



*PSG*

*Pure Steam Generators*





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## *A choice of quality*

Telstar Puretech PSG Pure Steam Generators are designed and constructed to produce clean/pure steam in full compliance with cGMP guidelines as per FDA and EMEA requirements.

Engineering and manufacturing practices follow ISO 9001 procedures, ASME BPE criteria, GAMP guidelines, etc. Design and construction meets the most stringent Regulations and Codes from Europe, USA and others concerning Safety and Pressure Vessels.

To ensure the equipment meets your requirements, we work in partnership with you and a dedicated team follows your order as a unique project. We develop specific Quality Plans (DQ, IQ and OQ) and undertake factory acceptance testing (FAT) to give assurance, performance and quality.



## *Pure steam applications*

Clean steam is defined as saturated steam produced from additive-free water, relatively free from non-condensable gases and dry, but not overheated. Pure steam is the same as clean steam, but when condensed it meets the USP and the EU Ph standards for WFI, which state that endotoxins level is typically below 0.25 Eu/ml.

Clean steam should be used when the steam or resulting condensate comes into direct or indirect contact with any medical device or pharmaceutical product. Thus, it is the ideal heat transfer media for carrying out sterilization and/or sanitization processes in autoclaves, tanks, reactors, pipe systems, etc.



## *Design & construction features*



*PSG 1500 T model.*



*PSG 1500 M model.*

### *Compact and Modular*

The generator is designed as a vertical column, with a special heat exchanger in the lower part (evaporator) and an expansion chamber above (separator column). The unit and all its components such as feed water pump, pre-heater, control panel, etc. are mounted on a stainless steel AISI 304 skid.

All parts in contact with the media are made of stainless steel AISI 316L, insulated with mineral wool (asbestos-free material) with external cladding made of stainless steel AISI 304. Inner surfaces are polished to  $Ra \leq 0.51 \mu\text{m}$  and electro polishing is an available option.

Hygienic design: Including clamp connections, orbital welding techniques for tubing and components, minimisation of dead legs, piping slopes for self-drainability, double tube sheet construction, etc.

*Pure steam sampling and conductivity monitoring system (for T and M models)*





## *Simple and Efficient Design*

The lower part of the column consists of a double tube sheet shell heat exchanger with a large central pipe surrounded by a bundle of peripheral seamless pipes. This arrangement produces a natural fluid circulation: ascendant inside the peripheral pipes and descendant inside the central one. Steam flows up very slowly but droplets cannot reach the top of the column as they fall down simply by gravity. Thus, impurities such as particles and pyrogens contained in the droplets are dragged down towards the bottom of the column where they are automatically blown down. In order to improve energy efficiency, a pre-heater combined with a degassing tank complete the installation. Steam quality meets the standards of the HTM 2010 (EN 285).

## *Ease of Maintenance and Installation*

The heat exchangers are totally accessible and no internal elements are located within the column. This makes inspection much easier than other designs, with long pipes or internal heat exchangers.

The replacement of column gaskets can be done easily and quick, without needing to dismantle the column, which removes the need for very high technical areas in order to take off any internal part.

Heat exchanger pipes are always totally immersed in water, so there is a very low tendency to build up scale inside the tubes. Moreover, as they are shorter than other designs, they are less stressed by vibrations and risk of corrosion is significantly reduced.

*Drainage tank  
(for T and M models)*



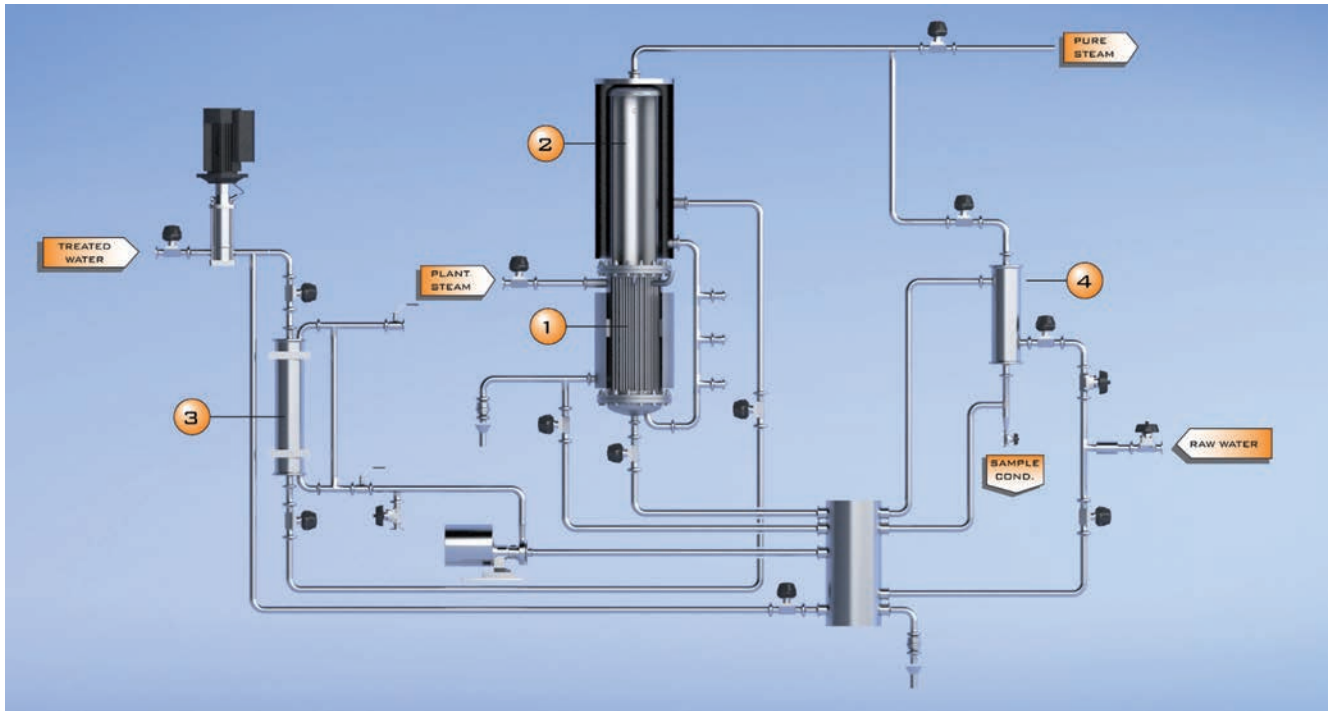
*PSG 1500 T pre-heater using plant  
steam condensate*



*PSG 1500 M membrane  
degassing system*



# Operating principle



Treated feed water (PW) is circulated through the degassing membrane to the evaporator column. This column is designed to have a large heat transfer area and large water-steam reservoir to provide efficient handling at peak consumption.

The separator column diameter has been calculated to prevent water droplets and impurities entering the product steam. As an option, a small condenser can be installed for on-line monitoring of steam conductivity and taking samples.

- 1 EVAPORATOR COLUMN
- 2 SEPARATOR COLUMN
- 3 MEMBRANE DEGASSER
- 4 SAMPLE CONDENSER

# Control system

The control system is based on a PLC wire operator supervision via a user-friendly touch-screen HMI with the following menu:

- Mimics of the equipment, showing the operational state in real time
- Process parameters (temperature, pressure and conductivity)
- Setting up of parameters
- Alarm information
- Start-up and alarm recognition.

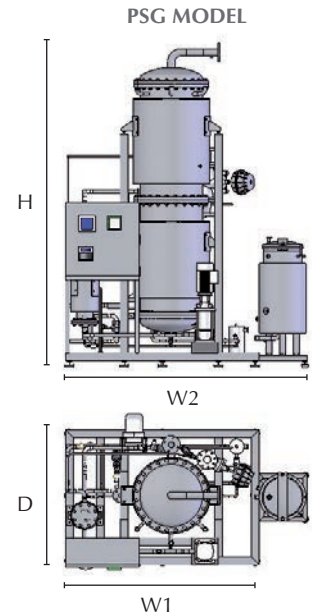
Options include: paper or electronic chart recorder for pure steam conductivity, temperature, extra feed water conductivity meter, on-line TOC monitoring, etc.



# Technical data

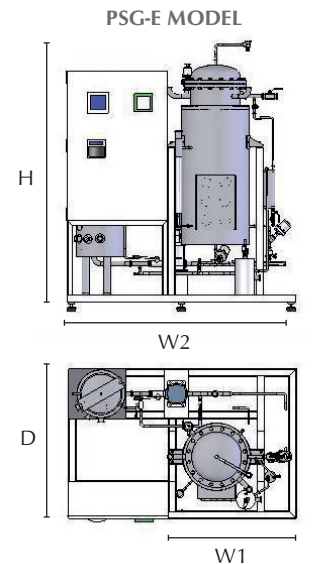
## STEAM TO STEAM HEATED

MODEL	Overall dimensions				Main Utilities			Approx. Weight Kg
	Width (W1)	Width (W2)	Height (H)	Depth (D)	PS output @ 3 bar	Heating steam @ 6 bar	PW Feed water	
	mm	(T models) mm	mm	mm	Kg/h	Kg/h	l/h	
PSG 50	1.450	1.950	2.165	850	50	63	55	350
PSG 100	1.455	1.955	2.165	850	100	126	105	375
PSG 150	1.475	1.975	2.165	890	150	189	155	390
PSG 300	1.610	2.110	2.725	1.040	300	378	305	500
PSG 500	1.635	2.135	2.735	1.050	500	630	505	700
PSG 750	1.635	2.135	2.735	1.050	750	945	755	900
PSG 1000	1.800	2.300	3.220	1.110	1.000	1.260	1.005	1.200
PSG 1500	1.900	2.400	3.305	1.260	1.500	1.889	1.505	1.500
PSG 2000	1.900	2.400	3.935	1.360	2.000	2.519	2.005	1.800
PSG 2500	1.900	2.400	3.975	1.360	2.500	3.149	2.505	2.400
PSG 3000	1.900	2.400	3.985	1.360	3.000	3.779	3.005	2.900



## ELECTRICALLY HEATED

MODEL	Overall dimensions				Main Utilities			Approx. Weight Kg
	Width(W1)	Width(W1)	Height(H)	Depth(D)	PS output @ 3 bar	Heating power	PW Feed water	
	mm	mm	mm	mm	Kg/h	kw	l/h	
PSG 32-E	1.200	1.700	1.800	1.200	32	27	35	330
PSG 43-E	1.200	1.700	1.800	1.200	43	36	47	330
PSG 54-E	1.250	1.750	1.800	1.200	54	45	59	340
PSG 65-E	1.250	1.750	1.800	1.200	65	54	71	340
PSG 76-E	1.250	1.750	1.800	1.200	76	63	83	360
PSG 86-E	1.325	1.825	1.800	1.200	86	72	94	370
PSG 97-E	1.325	1.825	1.850	1.200	97	81	106	390
PSG 108-E	1.325	1.825	1.850	1.200	108	90	118	420
PSG 129-E	1.325	1.825	1.850	1.200	129	112	135	450



## Available options

- Thermal degassing system
- Condensing unit to produce WFI quality water
- Pure steam condensate sampling device
- Feedwater and/or condensate pure steam conductivity monitoring system
- On-line TOC monitoring system
- Chart recorder.



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Telstar Puretech reserves the right to improvements and specifications changes without notice.