FLUID CONTROL

Highly engineered valves
Smart valves

Reliable. Innovative.
SCHRADER PACIFIC Advanced Valves is the worldwide leader in automotive and industrial valves and in fluid control devices.

SCHRADER PACIFIC Advanced Valves means fluid control and pressure management for a large range of fluids such as air, nitrogen, air-conditioning gas, water, fuels, oils, hydrogen, ammonia...

SCHRADER PACIFIC Advanced Valves designs and produces highly engineered valves such as:

- Shut off valves
- Check valves
- Pressure regulators
- Safety solutions
- Connectors
- Smart valves (By-Pass valves)
- Dosing devices

for many applications: Automotive, Truck & Bus, Heavy Duty/Off Road, Aeronautics, Energy, Industrial/Manufacturing & plant equipment...

RESEARCH AND DEVELOPMENT, LABORATORY AND INNOVATION GROUP

Custom Engineering and Design for fluid control systems:

“We Can Design, Prototype and Manufacture That For You”
ENGINEERING AND R&D EXCELLENCE:
Mechanics, Fluidics and Mechatronics

To design the high engineering valves, Schrader s.a.s. can build on:

- Specific and strong knowledge in mechanics, fluidics, materials, surface & thermal treatment and electronics
- Capacity of prototyping and numerical simulation (mechanics, fluidics, plastic molding)
- An organization in project mode to have best management and best efficiency
- A large laboratory for environment, mechanical and functional validation testing with ability to develop laws for reliability

Design and simulation are made with Autodesk suite:

- Inventor for CAD-modelling
- Mechanical for FEA simulation
- CF Design for fluid simulation
- Moldflow for injection simulation

Data analysis and algorithm development with Matlab Simulink Suite

Examples of equipment in the laboratory:

- Climate & hygrometry, Salt fog, Thermal shocks and Ozone chambers
- Traction bench, Elastometer, different Durometer
- Pressure proof, Burst tests, Nitrogen pressure bench, Flow measurement, Vibrations
- Helium leakage spectrometer, ATEC tools
- Many other test benches are developed
Features:

Shut-Off Valves allow permanent or temporary access into a pressurized circuit or tank.

The Shut-Off range is able to satisfy a great majority of life cases.

Technical specification:

- Opening Pressure: 0.99 to 750 bar / 0 to 11 000 psi
- Temperature range: -40°C to +180°C
- Flow rate: 6 m³/h - 35 m³/h under 7 bar /100 psi
- Tightness: 0.206 cm³/min under 6 bar / 88 psi
  example: less than 1 gr CO2 /year in an AC system
- Assembly: screwed or pushed
  (highly recommended for a plastic body)
- Fluid: gaseous or liquid

Strengths:

Well known products by Schrader s.a.s.

- Robustness regarding the specification submitted
- Large range of part numbers for different applications
- Cost efficient
- 100% air leak control

Examples of applications:

- Air conditioning system filling port, including vacuum stage
- Fuel module coupling port
- Engine purge valves
- Engine service valves
- Pressure accumulator
- Gas springs

For more details, please refer to our documentation PU162
CHECK VALVES

Features:
A check valve is added on the circuit to avoid any back flow.

Check valves are delivered as a:
- **Cartridge** directly fitted in a hose or pushed in a (plastic, aluminum...) cavity
- **Hose to Hose** device

In both case, the check valve core technology is the same.

Technical specification:
- Opening pressure: according to the dynamic requirement
- Temperature range: -40°C to +200 °C
- Flow rate: designed according to the specification
- Tightness: Schrader s.a.s has developed a specific software which allows to design the right tightness according to the life conditions
- Dimensions: according to the drop pressure requested
- Fluid: gaseous or liquid

Strengths:
Thanks to SCHRADER PACIFIC Advanced Valves technology, one poppet and one spring are sufficient to satisfy most of the specifications. Included high frequency flow change till 20 Hz during millions cycles.

Examples of applications:
- Fuel circuit (gasoline or diesel)
- Air conditioning system
- Hydraulic circuit
- All types of pump...
Pressure regulator with low pressure drop:

The Pressure Regulator maintains a constant pressure for any fluid. A constant pressure improves significantly the system efficiency. Thanks to an innovative technology, Schrader s.a.s Pressure Regulators are able to ensure a constant pressure with low hysteresis in a large flow range with few components.

The innovation consists of a specific spring developed by Schrader s.a.s which allows to have a double guiding of the piston into the body without any additional component. This is thanks to a cylindrical conical spring. This guiding is essential to have a good pressure regulation and a good sealing. The regulated pressure is calibrated by welding or screwing a cap. The cylindrical conical spring allows also to have higher flow through the valve. The value analysis is optimum, the functionalities are guaranteed with few simple components and consequently the cleanliness is improved.

Advantages:

- **A design with few components**: cost advantages and high reduction of risk of pollution
- **Constant pressure** with low hydraulic pulsation sensitivity
- **Large flow regulated**
- **100% control** of the calibrated pressure during the assembly line
- **100% control** of the leak rate

Technical data:

- **Pressure opening**: 5.4 ±0.25 bar / 78 ±3.7 psi
- **Leak rate when closed**: <3 cm³ (at 1 bar / 15 psi)

Schrader s.a.s is able to adapt the design to meet a large range of specification for regulated pressure and flow.

Ports:

- **Hose to hose device**
- **Cartridge directly fitted in a hose or pushed in a plastic or metal cavity**

Graphs:

The design fits very well for the liquid applications. An other design is proposed for gas applications.

Material of constructions and dimensions:

<table>
<thead>
<tr>
<th>Body</th>
<th>Aluminium or stainless steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piston</td>
<td>Polymer</td>
</tr>
<tr>
<td>Spring</td>
<td>Stainless steel</td>
</tr>
</tbody>
</table>
Pressure regulator with a high level of tightness, for gas application for example:

To achieve a high level of gas tightness which could be expressed for example in gram per year, Schrader s.a.s proposes also a design with a square seal on the piston. The technology of cylindrical conical comes in different technology of regulators.

The special square seal mounted on the piston ensures an accurate closing pressure and high performances of tightness. This design is ideal for the gas applications.

Membrane pressure regulator independant on the outlet pressure variation:

Schrader s.a.s proposes also a pressure regulation with a membrane technology which has the benefit to regulate the pressure independently of the variation of the outlet pressure.

Advantages:

- **High stability of pressure regulation** with low pressure drop thanks to a special design
- **Dedicated elastomer membrane** which guarantee a long life time and high stability after ageing and pressure cycling
- **High ability to calibrate the opening pressure** thanks to a special combination of screwed cap and spring
- **Possibility to achieve high flow at a low pressure** (>40 L/h at 0.9 bar / 14 psi)
Safety solutions: PRESSURE RELIEF VALVE

Features:
Schrader s.a.s Pressure Relief Valves protect circuits from overpressure. The gas exhaust is fast and the PRV is indicated by a flag the opening.

Technical specification:
- Opening pressure: e.g. 120 to 160 bar ±10 bar / 1 760 to 2 353 psi ±150 psi
- Hysteresis: e.g. 15%
- Temperature range: -30°C to +180°C
- Flow rate: based on specification
- Air tightness: for example with R744 gas, less than 1 g /year in an AC system
- Dimensions: M12 or M14
- Height: 28 mm
- Fluid: air-conditioning gas (R134a, R1234yf, CO2), fuel (gasoline - diesel), gaseous or liquid

All these characteristics can be adjusted to a customer need.

Strengths:
- Low hysteresis
- Very low permeability: for example with R744 gas, less than 1 g /year in an AC system
- Several opening and closing: reusable product compared to a burst disc and not fatigue sensitive
- 100% calibrated and controlled during assembly
- High temperature resistance

Examples of applications:
- High Pressure Rail Engine
- Air-conditioning circuit and Air-conditioning compressor
Safety solutions: ACTIVE MAGNETIC PRESSURE RELIEF VALVE

Features:

Protect your pressurized circuit or tank with an innovative combined safety valve.

The Shrader s.a.s valve:

- Protects your system from over-pressure
- Discharges your circuit at your request

The valve is activated by an over-pressure and thank to an innovative magnetic technology, the valve can be also activated by power supply. A power ≤ 3A during 50 ms is enough to activate the valve.

Technical specification:

- Opening pressure: 5 to 600 bar / 73 to 8 800 psi
- Temperature range: -30°C / +160°C
- Hysteresis: 10% opening pressure (PRV only)
- Flow rate: opened section until 10 mm diameter according to the pressure level
- Electric description: intensity and time 3A during 50 ms
- Fluid application: gas or liquid
- Gas tightness: less than 1 g/year
- Length: 50 mm
- Diameter: 33 mm

Strengths:

- Very robust
- Not cycling sensitive
- Not temperature sensitive
- Calibrated at the requested opening pressure
- 100% controled during the process
- Combined functions

Examples of applications:

- Air conditioning - CO2 line
- Gas tank
- CNG tank

AMPRV 160 bar Ø 1.5 mm
SAFETY VALVES FOR PRESSURIZED TANK

Thermal Relief Valve for Hydrogen or GNV Tanks

Fire in the vehicle or over temperature → Full gas exhausted (multipoint passive function): THERMAL RELIEF VALVE

A tank protected by a metal tube with eutectic fuses:

Sequence of opening of the Thermal Relief Device:

1. Close
2. Compensation
3. Opening in progress
4. Open
SAFETY VALVES FOR PRESSURIZED TANK

To detect excessive temperature in a specific area, Schrader s.a.s has designed an innovative Thermal Relief Valve linked to a metal tube with several welded eutectic fuses. This tube follows the cylinder to control potential over-temperature. Then, even on long tanks, it is not anymore necessary to implement TRV at each end: only one valve is required and totally efficient.

The principle is as follows: the tube with fuses is filled with a liquid under constant pressure below 10 bar. The liquid’s pressure is created by a piston-spring system then this pressure is independent from the gas’s pressure. The fuses are made with specific alloys and placed at defined intervals on the tube in order to respond to the requested temperature.

When it happens, the liquid is discharged and then, the piston moves back. Consequently, the gas sealing system is released. The stored gas is evacuated through an opened area or can be drained anywhere on the vehicle.

The advantages of this technology:

- The tube can be located where fire potential risk is maximum to ensure a fast reaction time
- Only one Thermal Relief Valve is required whatever the tank length is
- The tube is filled with an antifreeze fluid below 10 bar which is not linked to the gas pressure in the tank
- Not fatigue sensitive regarding pressure cycles
- Valve stays mechanically opened in the event of over-temperature detection

This technology of TRV can be integrated in any Outlet Tank Valves or Schrader s.a.s also offers a complete Outlet Tank Valves with all the integrated technology.

Technical characteristics:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>700 bar / 10 000 psi</td>
</tr>
<tr>
<td>Flow cross section</td>
<td>Diameter 6 mm</td>
</tr>
<tr>
<td>Fuse tube pressure</td>
<td>&lt;10 bar / &lt;147 psi</td>
</tr>
<tr>
<td>Fuse temperature &amp; opening</td>
<td>110°C</td>
</tr>
<tr>
<td>Fast opening time</td>
<td>&lt;20 sec at 600°C</td>
</tr>
</tbody>
</table>
CONNECTORS

Features:

Connectors must be:

- **Safe**: appropriate position controlled by a Poka Yoke
- **Easy to fit** by the OEM and/or by Tier 1
- **Disconnection** with a tool or not
- **Robust** regarding temperature, pressure & temperature cycling, vibrations...
- **Large enough** to avoid any added drop pressure
- **Cost efficient**
- The connectors exist with **additional functionalities**:
  - Shut off
  - Active functions
  - Sensors
  - Access valve

Technical specification:

- Pressure range*: -1 to 700 bar / 10 000 psi
- Temperature range: -40°C to +160°C (180°C)
- Flow rate: Design according to the specification
- Tightness: 100% controlled
- Dimensions: optimized according to the requested functionalities
- Fluid: gaseous or liquid
  *For metal design

Strengths:

Thanks to patented technologies, Schrader s.a.s connectors are robust, fast fitted and cost efficient. Feel free to ask Schrader s.a.s for a technical presentation to understand how these functionalities are assumed.
Schrader s.a.s uses innovative metal clip which allows to achieve all the functionalities with only one component.
Moreover, the design of the clip ensures the right locking of the connector, the secure self-locking mechanism is very safe and highly stable. A bad lock is impossible with this technology.

Examples of applications:

- All fluid transfer
- Fuel line couplers
- Adblue line
- CNG couplers
To offer a better fluid management to the customers, Schrader s.a.s has the ability to control all the functionalities of the valves electronically: these are the smart valves.

Actuator, Motor, Sensor and Controller are combined to the Schrader s.a.s valves proposing very compact designs.

- **Active shut off valve** for opening and closing the access to a tank electronically
- **Safety valves** open a circuit and exhaust fluid from the circuit electronically
- **By-Pass valve** to conduct the flow of a fluid
- **Expansion valve** with accurate flow control
- **Active and accurate Dosing system**
MANUFACTURING EXCELLENCE

- Precision
- Automation
- Rigorous error checking
- Experience highly skilled work forces

QUALITY:
- Highest quality solutions via high automation
- Proven track record
- Trusted partner

IATF 16949 V2016
ISO 9001 V2015
ISO 14001 V2016
OHSAS 18001 V2007
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