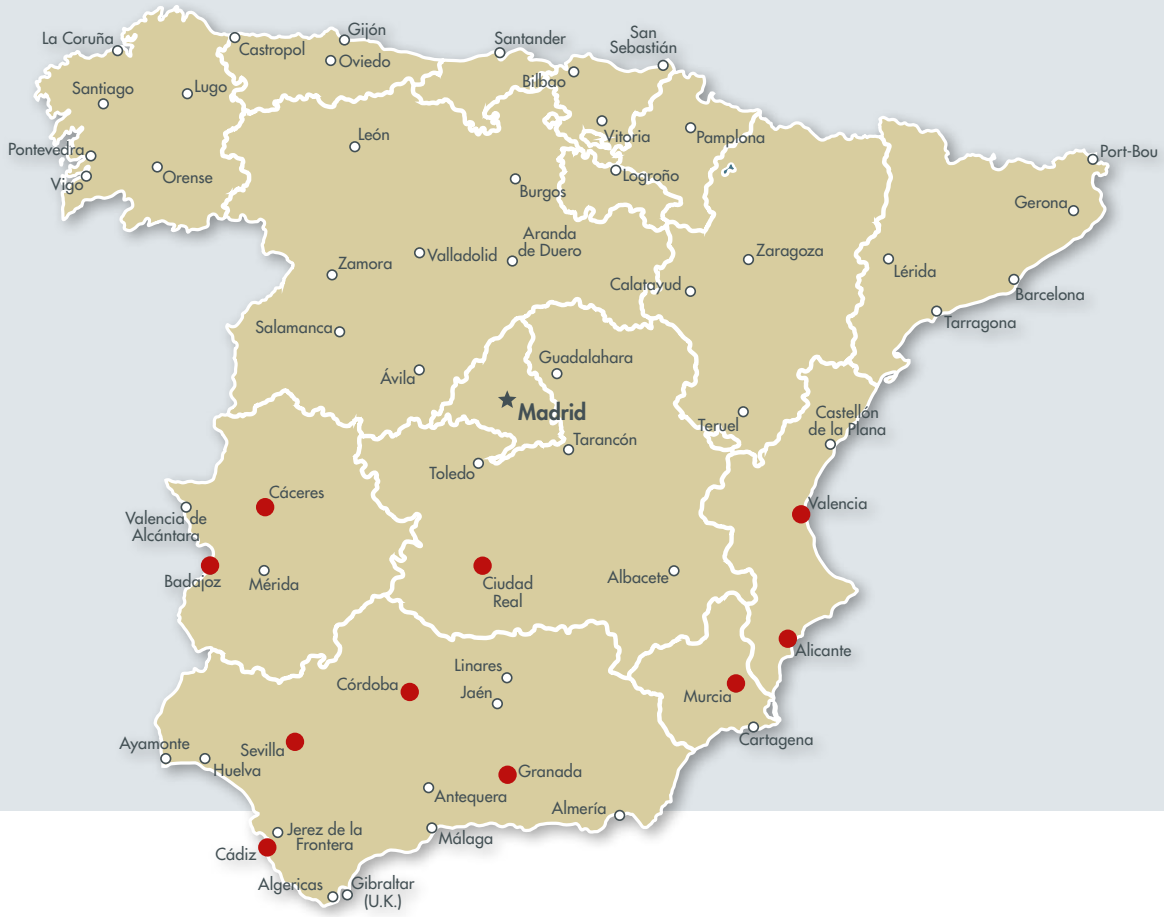
SAMSON

Solutions for Concentrated Solar Power Plants (CSP)

SMART IN FLOW CONTROL

THE POWER OF THE SUN

In solar thermal power plants, the heat produced by the sun is used to generate electricity. As a result, sun-kissed areas where the sun shines for 2000 to 2600 hours per year are preferred spots for solar thermal power plants. Particularly suitable are locations near the equator and between the 20th and 40th parallels in the northern and southern hemisphere. In Europe, the country with the highest density of solar thermal power plants is Spain. Valves engineered by SAMSON are used in many of these plants to control the processes that take place: automated linear and rotary valves are fitted in all plant sections and self-operated regulators are used in the power plant block.



Challenges

Solar thermal power plants are vital to climate protection and sustainable energy generation. Their efficiency depends on the hours of sunshine they are exposed to and the technology employed. Apart from improving the collectors, the greatest potential for optimization lies in the heat exchanger circuit by:

- Increasing the flow rate of the heat transfer medium
- Using heat transfer media with a better heat transfer capacity
- Reducing the need for service and repairs

As a result, the requirements placed on the valves used in the circuit increase as well:

- Larger nominal sizes
- Better temperature resistance
- Easy-to-service design including predictive maintenance

SAMSON has the right products to meet these requirements:

- Control valves in sizes up to DN 2500/NPS 100
- Special high-temperature versions for hot media (heat transfer oil, steam, and molten salt)
- Suitable accessories, e.g. positioners with integrated valve diagnostics

Valve engineering and customer service from a single source:

- SAMSON supports you in planning new installations or overhauling and expanding existing plants.
- SAMSON assists you in selecting and configuring the right equipment to suit your control requirements.
- SAMSON is close at hand to support your life cycle management, from installation and start-up to maintenance and service.

SOLAR THERMAL POWER PLANTS

Solar thermal plants are used for industrial-scale power generation. They essentially consist of three units:

- Collector field
- Heating medium circuit
- Power plant block
- Storage system

Collector field

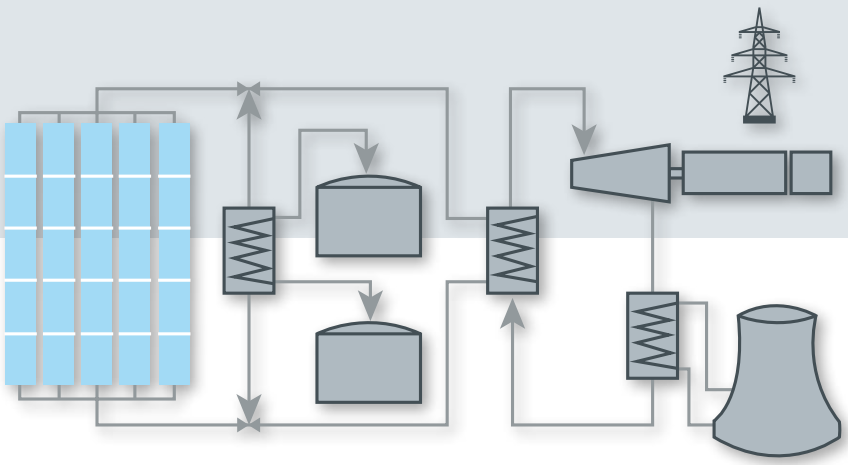
In the collector field, collectors capture and concentrate the rays of sunlight so that their heat energy can be transferred to the heating medium. The collectors can be arranged in different ways in the field, which means that there are different types of collector fields

Heating medium circuit

The heating medium (e.g. molten salt or heat transfer oil) makes the concentrated solar energy usable. When exposed to solar radiation, the medium heats up inside the absorber tube or solar tower and can subsequently transfer the heat energy it has collected to a storage system or through a heat exchanger to the power plant block.

Power plant block

In the power plant block, the hot heating medium is pumped through a steam generator. The steam drives a turbine that generates electricity. During steam generation, the heat energy is extracted from the heating medium so that it can be reheated in the collector field.



TECHNICAL DATA

Collector field types

Parabolic trough power plants are used widely. In these systems, parabolic-shaped mirrors (reflectors) focus the rays of sun on a receiver (absorber) pipe.

Solar power towers use heliostats. They reflect and concentrate sunlight onto a central receiver on top of a tower.

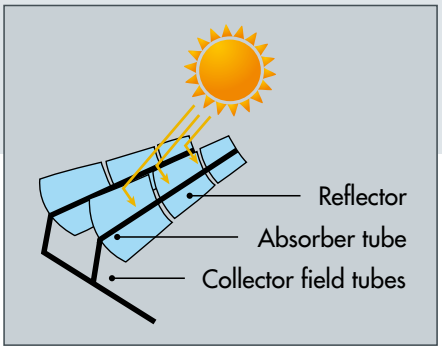
Linear Fresnel power plants come with flat mirrors. They concentrate the sunlight onto a secondary reflector located above the collectors to heat up an absorber tube.

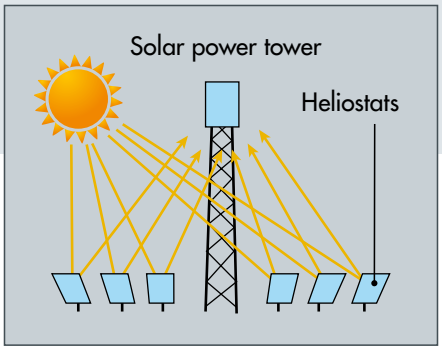
Storage system

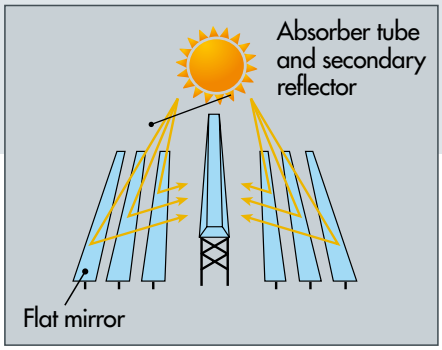
Solar thermal power plants with storage system ensure that electricity can even be generated when there is not enough sunshine to heat up the heating medium in the collector field. The storage systems consist of two salt tanks and a heat exchanger. There is cold salt in one tank and hot salt in the other.

To store energy, salt is pumped from the cold tank, heated up by the heating medium, and pumped into the hot salt tank.

Salt is pumped back from the hot to the cold tank as needed. The salt cools down when passing through the heat exchanger and heats up the heating medium again.







REQUIREMENTS

	Medium	Challenge
Heating medium circuit	 Molten salt	– Medium must have high solidification temperature (above 200 °C) – High ambient temperature (50 °C above solidification temperature)
		– Abrasive, corrosive medium
		– High pressures up to 25 bar in CSP – High pressures up to 50 bar in tower plants
		– Temperatures up to 600 °C in tower plants – Temperatures up to 400 °C in CSP
		– Crystallization when exposed to air
	 Heat transfer oil	– Severe fire hazard in the event of medium leakage
		– Temperatures up to 400 °C – Chemically active medium

	Implementation	Proven products from the SAMSON product portfolio
	– Accurate temperature control and monitoring – Connection for temperature sensor in the valve bonnet – Heating jacket – Electric trace heating	– Series 250, e.g. Type 3251 – Type 3595 (RINGO) – Type LTR 43 (LEUSCH)
	– Seat and plug of Stellite®	
	– Special high-pressure version	
	– Rugged materials: body made of 1.4552/A351 CF8C, A217 WC6, 1.0619/A216 WCC – Version with longer bellows seal	
	– Type MS packing: special gaskets with zinc corrosion inhibitor and Inconel® cover	
	– Leakage monitoring (test connection) – Metal seal (leakage class IV) – Metal bellows and backup packing	– Type 3241 (bellows version) – Type 3251 (bellows version) – Type 3252 – Type LTR 43 (LEUSCH)
	– Body of spheroidal graphite iron, cast steel, or stainless steel – Wetted parts (e.g. gaskets) made of rugged materials	

REQUIREMENTS

Power plant block	Medium	Challenge
	 Steam	– High flow rates – High temperatures – High pressures – Severe noise emissions
		– Uniform steam quality without excess water – Pressure and temperature reduction

	Implementation	Proven products from the SAMSON product portfolio
	– Control and shut-off valves in large sizes – Temperature-resistant materials – High-pressure versions – Valve trims for low-noise operation	– Globe valves up to NPS 32: Type 3595 (RINGO), Type 3241, Type 3251 – Rotary valves up to DN 2000/NPS 80: Type 82.7 (VETEC), Type LTR 43 (LEUSCH)
		– Pressure limitation in the pipeline: – Type 41-23 Universal Pressure Reducing Valve
		– Upstream pressure control in the pipeline: – Type 41-73 Universal Excess Pressure Valve – Type 2335 Excess Pressure Valve with pilot valve
	– Steam conditioning valves: to achieve a perfect mixture of water and steam, water is injected into the steam flow after throttling.	– Series 280

PRODUCT PORTFOLIO

Thanks to their modular design, the valves can be combined with pneumatic, electric, or hand-operated actuators. In pneumatic control valves, positioners can take over the control task. SAMSON offers a wide range of high-grade mounting kits that allow positioners to be mounted on many different kinds of linear and rotary actuators by various manufacturers.

Type 3251
- Globe valve, NPS ½ to 20
- Pressure ratings up to Class 2500
- Welding ends, optional with longer bellows seal and temperature sensor in the valve bonnet
- Seat and plug of Stellite®

Type 3252 High-pressure Valve
- Globe or angle valve, NPS ½ to 1
- Pressure ratings up to Class 2500
- Version with welding ends, G or NPT threads, or flanges
- Optional bellows seal

Type 3241 Globe Valve
- Valve size NPS 1 to 16
- Class 150 and 300
- With welding ends and optional bellows seal

Type 3510 Micro-flow Valve

– Versions in globe or angle style in NPS ½
– for pressures up to Class 1500
– With bellows seal and welding ends
– Special material for temperatures
– up to 650 °C

Type 3281 and Type 3286
Steam Conditioning Valves

– Globe or angle valve up to DN 500/NPS 20
– PN 16 to 160/Class 150 to 900
– Low-noise, balanced valve plug with
– metal seal

PRODUCT PORTFOLIO

Type 41-23 Universal Pressure Reducing Valve
Type 41-73 Universal Excess Pressure Valve
Type 2335 Excess Pressure Valve with pilot valve

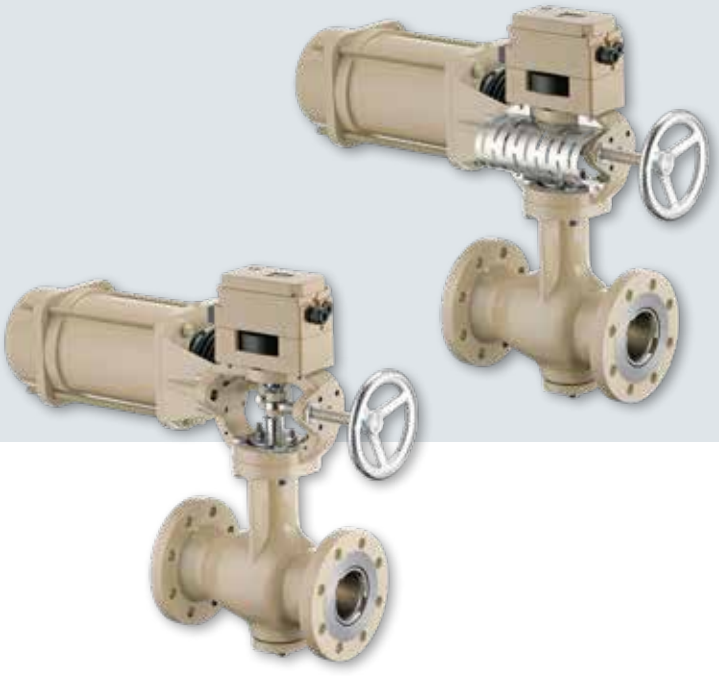
- Self-operated regulators
- Suitable for steam up to 350 °C
- Set points adjustable between 0.05 and 0.25 bar or 8 and 20 bar

Type 72.4 Double-eccentric Rotary Plug Valve (VETEC)

- Valve size DN 25 to 300/NPS 1 to 12
- Pressure ratings PN 10 to 40/Class 150 and 300
- Medium temperatures –100 to +400 °C
- Sandwich version (without flanges)
- Suitable for highly abrasive media

Type 82.7 Double-eccentric Rotary Plug Valve (VETEC)

- Valve size DN 25 to 250/NPS 1 to 10
- Medium temperatures –100 to +400 °C
- Both directions of flow

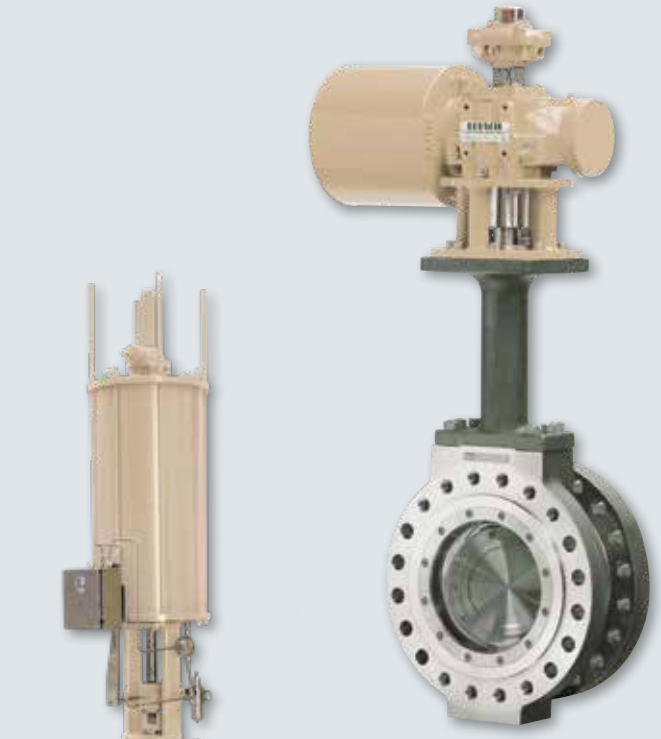


Type LTR 43 High-pressure Butterfly Valve with tight shut-off (LEUSCH)

- Valve size up to NPS 20 or up to DN 2000/NPS 80
- Pressure ratings up to Class 2500
- Version with welding ends
- High-temperature version up to 1000 °C
- Leakage class VI

Type 3595 (RINGO)

- Globe valves, up to NPS 32
- Pressure ratings up to Class 2500
- Temperature-resistant materials
- Easy-to-service components
- Special valve trims for low-noise operation



REFERENCES

2011

- Spain · Andasol 3 · Type 3241 Globe Valve; Type 2335 and Type 41-23 Self-operated Pressure Regulators (8 in total) · NPS 2 to 8 · Class 300
- Spain · Astexol II · Type 3251 Globe Valve (110 in total) · NPS 3 · Class 600
- Spain · Olivenza · Type 3241 and Type 3251 Globe Valves; Type 3256 Angle Valve; Type LTR 43 Shut-off Butterfly Valve (47 in total) · NPS 1 to 18 · Class 150 to 1500
- Spain · P.T.S HELIOS I · Type 3241 and Type 3251 Globe Valves; Type 3256 Angle Valve; Type LTR 43 Shut-off Butterfly Valve (27 in total) · NPS 1 to 20 · Class 150 to 1500
- Spain · P.T.S HELIOS II · Type 3241 and Type 3251 Globe Valves; Type 3256 Angle Valve; Type LTR 43 Shut-off Butterfly Valve (27 in total) · NPS 1 to 20 · Class 150 to 1500
- Spain · P.T.S SOLACOR I · Type 3241 and Type 3251 Globe Valves; Type 3256 Angle Valve; Type LTR 43 Shut-off Butterfly Valve (27 in total) · NPS 1 to 20 · Class 150 to 1500
- Spain · Puerto Errado 1&2 · Type 3241 and Type 3251 Globe Valves; Type 3256 Angle Valve (64 in total) · NPS 1 to 8 · Class 150 to 600
- Spain · Villena · Type 3241 and Type 3251 Globe Valves; Type 3256 Angle Valve; Type 82.7 Maxifluss Rotary Plug Valve; Type LTR 43 Shut-off Butterfly Valve (47 in total) · NPS 1 to 16 Class 150 to 1500
- Spain · Villena · Type 3241 Globe Valve (110 in total) · NPS 3 · Class 300

2012

- Spain · Aste 1A · Type LTR 43 Shut-off Butterfly Valve (10 in total) · NPS 8 to 10 · Class 1500
- Spain · Aste 1B · Type LTR 43 Shut-off Butterfly Valve (10 in total) · NPS 8 to 10 · Class 1500
- Spain · Casablanca · Type 3241 and Type 3251 Globe Valves (107 in total) · NPS 1 to 10 Class 150 to 900
- Spain · Central Termosolar Arenales · Butterfly valves · NPS 6 · Class 150
- Spain · CTS Puertollano · Type 3241 Globe Valve; Type 41-23 Self-operated Pressure Regulators (7 in total) · NPS 1 to 8 · Class 150 and 300
- Spain · La Africana · Type 3251 Globe Valve with electric actuator (168 in total) NPS 3 · Class 600
- Spain · La Africana · Type 3241 and Type 3251 Globe Valves; Type 3256 Angle Valve; Type LTR 43 Shut-off Butterfly Valve (78 in total) · NPS 1 to 20 · Class 150 to 1500
- Mexico · P.T.S AGUA PRIETA · Type 3241 and Type 3251 Globe Valves; Type LTR 43 Shut-off Butterfly Valve (9 in total) · NPS 1 to 12 · Class 300 to 1500
- Spain · P.T.S LEBRIJA · Control valves (1 in total) · NPS 6 · Class 1500
- Spain · P.T.S SOLABEN I · Type 3241 and Type 3251 Globe Valves; Type 3256 Angle Valve; Type LTR 43 Shut-off Butterfly Valve (27 in total) · NPS 1 to 20 · Class 150 to 1500
- Spain · P.T.S SOLABEN II · Type 3241 and Type 3251 Globe Valves; Type 3256 Angle Valve; Type LTR 43 Shut-off Butterfly Valve (27 in total) · NPS 1 to 20 · Class 150 to 1500

– Spain · P.T.S SOLABEN III · Type 3241 and Type 3251 Globe Valves; Type 3256 Angle Valve; Type LTR 43 Shut-off Butterfly Valve (27 in total) · NPS 1 to 20 · Class 150 to 1500
– Spain · P.T.S SOLABEN VI · Type 3241 and Type 3251 Globe Valves; Type 3256 Angle Valve; Type LTR 43 Shut-off Butterfly Valve (27 in total) · NPS 1 to 20 · Class 150 to 1500
– Spain · P.T.S SOLACOR II · Type 3241 and Type 3251 Globe Valves; Type 3256 Angle Valve; Type LTR 43 Shut-off Butterfly Valve (27 in total) · NPS 1 to 20 · Class 150 to 1500

2013 – South Africa · KAXU Solar One · Type 3241 Globe Valve; Type 3256 Angle Valve; Type LTR 43 Shut-off Butterfly Valve (12 in total) · NPS 1 to 28 · Class 150 to 1500

2014 – Morocco · NOOR I · Type 3251 Globe Valve (134 in total) · NPS 1 to 10 · Class 150 to 1500

– Morocco · NOOR I · Type 3251 Globe Valve (400 in total) · NPS 3 · Class 600

2015 – Israel · ASHALIM · Type 3241 and Type 3251 Globe Valves; Type 3256 Angle Valve; Type LTR 43 Shut-off Butterfly Valve (35 in total) · NPS 1 to 28 · Class 150 to 1500
– South Africa · Bokpoort · Type 3251 Globe Valve (168 in total) · NPS 3 · Class 600
– South Africa · XINA SOLAR ONE · Type 3241, Type 3251, and Type 3252 Globe Valves; Type LTR 43 Shut-off Butterfly Valve; Type 41-23 Self-operated Pressure Regulator (64 in total) NPS 1 to 40 · Class 150 to 600
– South Africa · XINA SOLAR ONE · Ringo · NPS 1 to 10 · Class 150 to 1500

2016 – Morocco · NOOR II · Type 3251 Globe Valve with electric actuator (425 in total) NPS 3 · Class 600

2017 – China · Dunhuang CSP · Type 3251 Globe Valve (2 in total) · NPS 4 · Class 300
– Kuwait · Shagaya · Type 3241 and Type 3251 Globe Valves; LEUSCH; self-operated regulators (124 in total) · NPS 1 to 24 · Class 150 to 1500
– South Africa · Kathu · Type 3251 Globe Valve (250 in total) · NPS 3 · Class 600
– South Africa · Ilanga · Type 3251 Globe Valve (266 in total) · NPS 3 · Class 600

2018 – Spain · Manchasol · Type 3251 Globe Valve · NPS 2 · Class 300
– Spain · Manchasol · Type 3251 Globe Valve · NPS 3 to 4 (3 in total) · Class 300
– China · Luneng Haizizhou CSP · Type 3591 Globe Valve · NPS 6 · Class 300
– China · Haixizhou – RINGO Globe on/off (353 in total)– NPS ¾ to 6 – Class 300 to 600

SAMSON AT A GLANCE

STAFF

- Worldwide 4,300
- Europe 3,300
- Asia 500
- Americas 200
- Frankfurt am Main, Germany 1,800

MARKETS

- Chemicals and petrochemicals
- Power and energy
- District heating and cooling, building automation
- General industry
- Industrial gases
- Food and beverages
- Metallurgy and mining
- Oil and gas
- Pharmaceuticals and biotechnology
- Marine equipment
- Water and wastewater
- Pulp and paper

PRODUCTS

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

SALES SITES

- More than 50 subsidiaries in over 40 countries
- More than 200 representatives

PRODUCTION SITES

- SAMSON Germany, Frankfurt, established 1916
  Total plot and production area: 150,000 m²
- SAMSON France, Lyon, established 1962
  Total plot and production area: 23,400 m²
- SAMSON Turkey, Istanbul established 1984
  Total plot and production area: 11,053 m²
- SAMSON USA, Baytown, TX, established 1992
  Total plot and production area: 9,200 m²
- SAMSON China, Beijing, established 1998
  Total plot and production area: 10,138 m²
- SAMSON India, Pune district, established 1999
  Total plot and production area: 18,000 m²
- SAMSON Russia, Rostov-on-Don, established 2015
  Total plot and production area: 5,000 m²
- SAMSON AIR TORQUE, Bergamo, Italy
  Total plot and production area: 27,684 m²
- SAMSON CERA SYSTEM, Hermsdorf, Germany
  Total plot and production area: 14,700 m²
- SAMSON KT-ELEKTRONIK, Berlin, Germany
  Total plot and production area: 1,060 m²
- SAMSON LEUSCH, Neuss, Germany
  Total plot and production area: 18,400 m²
- SAMSON PFEIFFER, Kempen, Germany
  Total plot and production area: 35,400 m²
- SAMSON RINGO, Zaragoza, Spain
  Total plot and production area: 18,270 m²
- SAMSON SED, Bad Rappenau, Germany
  Total plot and production area: 10,370 m²
- SAMSON STARLINE, Bergamo, Italy
  Total plot and production area: 26,409 m²
- SAMSON VDH PRODUCTS, the Netherlands
- SAMSON VETEC, Speyer, Germany
  Total plot and production area: 27,090 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

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