NET ZERO SOLUTIONS

Control Valves for Hydrogen, Ammonia and Carbon Capture Value Chains

SMART IN FLOW CONTROL

VALVES FOR LIQUID HYDROGEN

Type 3248 Valve for liquid hydrogen

- Top-entry valve for cold-box and vacuum-insulated applications

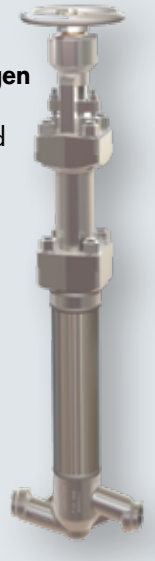
Nominal size
- DN 25 to 150
- NPS 1 to 6

Pressure rating
- PN 16 to 100
- Class 150 to 600

Temperature range
- –254 to +65 °C
- –425 to +149 °F

Properties
- Easy to service thanks to top-entry design
- Versions in globe or angle style
- Metal bellows seal
- Suitable for vacuum-insulated installation
- Plug with metal or soft seal
- Different K_{VS} coefficients
- With pneumatic or electric actuator, additional handwheel/manual override as an option
- Optional soft-seated version with leakage class VI

Type 3590 Hand-operated On/off Valve for liquid hydrogen



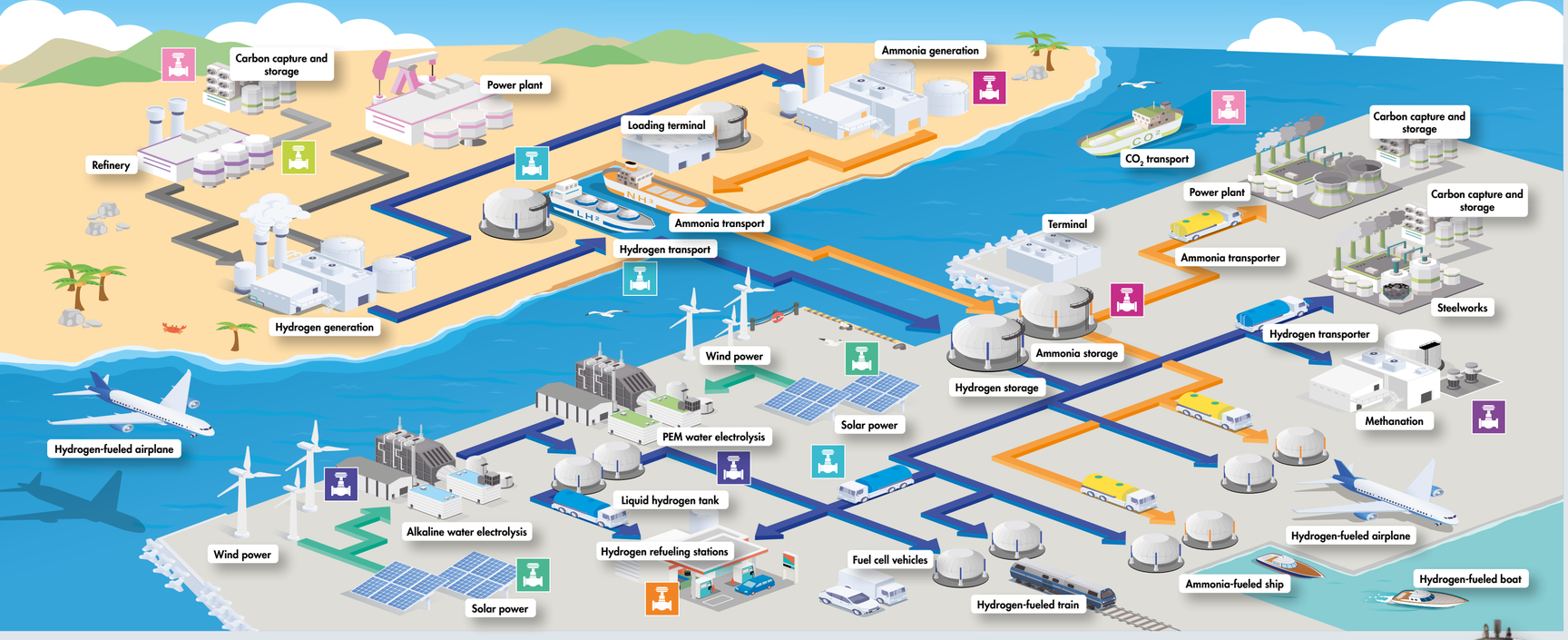
- Top-entry valve for cold-box and vacuum-insulated applications

Nominal size
- DN 15 to 150
- NPS ½ to 6

Pressure rating
- PN 16 to 100
- Class 150 to 600

Temperature range
- –254 to +65 °C
- –425 to +149 °F

Properties
- Easy to service thanks to top-entry design
- Metal bellows seal
- Suitable for vacuum-insulated installation
- Plug with metal or soft seal
- With manual adjuster, on request: with pneumatic actuator



Solar thermal power (generation)

The electricity required to produce green hydrogen is generated in solar-thermal power plants, for example. In such plants, solar radiation is bundled by reflectors (mirrors) to heat up oil, water or molten salt for the downstream generation of steam to generate electricity.

Water electrolysis

Green hydrogen is generated by decomposing water into hydrogen and oxygen using renewable electricity. In the different procedures, precise, rugged control is necessary to guarantee the highest levels of efficiency, reliability and safety in supply and the output stages across a wide load range.

Ammonia generation and utilization

Green hydrogen and nitrogen are fed into high-pressure reactors for the sustainable production of ammonia. Ammonia is more than an essential intermediate product in the production of fertilizers; it can also serve as a high-density fuel.

Hydrogen refueling stations

Hydrogen is stored as a liquid to reduce its volume. When refueling vehicles, the cryogenic hydrogen is evaporated and subsequently compressed before it is introduced into the vehicle tank.

Refinery

In refineries, hydrogen is used in crude oil refining processes: In hydrocracking, hydrogen serves to break long-chain hydrocarbon molecules. In hydrotreating, hydrogen is used to remove sulfur and other unwanted compounds from petroleum products through hydrogenation.

Liquefaction and transport

Hydrogen is cooled down in several stages to liquefy it. The two main methods used are the Joule-Thomson effect and Claude's process. Tanker ships or tank trucks, for example, are used for transport.

Methanation

In this process, methane (the main component of natural gas) is synthesized from hydrogen and carbon dioxide (CO_2). Since CO_2 is used as a raw material in methane synthesis, the technology is referred to as 'carbon recycling' (direct use of CO_2).

CCS/CCU

CCS is short for "Carbon Capture and Storage". Emissions from power plants, steelworks and chemical plants are separated from other gases, conditioned, compressed and transported to an underground storage location.
CCU is short for "Carbon Capture and Utilization". The generated CO_2 is used in industrial applications.

VALVES FOR HYDROGEN, AMMONIA, METHANOL, POWER-TO-X AND CARBON CAPTURE

Climate change is a challenge we all have to tackle head-on. Governments and enterprises all across the world are pushing to replace fossil fuels with cleaner energy sources to limit the increase of the global average temperature to 1.5 °C compared to pre-industrial levels.
This shift towards clean energy continues to pick up speed.
In the marine fuel sector for example, heavy fuel oil will be replaced by LNG in the medium to short term.
As medium- to long-term solutions, ships fueled by ammonia, methanol and hydrogen as well as the associated supply infrastructure will be used.
New technologies, such as switching to LNG or co-powering plants with hydrogen and ammonia, are being tested in power plants and steelworks, which are still being fired by coal, crude oil or natural gas.
The current dependence on fossil fuels is an enormous challenge. For the foreseeable future, we will need to use fossil fuels. And undoubtedly, the key to success for this period of time will be to capture, use and store carbon dioxide emissions.

SAMSON is a worldwide leader in the reliable control of media at low temperatures, such as LNG (–162 °C) and liquid hydrogen (–253 °C), as well as toxic media including ammonia.

Type 3241 Globe Valve

– Control valve for process engineering applications

Nominal size
– DN 15 to 300
– NPS ½ to 12

Pressure rating
– PN 10 to 40
– Class 125 to 300

Temperature range
– –196 to +450 °C
– –325 to +842 °F

Properties
– Different K_{VS} coefficients
– With pneumatic or electric actuator, additional handwheel/manual override as an option
– Optional bellows seal

Type 3251 Globe Valve

– Control valve for process engineering applications with high industrial requirements

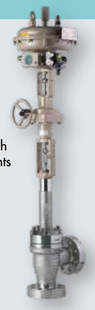
Nominal size
– DN 15 to 500
– NPS ½ to 20

Pressure rating
– PN 16 to 400
– Class 150 to 2500

Temperature range
– –196 to +550 °C
– –325 to +1022 °F

Properties
– Different K_{VS} coefficients
– With pneumatic or electric actuator, additional handwheel/manual override as an option
– Optional bellows seal

Type 3256 Angle Valve



– Control valve for process engineering applications with high industrial requirements

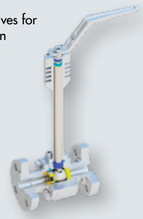
Nominal size
– DN 15 to 400
– NPS ½ to 16

Pressure rating
– PN 16 to 400
– Class 150 to 2500

Temperature range
– –196 to +550 °C
– –325 to +1022 °F

Properties
– Different K_{VS} coefficients
– With pneumatic or electric actuator, additional handwheel/manual override as an option
– Optional bellows seal

Ball valves



– Tight-closing ball valves for on/off applications in process engineering

Nominal size
– DN 08 to 1400
– NPS ¼ to 56

Pressure rating
– PN 10 to 400
– Class 150 to 2500

Temperature range
– –196 to +300 °C
– –325 to +527 °F

Properties
– Handwheel or pneumatic and electric actuators
– Trunnion-mounted or floating ball
– Straight-through or reduced flow path
– API 6A or API 6D
– Fire-safe design acc. to API 6FA, API 607, ISO 10497 and BS 6755

Type LTR 43 Control and Shut-off Butterfly Valve

– Triple-eccentric butterfly valve for industrial processes

Nominal size
– DN 80 to 2400
– NPS 3 to 96

Pressure rating
– PN 6 to 420
– Class 150 to 2500

Temperature range
– –196 to +800 °C
– –325 to +1472 °F

Properties
– Versions for low and high temperatures
– Low-noise and anti-cavitation trims
– ESD version
– Fire-safe design acc. to API 607/ ISO 10497
– Quick-closing version (<0.5 s)

Type 82.X/72.X/73.X Rotary Plug Valves

– Double-eccentric rotary plug valve for process engineering

Nominal size
– DN 25 to 600
– NPS 1 to 24

Pressure rating
– PN 10 to 400
– Class 150 to 2500

Temperature range
– –196 to +400 °C
– –325 to +752 °F

Properties
– Very high rangeability
– Metal or soft seal
– With pneumatic or electric actuator, additional handwheel/manual override as an option

SAMSON AT A GLANCE

STAFF

- Worldwide 4,500
- Europe 3,600
- Asia 700
- Americas 200
- Frankfurt am Main, Germany 1,800

INDUSTRIES AND APPLICATIONS

- Chemicals and petrochemicals
- Food and beverages
- Pharmaceuticals and biotechnology
- Oil and gas
- Liquefied Natural Gas (LNG)
- Marine equipment
- Power and energy
- Industrial gases
- Cryogenic applications
- District energy and building automation
- Metallurgy and mining
- Pulp and paper
- Water technology
- Other industries

PRODUCTS

- Valves
- Self-operated regulators
- Actuators
- Positioners and valve accessories
- Signal converters
- Controllers and automation systems
- Sensors and thermostats
- Digital solutions

SALES SITES

- More than 60 subsidiaries in over 40 countries
- More than 200 representatives

PRODUCTION SITES

- SAMSON Germany, Frankfurt, established in 1916
  Total plot and production area: 150,000 m²
- SAMSON France, Lyon, established in 1962
  Total plot and production area: 23,400 m²
- SAMSON Turkey, Istanbul, established in 1984
  Total plot and production area: 11,100 m²
- SAMSON USA, Baytown, TX, established in 1992
  Total plot and production area: 20,000 m²
- SAMSON China, Beijing, established in 1998
  Total plot and production area: 47,000 m²
- SAMSON India, Pune district, established in 1999
  Total plot and production area: 28,000 m²
- SAMSON AIR TORQUE, Bergamo, Italy
  Total plot and production area: 27,000 m²
- SAMSON CERA SYSTEM, Hermsdorf, Germany
  Total plot and production area: 14,700 m²
- SAMSON KT-ELEKTRONIK, Berlin, Germany
  Total plot and production area: 1,100 m²
- SAMSON LEUSCH, Neuss, Germany
  Total plot and production area: 18,400 m²
- SAMSON PFEIFFER, Kempen, Germany
  Total plot and production area: 20,300 m²
- SAMSON RINGO, Zaragoza, Spain
  Total plot and production area: 19,000 m²
- SAMSON SED, Bad Rappenau, Germany
  Total plot and production area: 10,400 m²
- SAMSON STARLINE, Bergamo, Italy
  Total plot and production area: 27,000 m²
- SAMSON VDH PRODUCTS, the Netherlands
  Total plot and production area: 12,000 m²
- SAMSON VETEC, Speyer, Germany
  Total plot and production area: 27,100 m²

SAMSON AKTIENGESELLSCHAFT

Weismuellerstrasse 3 · 60314 Frankfurt am Main, Germany
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507
E-mail: samson@samsongroup.com
Internet: www.samsongroup.com

2024-10 · WA488 EN

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