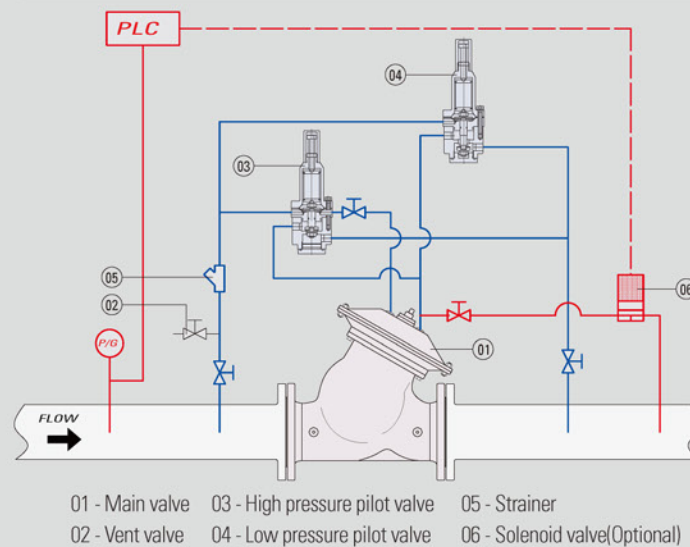
A pilot-operated control valve is a self-acting surge pressure relief valve used for backpressure, pressure reduction and pump bypass.

SRV-P-A/SRV-P-Y is installed in bypass pipeline to protect the piping system from the surge(Water hammer) by sudden flow change and pump sudden stop. Main Valve is open when low pilot valve anticipates the negative pressure in piping system to prevent the pipe pressure rise, and when high pilot valve detects the exceed pressure in piping system to discharge pressure.

Main Valve is tightly closed when normal operation is in state.



### Typical Installation



### Benefits

#### No maintenance

Piping system allows use of pilot-operated control valves with little or no maintenance

#### No external power source

Self-contained pilot-operated valves require no external power source

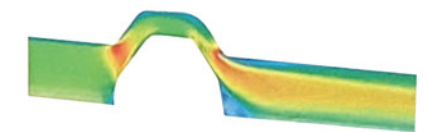
#### Can be installed in a variety of piping configurations

# Surge Relief Valve

## MECHANICAL STAND-ALONE AXIAL SRV-M-X TYPE

### Introduction

The SRV-M-X model can be installed in places where it can not supply power sources such as electricity or hydraulic pressure, such as underground or desert, or can not be maintained, and can be used in sewage or high-viscosity crude oil lines containing foreign matter.



Velocity Distribution Result  
(Using ANSYS CFD)



Pressure Distribution Result  
(Using ANSYS CFD)

### Benefits

#### All Fluids

Can be used for almost all fluids such as crude oil, contaminated water, sewage including sludge.

#### Quick Response Time

Valve response time is extremely important in controlling peak surges. SRV-M has response time less than 100 millisecond.

#### Large Flow Capacities

Since the shape of the flow path inside the valve is streamlined, the value of the flow coefficient Cv is larger than that of the other valves.

A large flow capacities means that smaller or fewer valves can be used to reduce installation costs and weight.

#### Accurate set pressure control

Set pressure of surge relief valve is controlled by precise pressure control through internal spring.



## Breather Valve

### BV/BS TYPE

#### Introduction

The model BV/BS pressure vacuum relief valves designed, manufactured and tested according to the API 2000 standard.

The model BV/BS pressure vacuum relief valves used to relieve excess pressure and vacuum that has generated in a tank.

To avoid product loss, BV/BS pressure vacuum relief valves are recommended for using at atmospheric storage tank.

The set pressure and relieving pressure shall be consistent with the requirements of the standard according to which the tank was designed and fabricated. The model BV/BS can be manufactured the range of pressure and vacuum setting from  $\pm 22$  mm W.C to  $\pm 8000$  mm W.C.

The model BV type is weight-loaded type with minimum setting  $\pm 22$  mm W.C and maximum setting  $\pm 700$  mm W.C.

The model BS type is spring-loaded type over weight loaded type.

The materials for BV/BS shall be selected for the stored-product service temperatures and pressures. Also, the materials should be compatible with the product stored in the tank and with any products formed in the vicinity of the relief valve during filling and discharge. Usually the materials are available in Aluminum, Carbon Steel, Stainless Steel grade 304, 316 and 316L to suit individual requirements.



#### Benefits

- Designed according to the API 2000 standard.
- Less losses from reliable operation
- Suitable and compact design ensures long-term maintenance free life cycle
- Full lifting and high flow capacity
- Meet API leak test requirement
- No need inside maintenance
- Available outside inspection, cleaning and maintenance without disassembling

## Pilot-operated Pressure/Vacuum Relief Valve

### POV TYPE

#### General

Pressure and/or vacuum relief valves are used for dangerous oil, gas or petrochemical storage tanks and other process vessels or systems to prevent structural damage due to excess pressure or vacuum in.

Pilot-operated pressure/vacuum relief valves is performed best at applications, which it is required high amount of backpressure or fluctuating backpressure.

- Opting for modulating pilots allows the piston to lift only as high as is needed, venting off just enough pressure to prevent cycling (a common side effect of backpressure that can cause undue wear to valve parts).

Pilot operation is also recommended for equipments which low accumulation rates are required or when the set pressure level needs to be close to the operating pressure level.

- As pressure increases, the pilot maintains its seal tightly, allowing reliable operation closer to the set point for pack line, without product leakage.

- Pilot-operated pressure/vacuum relief valves can work at an operating pressure of up to 98% of set pressure.

Although their initial investment price tends to be higher, pilot-operated pressure/vacuum relief valves are much smaller than their spring-loaded counterparts, making them easier to install, maintain, and repair.



#### Benefits

- **PILOT OPERATED**
  - Easy settings
  - Only the pilot needs to be set
  - Lower profile and weight than spring operated types for high settings
  - Remote pilot sensing allows the pilot to sense the true system pressure (optional)
  - Remote or manual blowdown available
- **EXTRA TIGHT SEAL** - Main valve remains tight to set pressure
- **FULL FLOW** - Full open at 10% overpressure
- **SNAP-ACTION OR MODULATING ACTION**
  - Modulating action protect product since valve opening is proportional to overpressure.
  - Noise is reduced since the valve only opens fully when required.
- **SOFT SEATED** - Soft seats seal tight to protect product and minimize valve wear which improves reliability
- **TOP ENTRY** - Reduces maintenance costs since the valve can be completely serviced without removal from its mounting



# Detonation Proof In-line Flame Arrester

ATEX and IMO Approved Explosion Proof In-line Flame Arrester

**DFA TYPE** 

## Introduction

The flame arrester is designed to prevent flame transmission when flammable gas/air- or vapor/air-mixtures are present.

The model FA in-line flame arrester is designed, manufactured and tested according to API 2000 and EN 12874.

Body material of arrester is available for nodular cast iron, cast steel, stainless steel grade 304, 316, 316L and special alloy steel for chemical resistance.

The material of element is available for stainless steel grade 316L or special alloy steel for chemical resistance.

The flame element is constructed with crimped ribbon metal.



## Specification of gas/air-mixtures for deflagration and detonation tests(ISO 16852:2016)

Range of Application (Marking)		Requirement for test mixture	
Explosion group	MESG of mixture (mm)	Gas type	Gas in air by volume(%)
IIA	> 0.90	Propane	4.2 ± 0.2
IIB1	≥0.85	Ethylene	5.0 ± 0.1
IIB2	≥0.75		5.5 ± 0.1
IIB3	≥0.65		6.5 ± 0.5
IIB	≥0.50	Hydorgen	45.0 ± 0.5
IIC	< 0.50	Hydorgen	28.5.2 ± 2.0

MESG : Maximum Experimental Safe Gap

## Benefits

- Type Approved by IMO and ATEX ( European Directive 94/9/EC )
- Meet the latest international rule requirement of API 2000 and ISO 16852
- Protection against explosion and deflagration flame
- High flow capacity and minimum pressure loss
- Available bi-directional flow and flame passage
- Available vertical and horizontal installation
- Very easy maintenance for quick cleaning
- High performance chemical resistance material

# Explosion Proof In-line Flame Arrester

EC-Type Examination Certificate N° FTZÚ 14 ATEX 0132X

**FA TYPE** 

## Introduction

The flame arrester is designed to prevent flame transmission when flammable gas/air- or vapor/air-mixtures are present.

The model FA in-line flame arrester is designed, manufactured and tested according to API 2000, EN 12874 and ISO 16852.

Body material of arrester is available for nodular cast iron, cast steel, stainless steel grade 304, 316, 316L and special alloy steel for chemical resistance. The material of element is available for stainless steel grade 316L or special alloy steel for chemical resistance. The flame element is constructed with crimped ribbon metal.



## Description of Protective System:

The in-line, bi-directional, deflagration flame arresters types FA-02; FA-03; FA-04; FA-05; FA-06; FA-08; FA-10; FA-12 are to prevent a flame transmission in case of deflagration of flammable gas - and/or vapour/air mixtures of the explosion group IIA, at a maximum operating pressure  $p_o$  which is defined below and at maximum operational temperature of the flame arrester  $T_o = +60^{\circ}\text{C}$ . Flame arresters are consists of flame arrester element tight between two flanges.

## Technical parameters:

Type of flame arrester	Size of flange connection	Ration Lu/D	Max. operation pressure $p_o$ (absolute)	Operational temperature of flame arrester $T_o$	Explosion group
FA-02	DN 50 (2")	40	1.1 Bar	$-20^{\circ}\text{C} \leq T_o \leq +60^{\circ}\text{C}$	IIA
FA-03	DN 80 (3")	20	1.1 Bar		
FA-04	DN 100 (4")	20	1.1 Bar		
FA-05	DN 125 (5")	10	1.1 Bar		
FA-06	DN 150 (6")	10	1.1 Bar		
FA-08	DN 200 (8")	10	1.09 Bar		
FA-10	DN 250 (10")	10	1.09 Bar		
FA-12	DN 300 (12")	10	1.09 Bar		

## Benefits

- Type Approved by IMO and ATEX ( European Directive 94/9/EC )
- Meet the latest international rule requirement of API 2000, EN 12874 and ISO 16852
- Protection against explosion and deflagration flame
- High flow capacity and minimum pressure loss
- Available bi-directional flow and flame passage
- Available vertical and horizontal installation
- Very easy maintenance for quick cleaning
- High performance chemical resistance material



# High Velocity Pressure / Vacuum Relief Valve with Gas Free Cover

## SMART-HV TYPE



**APPROVED**  
IMO MSC.1 / Circ, 1324 & MESG 0.65mm

### Changed IMPORTANT REGULATIONS

#### NEW IMO Regulation for Product & Chemical carriers, MSC.1/Circ,1324

1. The Maritime Safety Committee approved the following amendments to MSC/Circ.677:
2. Member Governments are invited to apply the amendments to the Revised standards, as amended, to ships constructed on or after 1 January 2013 and to ships constructed before 1 January 2013, no later than the first scheduled dry-docking carried out on or after 1 January 2013.

#### Benefits

- Reliable operations reduces vapor losses
- Suitable and compact design ensures long-term maintenance free life cycle
- Meet new IMO & MED requirements for cargo vapor flammability - MESG 0.9 & 0.65 mm
- Non-oscillating performance
- Full lifting and high flow capacity
- Variable application for usable installation vent pipe length and flow capacity range
- No peak pressure over opening pressure
- No need inside maintenance
- Available outside inspection, cleaning and maintenance without disassembling
- Adjustable outside opening and closing pressure without exhausting vapor gas

# Vapor Emission Control System

## VECS TYPE



### Introduction

- The VECS is installed on the mast riser's bypass line, and controls the vapor pressure in all cargo tanks during voyage for direct emission control, in order to reduce VOC loss from the tanks during voyage. By controlling the pressure in the venting system, it is possible to fully control the VOC emissions.
- To meet this challenge, a VECS and Reporting System can be used to control the vapour pressure in oil cargo tanks to minimise and fully control VOC emissions. Designed to comply with the latest international rules and regulations it is equipped with an advanced reporting system.

### Rules & regulations

- SOLAS 74 Chapter II-2 Reg. 59. : Venting, purging, gas-freeing and ventilation.
- IMO MSC/Circ. 731. : Revised factors to be taken into consideration when designing cargo tank venting and gas-freeing arrangements.
- IMO MSC/Circ. 680. : Systems and Operations/VOC Management plans
- USCG CFR 46 Part 39. : Vapor control system.
- ISO 15364:2007 : Ships and marine technology - pressure/vacuum valves for cargo tanks.

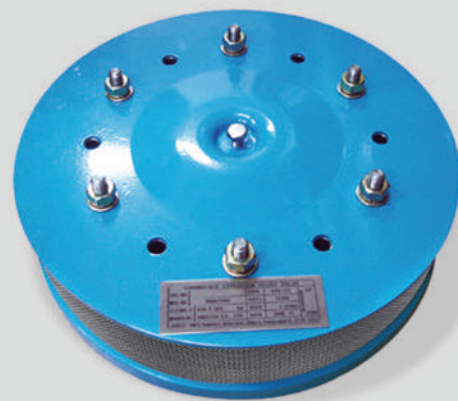
#### Benefits

- Remotely controlled opening/closing from C.C.R (Cargo Control Room)
- Setting value
  - Opening pressure & Closing pressure : 1,700mmW.G ~ 1,500mmW.G (adjustable)
  - Opening vacuum & Closing vacuum : -200mmW.G ~ -100mmW.G (adjustable)
- Full open/close remotely by manual operation
- The emission of V.O.C can be automatically controlled during the voyage.
- Emitted V.O.C flow rate can be recorded.
- Explosion proof approved electric actuator (EX d IIB T4)
- Electric power source : AC 220V, 1Ph, 60Hz
- Signal : 4~20mA DC input.
- Linear actuator on request



# Crankcase Explosion Relief Valve

## N-ERV SERIES



### International patent pending

- IACS UR M66 & M9 Type Testing Procedure for Crankcase Explosion Relief Valve
- MAN Diesel Quality Specification

### Rule and QC Specification being applied

#### IACS

- IACS UR M66 Type testing procedure for Crankcase Relief Valve
- IACS UR M9 Crankcase Explosion Relief Valves for crankcase of internal combustion engines
- IACS UR M10 Protection of internal combustion engines against crankcase explosion

#### MAN Diesel Quality Specification

Quality Specification No. 0742838-0 (Crankcase Relief Valve)  
Production Specification No. 0742839-2 (Function Test of Relief Valve)  
Quality Control No. 0742827-2 (Control of Sub-suppliers)

### Safety is our top priority at PROSAVE

PROSAVE's quality assurance system complies with the latest ISO 9001 provision.

PROSAVE explosion relief valves have received top mark in numerous explosion tests conducted by the FTZU institute and type approved by DNVGL, KR, LR, ABS, CCS, RS, BV, NK, RINA and MAN-ES.



### Benefits

- Quick opening and fully relieving pressure.
- Responding and opening even at a very low pressure setting
- No flame escape to outside.
- Due to absolute tightness after opening and closing, it prevents from secondary explosion.
- Can be installed in all mounting position from vertical to horizontal.
- It is light weight and small volume for easy installation and maintenance.
- Free area of flame arrester is enough wide and similar relief area.
- Closes and seals immediately after an explosion.

# Flameless explosion relief valves

## EVD SERIES



### Introduction

To avoid a dangerous pressure rise and resultant damage when an explosion occurring in exhausts and inlet manifold. It is necessary to provide pressure relief valves of an enough relief area. This valve is suitable for high temperature applications up to 700°C and high pressure up to 6 barg.

## EVDM TYPE

FOR INLET/EXHAUST MANIFOLD OF DF OR GAS ENGINES

EVDM Series is mounted on the inlet manifold of the DF ENGINE or GAS ENGINE. If the explosion occurs during the movement of the gaseous fuel from the inlet manifold to the inside of the cylinder, explosion pressure can be discharged, and flame can be blocked and automatically distinguished by flame arrester element for prevention of the man and important facilities.

## EVDD TYPE

FOR EXHAUST DUCT OF DF OR GAS ENGINES

EVDD Series is mounted on the exhaust duct of DF ENGINE or GAS ENGINE. When an explosion occurs by unburned gas fuel in the exhaust lines, explosion pressure can be discharged by EVDM, and flame can be blocked and automatically distinguished by flame arrester element for prevention of the man and important facilities.

### Benefits

- Automatic re-closing structures against rupture disc (non re-closing devices)
- No need engine shut-down.
- Very high capability seat tightness.
- Available continuously engine operation.
- Prevention of secondary explosion.
- Protection of man and key components due to explosion.
- Discharging protection of unfired and/or burned mist, gas, ashes and dust, into engine.
- Protection devices for Health, Safety and Environment.
- Available IoT options



# Quality Control Activities

## Company Overview

The company is a manufacturer of safety valve for tank, we strive to comply and maintain the quality manual to increase development of new technology, enhance product quality and productively while reducing costs.

## Scope of Application

This manual was established based on the regulations of ISO 9001 : 2000 / ISO 14001:2004 and applies to design, development, sales, procurement, manufacturing, inspection, service department and overall organizations.

## Definition of Terminology

The terminology relating to quality management system in the quality manual are as defined in ISO 9001:2015 / ISO 14001:2015

## Approved Classification

- QUALITY MANAGEMENT SYSTEM  
ISO 9001:2015 / ISO 14001:2015
- MAN Diesel & Turbo
- AMERICAN BUREAU OF SHIPPING (ABS)
- Bureau Veritas (BV)
- LLOYD'S REGISTER OF SHIPPING (LR)
- DET NORSKE VERITAS (DNV-GL)
- NIPPON KAIJI KYOKAI (NK)
- KOREA REGISTER (KR)
- CHINA CLASSIFICATION SOCIETY (CCS)
- REGISTRO ITALIANO NAVALE (RINA)



## Certificate

