



CSM-E

Electrical

Compact Clean Steam Generator

Description

The CSM-E range of compact clean steam generators has been designed to provide steriliser grade clean steam from suitably treated water using electricity as the heating medium and can be supplied with or without an integral feedwater pre-heating and degassing system.

The CSM-E range of generators covers steam outputs from 50 kg/h up to 150 kg/h at 3 bar g and each unit comes complete and ready to produce clean steam once connected to the available services.

All pressure components fully comply with the European Pressure Equipment Directive 2014/68/EU. The generator vessel and all surfaces in contact with generated clean steam or treated feedwater are manufactured in AISI 316L stainless steel.

The unit is supplied as standard (base model) packaged in a compact non-enclosed mild steel frame fitted with mounting feet. Other standard features include a mild steel control cabinet and a manual blowdown valve fitted to the bottom of the generator vessel. Standard options are available at an extra cost and are listed in the Technical data section. Details of these costs are available from Spirax Sarco on request.



Applications

The CSM-E is suitable for a wide range of sterilising, humidification and process applications within the Healthcare, Food and Beverage, Pharmaceutical, Biotechnology and Electronics industries.

Principal features

- Produces clean steam for sterilising and humidification processes using electrical energy
- Fully assembled skid-mounted system (transportable)
- Microprocessor steam and feedwater control
- All clean steam and feedwater wetted parts in AISI 316L stainless steel
- Produces clean steam in accordance with HTM 2031 standards
- Sample points (optional)

Pipework connections

Connection	Type	Size
Clean steam	Flanged PN16	DN50
Feedwater	Flanged PN16	DN15
Vessel drain/blowdown	Flanged PN16	DN25
Air supply	Push fit for nylon tube	8 mm diameter
Safety valve discharge	Flanged PN16	DN50
Safety valve drain	Welded tube	½" diameter
Pre-heat tank overflow	Screwed tube	¾" gas
Test point (optional)	Tri-clamp	1"

Versions and outputs

Generator without pre-heat tank			
Unit	CSM-EE	CSM-EG	CSM-EI
Electrical resistance heating power	50 kW	100 kW	110 kW
Clean steam flowrate at 3 bar g (maximum)	50 kg/h	100 kg/h	135 kg/h

Generator with pre-heat tank			
Unit	CSM-EF	CSM-EH	CSM-EL
Electrical resistance heating power	35 kW (GV) 15 kW (tank)	100 kW (GV) 15 kW (tank)	110 kW (GV) 15 kW (tank)
Clean steam flowrate at 3 bar g (maximum)	50 kg/h	110 kg/h	150 kg/h

Notes:

1. GV denotes Generator Vessel.
2. Flowrates and pressures stated are for feedwater temperatures ≥ 18 °C. Each unit can provide clean steam at different flowrates and pressures, please contact Spirax Sarco for any special requirements.

Clean steam pressure / temperature limits

Maximum operating pressure	5 bar g
Maximum operating temperature	159 °C
Test pressure	12.7 bar g

Materials

Part	Material
Pre-heat tank	Stainless steel AISI 316L
Vessel shell	Stainless steel AISI 316L
Heating coils (elements)	Stainless steel AISI 316L
Frame	Mild steel, painted
Clean steam pipework	Stainless steel AISI 316L
Feedwater pipework	Stainless steel AISI 316L
Vessel drain/blowdown pipework	Mild steel, painted
Safety valve discharge pipework	Stainless steel AISI 316L
Pipework insulation covers	Fireproof synthetic fibre jacket
Pipework Insulation	Glass Fibre

Technical data

	Compressed air: A 6 bar g compressed air supply is required; where this is unavailable an optional compressor can be supplied with the unit at extra cost (see standard options).		
Pneumatics	Compressed air flowrate (Nm³/h)		
	Air supply 5 bar g	max 30	
	Air supply 10 bar g	max 54	
	Power supply: 400 Vac 3-phase + Neutral - 50 Hz (10 A per phase). Dependant on model, a fused isolator must be incorporated in the supply line as near as possible to the unit.		
Electrical requirements			
		Unit without tank	Unit with tank
	Installed load:	CSM-EE 55 kW	CSM-EF 55 kW
		CSM-EG 105 kW	CSM-EH 120 kW
		CSM-EI 115 kW	CSM-EL 130 kW
Feedwater quality	To meet the requirements of HTM 2031, the use of de-mineralised or reverse osmosis feedwater is recommended. It is advised that analysis of the feedwater is undertaken prior to installation and commissioning.		
Clean steam condensate	Whilst not mandatory, the Table below gives a guide to recommended typical values for contaminants present within the clean steam condensate.		
	Property	Maximum value	
	Ammonium	0.2 mg/l	
	Heavy metals substitute	0.1 mg/l	
	Chloride	0.5 mg/l	
	Nitrate	0.2 mg/l	
	Sulphate	0.5 mg/l	
	Residue on evaporation	30 mg/l	
	Phosphate	0.1 mg/l	
	Silicate	0.1 mg/l	
	Pyrogens (bacterial endotoxins)	0.25 EU/ml	
Electrical conductivity at 25°C	35 µS/cm		
Control panel	The unit is PLC controlled to regulate generator clean steam outlet pressure, generator water level and pre-heat tank water temperature and level. The unit is provided with a colour touch screen visual display to show alarms and other monitored and controlled parameters. The unit is also equipped with pulse output for fault conditions or general power failure.		
Standard options	Control panel		
	<ul style="list-style-type: none"> - Communication protocol interfaces: Profibus DP, OPC 232 Ethernet, Can Open, Device Net, Asi Net, Modbus - Analogical retransmission - Software packages for remote supervision - Alarm notification via SMS and /or e-mail 		
	Other equipment/features		
	<ul style="list-style-type: none"> - TDS analysis with manual blowdown valve - External compressor - Electric control valves - Steam sampling valve (EN 285/HTM 2031) - Protective side cover panels in mild steel - Frame, control panel cabinet and protective side cover panels in stainless steel AISI 304L - Frame fitted with transportation (handling) wheels - Automatic bottom blowdown valve (generator vessel) - Manual or automatic clean steam outlet valve 		
	Note: TDS analysis is advisable when feedwater electrical conductivity is > 15 µS/cm		

Safety information, installation and maintenance

For full details including spares information, refer to the Installation and Maintenance Instructions supplied with the unit.

Typical specification

Spirax Sarco compact clean steam generator CSM-EF (with pre-heat tank), designed and built to produce 50 kg/h of clean steam at 3 bar g to HTM 2031 (dependant upon feedwater) when supplied with electrical power at 50 kW rating.

All items are to be pre-assembled and mounted on to a compact frame and accompanied with PED certification.

How to order

Example: 1 off Spirax Sarco CSM-EF compact clean steam generator.

Please provide details of clean steam pressure, clean steam flowrate and feedwater system.

Ancillary items (to be used depending on installation):

- Blowdown vessel and system
- Clean steam check valves
- Clean steam isolation valves
- Feedwater isolation valves
- Clean steam trap sets

For other items that may be required, please contact Spirax Sarco.

Top connections for:

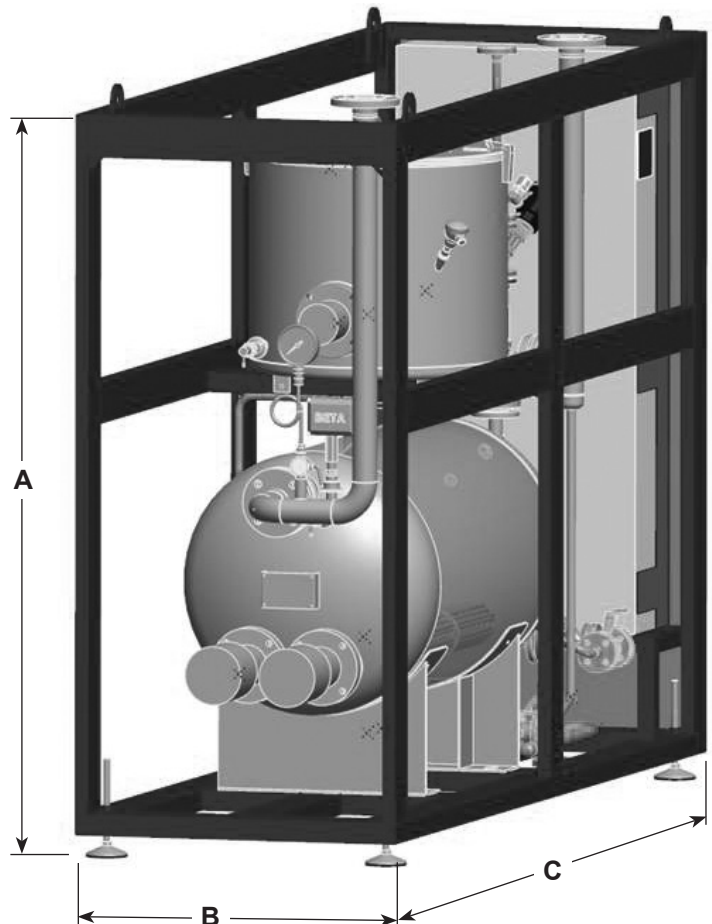
- Clean steam
- Safety valve vent
- Feedwater

Dimensions and weights (approximate)

Unit	Dimensions (mm)			Weight (kg)	
	A	B	C	Dry	Wet
CSM-EE/EG/EI (without tank)	1925	800	2400*	800	1300
CSM-EF/EH/EL (with tank)	1925	800	2400*	900	1600

* Control panel cabinet protrudes by 50 mm outside of frame dimension.

Please note: to allow for safe and comfortable working access, it is recommended that at least 1000 mm is kept clear of obstacles at the front and back of the unit.



Bottom connections for:

- Vessel drain/blowdown
- Safety valve drain
- Air supply