m-CSG
Ultra-compact
Clean Steam Generation System

Description
The m-CSG series of indirect mini clean steam generators are very compact units, designed to produce up to 300/600 kg/h (at nominal operating conditions) of clean steam, using plant steam as primary medium. The units are supplied ready for installation into the application.

Versions and applications:

<table>
<thead>
<tr>
<th>Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>Unit for the nominal production of 300 kg/h*</td>
</tr>
<tr>
<td>600</td>
<td>Unit for the nominal production of 600 kg/h*</td>
</tr>
</tbody>
</table>

Versions / Applications:

- **H**: “Health”: humidification (AHU), sterilization of containers, generic use of clean steam.
- **F**: “Food&Beverage” - EC 1935/2004 Compliant: direct steam injection in food products (e.g. cooking), other applications where it is required the compliance with the EC directive as products intended to come in contact with food.

(*) max steam production at reference operating conditions: primary steam at 9-10 bar g, production at 3 bar g, feed water at 20 °C.

Construction and main features
- System complete, functional and safe
- Ultra-compact design: space saving
- Modulating pressure and level control: pressure stability and steam quality improvement
- Tube-bundle extractable: possible replacement, easy maintenance
- Packaged system, assembled on a metal base, with on board wired control panel: easy installation
- Gaskets on clean steam and water side in PTFE, FDA compliant
- Stop valves on the inlets/outlets of the fluids: possible partial or total system isolation (e.g. for maintenance)
- Strainers upstream: to protect the control valves, steam traps and other sensitive equipment from possible damage caused by impurities that drag from the fluids
- Heating ramp: to avoid material stress during start-up from cold
- System supplied properly insulated
- Engineered, built and tested by Spirax Sarco Italy, according to the following European Union Directives:
  - 2014/68/EU (PED)
  - 2006/42/EC (Machinery)
  - 2014/35/EU (LVD)
  - 2014/30/EU (EMC)
- Unit classified as ASSEMBLY, supplied with a nameplate bearing the mark and comes complete with EC Declaration of Conformity.
- Spirax Sarco’s worldwide service.
Design conditions

**Plant steam side (primary)**
- Design pressure (PS): 12.8 bar g
- Design temperature (TS): 194.4 °C

**Clean steam side**
- Design pressure (PS): 8 bar g
- Design temperature (TS): 194.4 °C
- Safety valve setting: 6 bar g

**Feedwater side**
- Design pressure (PS): 8 bar g
- Design temperature (TS): 110 °C

For a bespoke design, contact Spirax Sarco

Maximum operating conditions

<table>
<thead>
<tr>
<th>Production</th>
<th>Clean saturated steam, up to 5 bar g at 159 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary side</strong></td>
<td>Plant steam, up to 12 bar g / 191.7 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feedwater</th>
<th>Unit without pump</th>
<th>Unit with pump</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P min ≥ P clean steam + 0.5 bar g</td>
<td>Net positive suction head required (refer to IM-P486-21)</td>
</tr>
<tr>
<td></td>
<td>Pmax 8 bar g / Tmax 110 °C</td>
<td></td>
</tr>
</tbody>
</table>

Minimum ambient temperature: 0 °C
Designed for indoor installation only, protect from freezing.

Utilities

<table>
<thead>
<tr>
<th>Electrical supply (cabinets)</th>
<th>Unit without pump</th>
<th>Unit with pump</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 x 230 V +N</td>
<td>3 x 400 V +N</td>
</tr>
<tr>
<td></td>
<td>50/60 Hz</td>
<td>50 Hz</td>
</tr>
<tr>
<td></td>
<td>0.4 kW (instr.)</td>
<td>0.8 kW (instr.)</td>
</tr>
<tr>
<td>Air supply (filters)</td>
<td>Minimum 3 bar g to maximum 15 bar g (only for the unit with pneumatic actuators)</td>
<td></td>
</tr>
</tbody>
</table>

Performance of the units

Max clean steam production (kg/h), with feedwater at 20 °C:

<table>
<thead>
<tr>
<th>300</th>
<th>Clean steam production pressure (bar g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Plant steam pressure (bar g)</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

Max productions refer to clean generator clean, without blowdowns.

<table>
<thead>
<tr>
<th>600</th>
<th>Clean steam production pressure (bar g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Plant steam pressure (bar g)</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>8</td>
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<tr>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

The double flowrate (Q1/Q2) means respectively with supply water at +0.5/1.0 bar g than the pressure of the steam generated.

For the units equipped with pump, consider the production Q2.

N/A = not recommended operating condition, it is necessary to reduce the primary steam pressure.
### Main parts (basic unit)

The unit comprises the following main parts:

1. Steam generator and instrumentation, accessories, protection and safety devices
2. Primary steam control group and line accessories
3. Steam trap group and line accessories.
4. Feedwater control group and line accessories
5. Electrical control panel

### Main connections

<table>
<thead>
<tr>
<th></th>
<th>300</th>
<th>600</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Clean steam outlet DN50 PN16</td>
<td>DN80 PN16</td>
</tr>
<tr>
<td>B</td>
<td>Feedwater inlet  DN15 PN16</td>
<td>DN20 PN16</td>
</tr>
<tr>
<td>C</td>
<td>Generator drain  DN25 PN16</td>
<td>DN25 PN16</td>
</tr>
<tr>
<td>D</td>
<td>Safety valve      1” G-F Version H : DN40 PN16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>discharge         Version F : DN50 PN16</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>(spare)           ½”G-F ½”G-F</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Plant steam inlet DN32 PN16</td>
<td>DN50 PN16</td>
</tr>
<tr>
<td>G</td>
<td>Condensate outlet DN25 PN16</td>
<td>DN25 PN16</td>
</tr>
</tbody>
</table>

Flanged connections UNI-EN 1092-1 PN16 / PN40

### Dimensions and weights (approximate in mm and kg)

<table>
<thead>
<tr>
<th></th>
<th>L (Length)</th>
<th>W (Width)</th>
<th>H (Height)</th>
<th>E (Clearance for tube bundle extraction)</th>
<th>Empty (kg)</th>
<th>In operation (kg)</th>
<th>Maximum (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>1472</td>
<td>805</td>
<td>1615</td>
<td>950</td>
<td>350-400</td>
<td>430-480</td>
<td>520-570</td>
</tr>
<tr>
<td>600</td>
<td>1945</td>
<td>875</td>
<td>1800-1950 *</td>
<td>1050</td>
<td>450-500</td>
<td>600-650</td>
<td>700-750</td>
</tr>
</tbody>
</table>

* Depending on what configuration is chosen

For detailed dimensions of the unit, size and position of the connections, clearance for the tube bundle extraction, weights and other constructive information, refer to the specific general arrangement drawing of the product.

### Automation

The unit is equipped with an electrical control panel. The process variables (pressure and level) are maintained by digital regulators or PLC control logic. Front panel controls / lights: main switch, emergency push-button, switch for local / remote system start with system in operation light, blocks reset button, power supply and alarms lights.

Feed-back available (SPDT contacts): power supply, system in operation, alarm (cumulative).

Digital input (stable contacts): external consent/alarm, remote system start.
Available accessories/options:
- Clean steam intake stop valve
- Control valves with electrical actuators
- TDS control system, with controller on the electrical panel
- Sample cooler
- Primary steam pipeline trap group
- Handling wheels
- Feedwater pump (50 or 60 Hz)
- Control panel with PLC logic and possible serial-bus communication interface
- Frame and control panel cabinet made of stainless steel
- Feedwater RO system (as an auxiliary unit).

Documentation/certifications
The unit will be supplied complete with:
- Process and instrument diagram (P&Id) with the complete list of associated equipment used to assemble the unit
- Dimensional drawing (G.A. drawing)
- Wiring diagram of the control panel
- Installation and Maintenance Instructions (IMI)
- Additional instructions (e.g. unit with PLC logic)
- Technical specifications and manuals for all of the associated equipment used to assemble the unit.
- Assembly 'EC' Declaration of Conformity (PED).

For any other document/certification, please contact: Spirax Sarco Technical Department.
## Product nomenclature and selection guide

The product nomenclature is based on the characteristics of the main elements and options, identified as follows:

<table>
<thead>
<tr>
<th>Basic configuration</th>
<th>mCSG 300 - H11 - 000101101</th>
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<tbody>
<tr>
<td><strong>Size:</strong></td>
<td>- 300: Unit for nominal production of 300 kg/h</td>
</tr>
<tr>
<td></td>
<td>- 600: Unit for nominal production of 600 kg/h</td>
</tr>
<tr>
<td><strong>Version/Application:</strong></td>
<td>- &quot;Health&quot; (e.g. humidification, general use with clean steam)</td>
</tr>
<tr>
<td></td>
<td>- &quot;Food&amp;Beverage&quot; - EC 1935/2004 compliant</td>
</tr>
<tr>
<td><strong>Valves actuation:</strong></td>
<td>- pneumatic (fail-safe)*</td>
</tr>
<tr>
<td></td>
<td>- electric (fail-safe)</td>
</tr>
<tr>
<td><strong>Feedwater group:</strong></td>
<td>- control valve (P water ≥ P clean steam + 0.5 bar g)*</td>
</tr>
<tr>
<td></td>
<td>- control valve + pump 50 Hz</td>
</tr>
<tr>
<td></td>
<td>- control valve + pump 60 Hz</td>
</tr>
</tbody>
</table>

### Options (* = default selection)

**Clean steam intake stop valve:**
- none *
- ball valve (manual)

**TDS control / sampling:**
- none *
- TDS control system with CP10 probe and BC3150 controller
- sample-cooler
- TDS control system (CP10 / BC3150) + sample-cooler

**Steam line trap (primary):**
- none *
- steam trap station with pocket

**Control:**
- electronic controllers SX80 *
- electronic controllers SX90 (with remote SP + PV rtx)
- PLC logic ABB AC500 series with 7" display touch-screen
- PLC logic = Eaton XV102 series with 7" display touch-screen
- PLC logic = Siemens S7.300 series with 7" display touch-screen
- other (bespoke unit)

**Communication interface (only with PLC control logic):**
- none (default selection with electrical regulators) *
- Modbus RTU (standard for ABB and Eaton)
- BACnet MS/TP
- Modbus TCP/IP (standard for ABB and Eaton)
- DeviceNet
- CANopen
- BACnet IP
- Profinet DP (standard for Siemens)
- other (if feasible, bespoke unit)

**Unit frame / Panel cabinet:**
- carbon steel, painted *
- stainless steel (AISI 304)

**Insulation:**
- none
- CSG insulated (rock wool + stainless steel cladding)*

**Handling wheels:**
- none *
- wheels, lockable (carbon steel)

**PED test / certification (2014/68/EU) of the assembly:**
- none PED (as assembly) - only for the individual equipment
- PED test/certification of the assembly and "CE" marked *

**Customisations:**
- standard build (default selection) *
- special version (to be specified)

### Product selection example

**mCSG** 300 - H11 - 000101101

**How to order example**

1 off Spirax Sarco mCSG 300-H11-000101101 mini clean steam generation system.