



# CSM-C 600 Compact Clean Steam Generator

## Description

The CSM-C 600 compact clean steam generator has been designed to provide clean steam from suitably treated water using plant steam as the heating medium.

The CSM-C 600 generator can produce up to a maximum of 1,275 lb/hr of clean steam at 45 psig – dependent on plant steam pressure and feedwater temperature. Each unit comes complete, fully assembled, tested and ready to produce clean steam once connected to the available services. The generator pressure vessel is designed, manufactured, tested and stamped “U” in accordance with ASME Section VIII division 1. The generator pressure 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 with a compact frame, protective side cover panels and control panel all fabricated from carbon steel. Other standard features include dual “U” tube bundles, mounting feet, pneumatic control valves fitted to the primary (plant) steam supply and feedwater inlet. A piston actuated valve is fitted to the bottom of the generator vessel for timed blowdown to control TDS levels. Available standard options are listed in the Technical Data section of this document.

## Applications

The CSM-C 600 is suitable for a wide range of sterilization, humidification and process applications within the Healthcare, Institutional, Food and Beverage, Pharmaceutical and Electronics industries.

### Principal features:

- Produces clean steam for sterilization, humidification and direct injection processes using plant steam and treated feed water.
- Fully assembled skid-mounted system (transportable).
- Pneumatic modulating steam and feedwater control.
- All clean steam and feed water wetted parts in AISI 316L stainless steel.
- Produces clean steam in accordance with HTM2031, HTM2010, CFPP01-01 part C: 2013, and EN285 standards.
- Clean steam and feedwater sample points with sanitary connections
- PLC controller with 5.7” full color touch screen HMI
- NEMA 4 control panel enclosure with UL compliant components

### Pipework connections

| Connection                   | Type                    | Size |
|------------------------------|-------------------------|------|
| Plant steam inlet            | Flanged ANSI 150 RF     | 2"   |
| Clean steam outlet           | Flanged ANSI 150 RF     | 3"   |
| Condensate return outlet     | Flanged ANSI 150 RF     | 2"   |
| Feedwater inlet              | Flanged ANSI 150 RF     | 1/2" |
| Vessel drain/blowdown        | Flanged ANSI 150 RF     | 1"   |
| Air supply                   | Push fit for nylon tube | 3/8" |
| Safety valve discharge       | Flanged ANSI 150 RF     | 2"   |
| Safety valve drain           | Welded tube             | 1/2" |
| Feed water sampling valve    | Tri-clamp               | 1/2" |
| Clean steam (HTM) test point | Tri-clamp               | 1/2" |



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Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.

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### Outputs

| Plant Steam Pressure | Clean Steam Production* (lb/hr) at: |         |         |           |         |           |         |
|----------------------|-------------------------------------|---------|---------|-----------|---------|-----------|---------|
|                      | 75 psig                             | 60 psig | 45 psig | 37.5 psig | 30 psig | 22.5 psig | 15 psig |
| 150 psig             | 836                                 | 1,122   | 1,496   | 1,760     |         |           |         |
| 135 psig             | 660                                 | 946     | 1,276   | 1,496     | 1,804   |           |         |
| 120 psig             | 462                                 | 748     | 1,078   | 1,276     | 1,540   | 1,870     |         |
| 105 psig             |                                     | 550     | 880     | 1,056     | 1,276   | 1,562     | 1,892   |
| 90 psig              |                                     |         | 638     | 836       | 1,034   | 1,276     | 1,628   |
| 75 psig              |                                     |         |         | 594       | 792     | 1,012     | 1,298   |
| 60 psig              |                                     |         |         |           | 528     | 748       | 1,012   |
| 45 psig              |                                     |         |         |           |         | 462       | 704     |

\*Feedwater at 60°F

Note: Feedwater pressure must be at least 15psig above desired clean steam pressure.

- = HTM2031/2010 & EN285 compliance guaranteed
- = HTM2031/2010 & EN285 compliance not guaranteed
- = Inadequate thermodynamic conditions

### Steam pressure / temperature limits

|                                     |                               |                  |
|-------------------------------------|-------------------------------|------------------|
| Primary (tube) side plant steam     | Maximum operating pressure    | 150 psig         |
|                                     | Maximum operating temperature | 366°F            |
|                                     | M.A.W.P.                      | 174 psig @ 428°F |
| Secondary (vessel) side clean steam | Maximum operating pressure    | 75 psig          |
|                                     | Maximum operating temperature | 320°F            |
|                                     | M.A.W.P.                      | 101 psig @ 392°F |

### Materials

|                                 |                                  |
|---------------------------------|----------------------------------|
| Vessel shell                    | AISI 316L stainless steel        |
| Heating coils (U-tubes)         | AISI 316L stainless steel        |
| Frame                           | Carbon steel, painted            |
| Plant steam pipework            | Carbon steel, painted            |
| Clean steam pipework            | AISI 316L stainless steel        |
| Condensate pipework             | Carbon steel, painted            |
| Feedwater pipework              | AISI 316L stainless steel        |
| Vessel drain/blowdown pipework  | Carbon steel, painted            |
| Safety valve discharge pipework | AISI 316L stainless steel        |
| Pipework insulation covers      | Fireproof synthetic fiber jacket |
| Pipework insulation             | Glass fiber                      |

### Technical data

|                                |  |
|--------------------------------|--|
| <b>Pneumatics</b>              | <b>Compressed air:</b> A minimum 90 psig compressed air supply is required; where this is unavailable an optional compressor can be supplied at extra cost (see options).  |
| <b>Electrical requirements</b> | <b>Power supply:</b> 110 VAC, 50-60 Hz, Single Phase<br><b>Supply fuse:</b> 5 Amps (T)<br>A fused isolator must be incorporated in the supply line as near as possible to the unit   |
| <b>Feedwater quality</b>       | Thorough analysis of the feedwater system should be undertaken prior to installation and commissioning. To ensure reliability, longevity, efficient operation and to meet the requirements of HTM2031 and EN285, the feed water stream should be pretreated with one or more processes, as necessary, such as filtration, deionization, reverse osmosis, softening and de-chlorination to produce feed water that has the following characteristics:<br>pH: 6.5 – 8.5<br>Hardness: absent<br>Chlorine: absent<br>Conductivity: <600 ppm Total Dissolved Solids |
| <b>Control panel</b>           | The clean steam generator is PLC controlled to regulate clean steam outlet pressure, water level and blowdown operation.<br>NEMA 4 control panel enclosure with UL compliant components.<br>Full color touch screen HMI.<br>Analog 4-20mA retransmission for water level and clean steam pressure.<br>Relay contacts for retransmission of fault conditions and general power failure.   |
| <b>Communication protocols</b> | Mobus RTU<br>Modbus TCP/IP<br>BACnet MSTP<br>BACnet TCP/IP   |
| <b>Options</b>                 | External compressor<br>Transportation (handling wheels)  |

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# CSM-C 600

## Compact Clean Steam Generator

### 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 CSM-C 600 compact clean steam generator designed and built to produce 1,275 lb/hr of clean steam at 45 psig to HTM2031, HTM2010, CFPP01-01 part C: 2013 & EN285 (dependent on feedwater) when supplied with plant steam at 135 psig. All items are to be pre-assembled and mounted to a compact frame and accompanied with all necessary documentation.

### Warranty

Spirax Sarco, Inc. warrants to the original user, that the CSM-C 600 Clean Steam Generator, being used in the service and the manner for which it was intended, shall be free from defects in material and workmanship for a period of 12 months from date of commissioning and no longer than 18 months from the date of shipment from the factory. The validity of this warranty is subject to the completion of the mandatory commissioning and start-up service performed by a Spirax Sarco Service Technician. This warranty does not extend to any product that has been subject to misuse, neglect or alteration after shipment from the Spirax Sarco factory, except as may be expressly provided in a written agreement between Spirax Sarco, Inc. and the user and which is signed by both parties. The use of the CSM-C 600 Clean Steam Generator with poor quality feed water that does not meet the minimum feed water quality requirements as published by Spirax Sarco will be considered misuse and neglect and will void the warranty. Defective components or assemblies found during the warranty period may be repaired or replaced at the discretion of Spirax Sarco and must be completed by a Spirax Sarco service technician or qualified representative; otherwise the warranty will be terminated.

### How to order

**Example:** 1 off Spirax Sarco CSM-C 600 compact clean steam generator.

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

### Ancillary items (to be used depending on installation):

- Blowdown vessel and heat recovery package
- Clean steam check valves
- Clean steam isolation valves
- Primary (plant) steam isolation valves
- Feedwater isolation valves
- Condensate isolation valves
- Clean steam separator

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

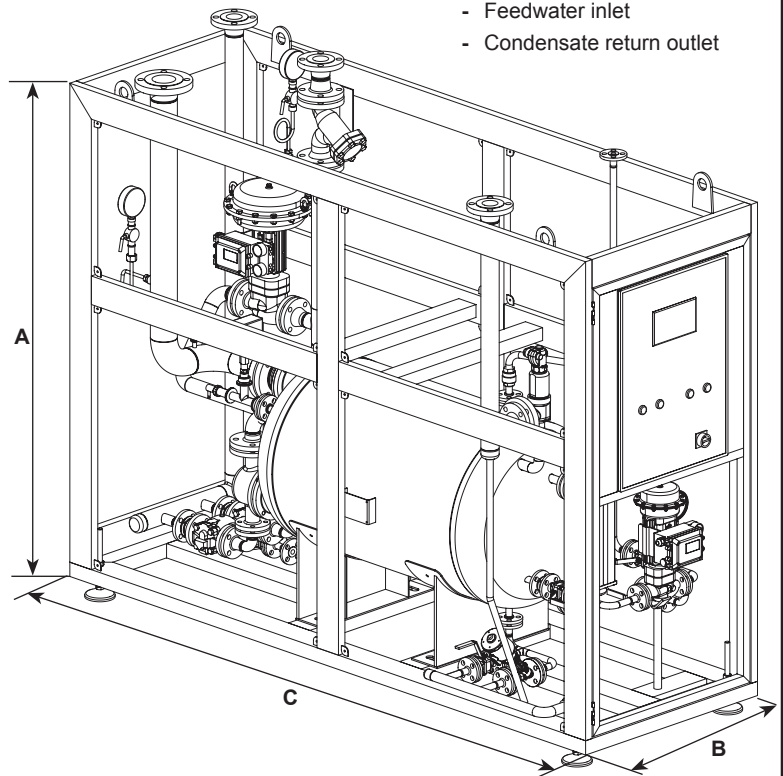
### Dimensions and weights (approximate)

| Dimensions (inches) |    |    | Weight (lb) |      |
|---------------------|----|----|-------------|------|
| A                   | B  | C  | Dry         | Wet  |
| 74                  | 32 | 95 | 1763        | 3086 |

**Please note:** to allow for safe and comfortable working access, it is recommended that at least 3 ft is kept clear of obstacles at the front and rear of the unit.

### Top connections for:

- Plant steam inlet
- Clean steam outlet
- Safety valve vent
- Feedwater inlet
- Condensate return outlet



### Bottom connections for:

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

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