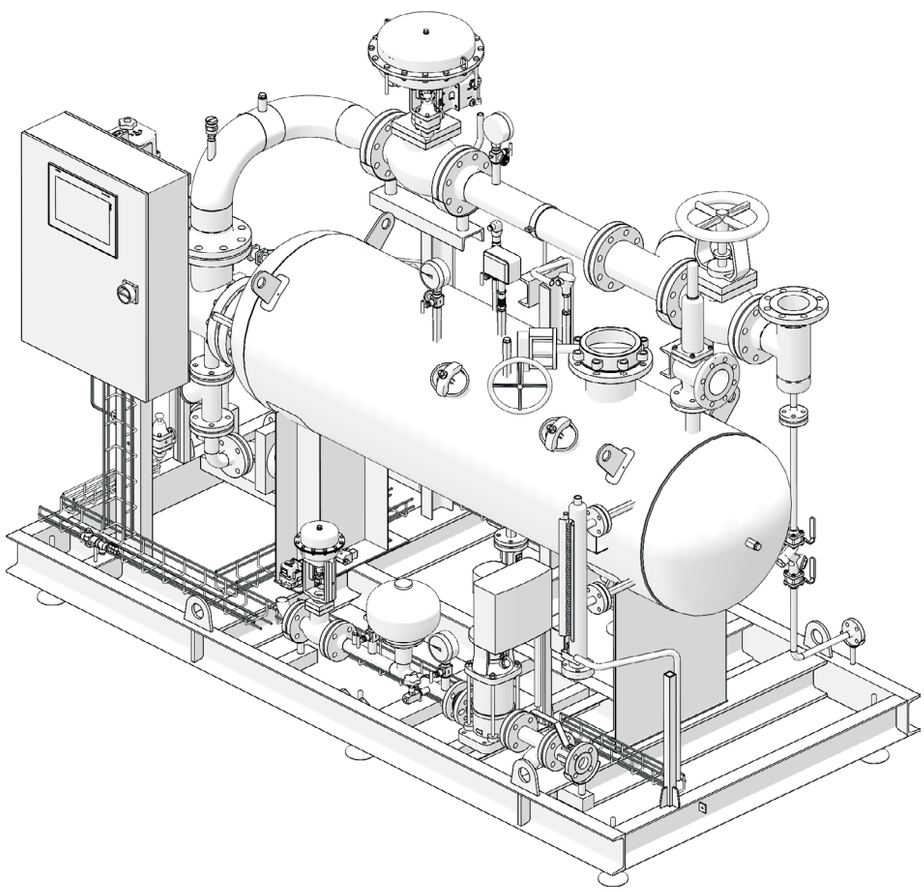
TI-P664-01
TES Issue 7

CSG-FB
Clean steam generation system for Food & Beverage



Description

Spirax Sarco has created a new range of steam generators for food and beverage applications to deliver food quality steam, specifically for direct injection processes within the food & beverage industry sector, where steam is considered as an ingredient. Primary heating medium is plant steam and the secondary steam should be generated from either de-mineralised or reverse osmosis quality water. All generators are supplied as packaged solutions ready to install and commission.

Designed, manufactured and approved for Steam and Condensate applications. This product complies with EC1935:2004 Food Contact Materials. It also complies with regulation EC2023:2006 on good manufacturing practice for materials and articles intended to come into contact with food.

Product range

Size:	**CSG-FB-020**	nominal production capacity 200 kg/h (440 lbs/hr)*	(*) max steam production at reference operating conditions: primary steam at 10 bar g (145 psi g), production at 5 bar g (73 psi g), feed water at 20 °C (68 °F).
	CSG-FB-050	nominal production capacity 500 kg/h (1002 lbs/hr)*	
	CSG-FB-110	nominal production capacity 1100 kg/h (2425 lbs/hr)*	
	CSG-FB-160	nominal production capacity 1600 kg/h (3527 lbs/hr)*	
Versions/Applications:	**FB**	Food and Beverage steam injection	

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Construction and main features

- System complete, functional and safe
- Compact design
- Modulating pressure and level control: pressure stability and steam quality improvement
- Intelligent PLC with SIMS technology, easy maintenance
- Packaged system with on board wired control panel: easy installation
- Automated start up/commissioning sequence
- Configurable options to suit individual needs
- System diagnostics
- Preventive maintenance
- Pre-heater can reduce plant usage by a minimum of 8% at peak flow.
- Spirax Sarco's worldwide service.

Compliances available **but not standard** in all geographies

	EMEA		Americas		Asia Pacific	
	STD	On request	STD	On request	STD	On request
- CE mark with EU declaration of conformity according to the following directives:	●					●
- 2014/68/EU (PED)	●					●
- 2014/35/EU (LVD)	●					●
- 2014/30/EU (EMC)	●					●
- EC1935/2004 requirements as products intended to come into contact with food.	●					
- ASME design with U stamp certification			●			
- FDA requirements as products intended to come into contact with food.			●			
- Chinese GB national standard					●	
- GB4806 requirements as products intended to come into contact with food.						●
- Seismic compliance		●		●		●

Design conditions

Primary side	Design pressure		12.8 bar g	(187 psi g)
	Design temperature		194.4 °C	(382 °F)
Secondary side	Design pressure		8 bar g	(116 psi g)
	Design temperature		194.4 °C	(382 °F)
	Safety valve set pressure		7 bar g	(101.5 psi g)
Feedwater	Design pressure		8 bar g	(116 psi g)
	Design temperature	without pump	110 °C	(230 °F)
		with pump	100 °C	(212 °F)

For a bespoke design, contact Spirax Sarco

Maximum operating conditions

	Without pump	With pump	
Production	Clean saturated steam, up to 6 bar g/165.0 °C (Clean saturated steam, up to 97 psi g/206 °F)		Minimum ambient temperature: 0 °C Designed for indoor installation only, protect from freezing.
Primary side	Plant steam, up to 12 bar g/191.7 °C (Plant steam, up to 174 psi g/345 °F)		
Feedwater	P min. ≥ P clean steam + 0.5 bar g (P min. ≥ P clean steam + 7.2 psi g)	Net positive suction head required (see IM)	
	P max 8 bar g/T max 110 °C (P max 116 psi g/T max 230 °F)	P max 8 bar g/T max 80 °C (P max 116 psi g/T max 176 °F)	

Note: Feedwater is recommended to be demineralised or Reverse Osmosis quality to ensure high performance.

Utilities

	Unit without pump	Unit with pump
Electrical supply (cabinets)	1 x 230 V +N 50/60 Hz 0.4 kW (inst.)	3 x 380 to 500 V +N 50/60 Hz 1 kW (sizes 020-050) (inst.) 1.5 kW (size 110) (inst.) 2 kW (size 160) (inst.)
Air supply (filters)	Minimum 5 bar g (72.5 psi g) to maximum 7 bar g (101.5 psi g) (only for the unit with pneumatic actuators or Integrity test option)	

Performance of the units without pre-heater option

Max clean steam production (kg/h), with feedwater at 20 °C:		Clean steam pressure/bar g		
		4.5	4.0	3.5
CSG-FB-020	10.0	225	259	297
	9.5	205	239	276
	9.0	185	219	255
	8.5	164	197	236
	8.0	142	175	212
CSG-FB-050	10.0	588	682	783
	9.5	536	625	732
	9.0	485	571	671
	8.5	431	516	611
	8.0	375	461	553
CSG-FB-110	10.0	1,302	1,526	1,637
	9.5	1,181	1,395	1,500
	9.0	1,054	1,264	1,500
	8.5	940	1,136	1,360
	8.0	833	1,006	1,223
CSG-FB-160	10.0	1,894	2,220	2,552
	9.5	1,702	2,026	2,371
	9.0	1,511	1,828	2,172
	8.5	1,323	1,629	1,969
	8.0	1,144	1,427	1,760

Plant steam pressure/bar g

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Performance of the units without pre-heater option (continued)

Max clean steam production (lbs/hr), with feedwater at 68 °F:	Plant steam pressure/psi g	Clean steam pressure/psi g		
		65.3	58.0	50.8
CSG-FB-020	145.0	496	570	654
	137.8	452	526	609
	130.5	407	482	562
	123.3	361	435	515
	116.0	314	387	467
CSG-FB-050	145.0	1296	1,503	1,747
	137.8	1181	1,379	1,613
	130.5	1069	1,259	1,479
	123.3	951	1,138	1,347
	116.0	826	1,017	1,219
CSG-FB-110	145.0	2,871	3,363	3,599
	137.8	2,603	3,074	3,307
	130.5	2,324	2,786	3,307
	123.3	2,073	2,503	2,999
	116.0	1,836	2,217	2,695
CSG-FB-160	145.0	4,175	4,894	5,625
	137.8	3,753	4,467	5,228
	130.5	3,331	4,031	4,789
	123.3	2,916	3,581	4,341
	116.0	2,522	3,146	3,880

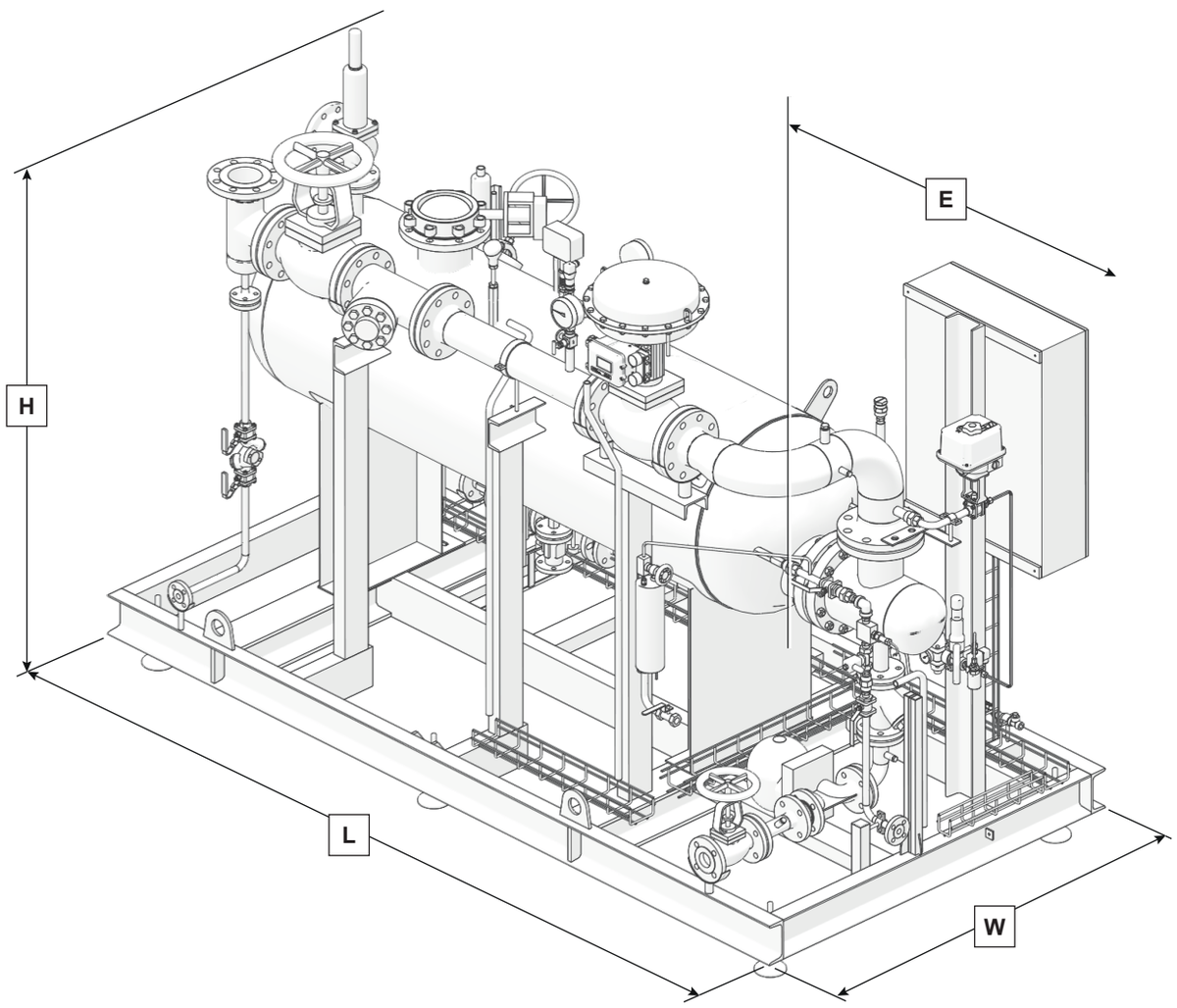
Dimensions and weights without pre-heater option

approximate in mm (inches) and kg (lbs) of a standard unit

	Dimensions mm (inches)				Weights kg (lbs)		
	L Length	W Width	H Height	E Clearance for tube bundle extraction	Empty	In operation	Maximum
CSG-FB 020	2000 (79)	850 (33)	1840 (72)	1250 (49)	550 (1213)	650 (1433)	(800) (1764
CSG-FB 050	2350 (93)	850 (33)	1840 (72)	1300 (51)	850 (1874)	1050 (2315)	1250 (2756)
CSG-FB 110	2450 (96)	1450 (57)	2060 (81)	1600 (63)	1100 (2425)	1450 (3197)	1700 (3748)
CSG-FB 160	2950 (116)	1450 (57)	2060 (81)	2000 (78)	1550 (3417)	2050 (4519)	2450 (5401)

Indicated dimensions are the maximum dimensions for a specific configuration of the package.

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.



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Dimensions and weights with pre-heater option

approximate in mm (inches) and kg (lbs) of a standard unit

	Dimensions mm (inches)				Weights kg (lbs)		
	L Length	W Width	H Height	E Clearance for tube bundle extraction	Empty	In operation	Maximum
CSG-FB 020	2000 (79)	850 (33)	1840 (72)	1250 (49)	600 (1323)	670 (1477)	850 (1874)
CSG-FB 050	2350 (93)	850 (33)	1840 (72)	1300 (51)	870 (1918)	1070 (2359)	1270 (2799)
CSG-FB 110	2450 (96)	1450 (57)	2060 (81)	1600 (63)	1100 (2425)	1450 (3197)	1700 (3748)
CSG-FB 160	2950 (116)	1450 (57)	2060 (81)	2000 (78)	1550 (3417)	2050 (4519)	2450 (5401)

Indicated dimensions are the maximum dimensions for a specific configuration of the package.

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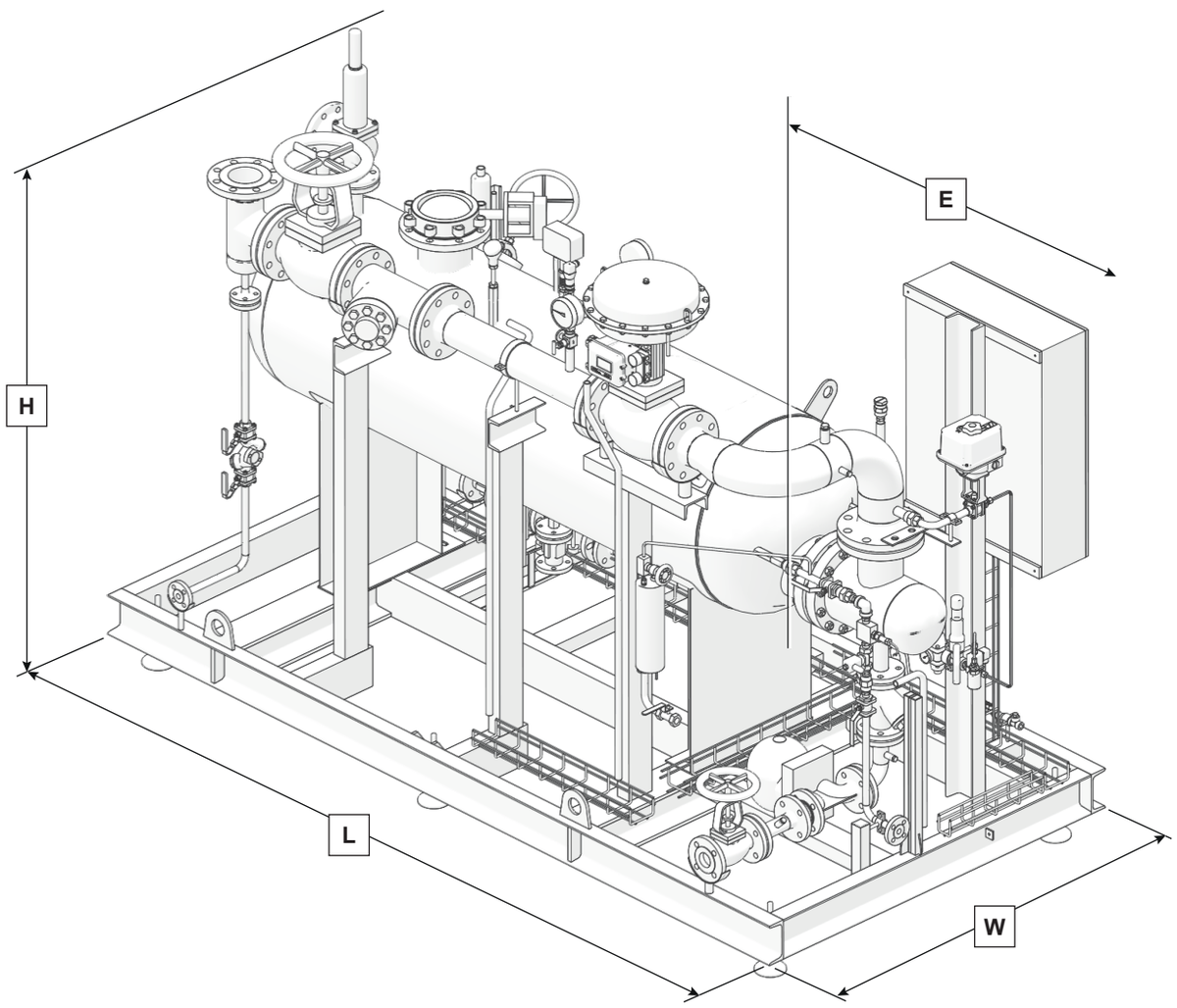
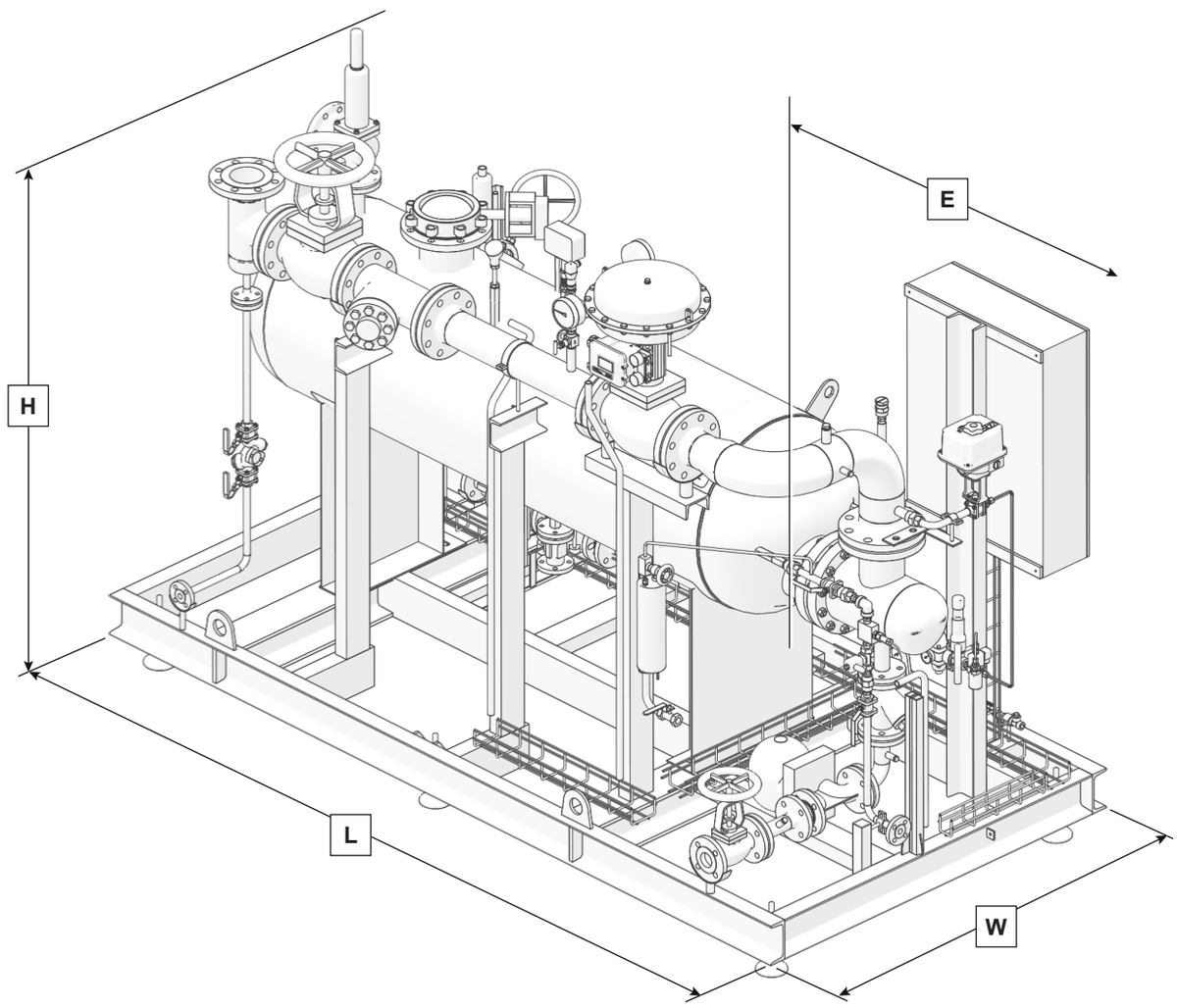


Dimensions and weights of the units with EENV option - insulation 100 mm

approximate in mm (inches) and kg (lbs)

	Dimensions mm (inches)				Weights kg (lbs)		
	L Length	W Width	H Height	E Clearance for tube bundle extraction	Empty	In operation	Maximum
CSG-FB 020	2100 (83)	950 (37)	1950 (77)	1250 (49)	700 (1543)	800 (1764)	950 (2094)
CSG-FB 050	2500 (98)	1100 (43)	2000 (79)	1300 (51)	1000 (2205)	1200 (2646)	1400 (3086)
CSG-FB 110	2550 (100)	1450 (57)	2250 (89)	1600 (63)	1300 (2866)	1600 (3527)	1850 (4079)
CSG-FB 160	3100 (122)	1500 (59)	2250 (89)	2000 (79)	1650 (3638)	2200 (4850)	2550 (5622)



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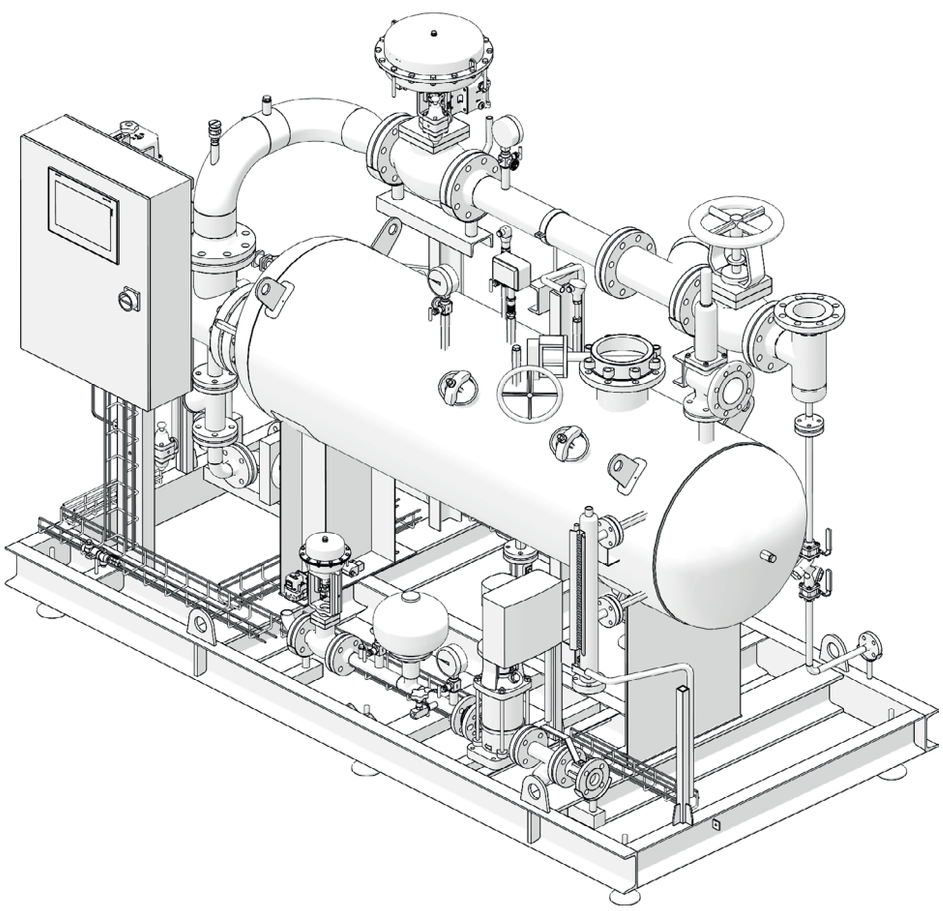
Connections

	Metric				Imperial			
	020	050	110	160	020	050	110	160
Plant steam inlet connection	DN32 PN16	DN50 PN16	DN80 PN16	DN100 PN16	1¼" ANSI 150	2" ANSI 150	3" ANSI 150	4" ANSI 150
Condensate outlet connection	DN25 PN16	DN25 PN16	DN40 PN16	DN40 PN160	1" ANSI 300	1" ANSI 300	1½" ANSI 300	1½" ANSI 300
Clean steam outlet connection	DN50 PN40	DN80 PN40	DN125 PN16	DN150 PN16	2" ANSI 300	3" ANSI 300	5" ANSI 300	6" ANSI 300
Feedwater inlet connection	DN15 PN40	DN20 PN40	DN25 PN40	DN32 PN40	½" ANSI 300	¾" ANSI 300	1" ANSI 300	1¼" ANSI 300
Safety valve discharge	1" G-f	DN50 PN16	DN80 PN16	DN80 PN16	1" NPT	1¼" NPT*	3" NPT	3" NPT
Drain connection	DN25 PN40	DN25 PN40	DN25 PN40	DN25 PN40	1" ANSI 300	¾" ANSI 300	1" ANSI 300	1" ANSI 300
Plant steam condensate drain connection	DN15 PN40	DN15 PN40	DN15 PN40	DN15 PN40	½" ANSI 150	½" ANSI 150	½" ANSI 150	½" ANSI 150
TDS Blowdown connection	DN15 PN40	DN15 PN40	DN15 PN40	DN15 PN40	½" ANSI 150	½" ANSI 150	½" ANSI 150	½" ANSI 150
Sampling system (cooling water in/ out-sample out)	½" BSP-6 mm	½" BSP-6 mm	½" BSP-6 mm	½" BSP-6 mm	½" BSP	½" BSP	½" BSP	½" BSP
Options								



Product nomenclature and selection guide

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

Basic configuration				Selection
Design code	E	EN		E
	A	ASME		
	G	GB		
	J	JBA		
Shell type	S	Flanged openable-shell and tube, flanged openable without integrated deaerator		S
Unit size	020	Up to 200 kg/h	(440 lbs/hr)	020
	050	Up to 500 kg/h	(1002 lbs/hr)	
	110	Up to 1100 kg/h	(2425 lbs/hr)	
	160	Up to 1600 kg/h	(3527 lbs/hr)	
			(at the reference operating conditions)	
Valve actuation type	PN	Pneumatic (fail-safe)		PN
	EL	Electric (fail-safe)		
Control	P1	ABB AC500 series + 7" display		P3
	P2	Allen-Bradley CompactLogix 1700 series + 7" display		
	P3	Siemens S7.1200 series + 7" display		
	P4	Selective Control Panel (with PLC ABB AC500 series + 7" display)		
Communication interface	C0	None		C1
	C1	BACnet IP		
	C2	Profinet		
	C3	Modbus TCP/IP		
	C4	BACnet MSTP		
	C5	Profibus		
	C6	Modbus RTU		
	C7	BACnet (BTL cert.) IP		
	C8	BACnet (BTL cert.) MSTP		
Unit frame/Electrical cabinet	0	Base and cabinet made of carbon steel, painted		1
	1	Open frame and cabinet made of carbon steel, painted		
	2	Frame w. side panels and cabinet made of carb. steel, painted		
	3	Base and cabinet made of stainless steel (304) *		
	4	Open frame and cabinet made of stainless steel (304) *		
	5	Frame with side panels and cabinet made of stainless steel (304) *		
	7	Seismic, Base and cabinet made of carb. steel, painted		
Control Panel location	S	Side		S
Insulation	1	Steam generator body only		2
	2	Steam generator and hot piping		
	3	Insulation to EEnv specification		
	0	Not insulated		

* This option/configuration is not allowed with P4 control (Selective Control Panel)

Product nomenclature and selection guide continued on next page

Product nomenclature and selection guide (continued)

Handling wheels and feet	N	None (only plates with anchor holes are provided)	**F**
	F	Adjustable feet	
	W	Pivoting wheels, lockable, with feet	
Plant steam inlet shut-off valve	M	Manual stop valve	**AE**
	AE	Automatic electric isolation valve *	
Plant steam line trapping	N	None	**T**
	T	Plant steam line trapping station	
TDS control system	1	Timed TDS blowdown	**2**
	2	TDS control with external probe (discontinuous metering) *	
Sampling cooler	N	None	**S**
	S	Sample-cooler and sampling valve	
Feedwater pressurisation system	N	None (water P > clean steam P + 0,5 bar g)	**P**
	P	Pump with VFD *	
Independent downstream plant protection	N	None	**T**
	T	Temperature limiter *	
Feedwater pre-heating	N	None	**N**
	PR	Feedwater pre-heating by heat recovery from primary condensate*	
Intelligent diagnostics	N	None	**I1**
	I1	System diagnostics *	
	I3	Integrity test *	
	I4	System diagnostics + Integrity test *	
Clean steam outlet shut-off valve	N	None	**AE**
	M	Manual stop valve	
	AE	Automatic electric isolation valve *	
Test and certifications	S	EU PED test and CE marking of the assembly	**S**
	U	ASME U stamp	
	M	MOM compliance	
	K	KGS compliance	
	D	DOSH compliance	
	GC	GB standard in Chinese language	
	GE	GB standard in English language	
	SF	None (as assembly)	
	U	ASME U stamp in line with FDS requirements.	
Level indicator	V	Viscorol (Magnetic Level Indicator)	**V**

* This option/configuration is not allowed with P4 control (Selective Control Panel)

Product nomenclature example

CSG-FB E S 020-PN P3 C1-1 S 2 F-AE T-2 S P T N I1-AE S V

Not all configurations are available in every country. Please contact your local Spirax Sarco representative for more details.

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6 Heat transfer solutions
Clean steam generators

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