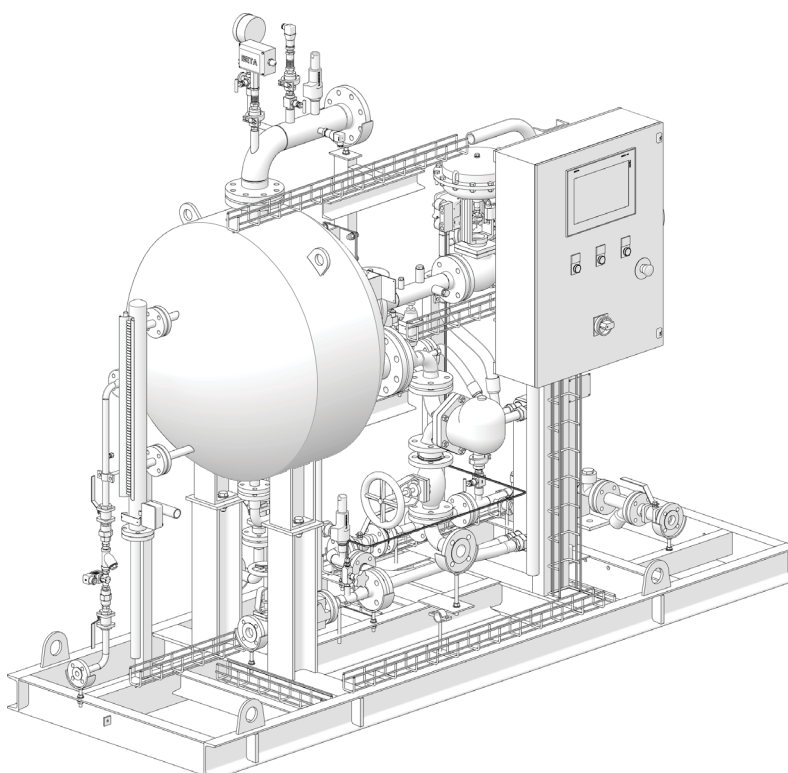




TI-P664-05
TES Issue 6

CSG-FBHP

High pressure clean steam generation system for Food & Beverage



Description

Spirax Sarco has created a new range of steam generators 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 FBHP-130	maximum production capacity	1250 kg/h	(2756 lbs/hr)*
	CSG FBHP-185	maximum production capacity	1800 kg/h	(3968 lbs/hr)*
	CSG FBHP-235	maximum production capacity	2200 kg/h	(4850 lbs/hr)*
	CSG FBHP-300	maximum production capacity	2900 kg/h	(6390 lbs/hr)*
	CSG FBHP-375	maximum production capacity	3500 kg/h	(7716 lbs/hr)*
	CSG FBHP-470	maximum production capacity	4400 kg/h	(9700 lbs/hr)*
	CSG FBHP-600	maximum production capacity	5300 kg/h	(11685 lbs/hr)*
Versions/Applications:		FBHP Food and Beverage steam injection for high pressure applications		

(*) max steam production at reference operating conditions: primary steam at 10.8 bar g (156.6 psi g), production at 8 bar g (116 psi g), feed water at 20 °C (68 °F).

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
- Spirax Sarco's worldwide service.

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

	EMEA		Americas	
	STD	On request	STD	On request
-  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			-	
- Materials on clean side compliant with list of FDA approved materials			-	

Design conditions

			EMEA	Americas
Primary side	Design pressure		12 bar g	(180 psi g)
	Design temperature		200 °C	(400 °F)
Secondary side	Design pressure		12 bar g	(180 psi g)
	Design temperature		200 °C	(400 °F)
	Safety valve set pressure		12 bar g	(180 psi g)
Feedwater	Design pressure		12 bar g	(180 psi g)
	Design temperature	without pump	200 °C	(400 °F)
		with pump	110 °C	(230 °F)

For a bespoke design, contact Spirax Sarco

Operating limits

	Without pump		With pump		Ambient Temperature: 0-40 °C Designed for indoor installation only, protect from freezing.
Production	Clean saturated steam, up to 8 bar g/175 °C (Clean saturated steam, up to 125 psi g /353 °F)				
Primary side	Plant steam, up to 12 bar g/200 °C (Plant steam, up to 180 psi g/400 °F) See safety valve protection				
Feedwater	P min. ≥ P clean steam + 2 bar g (P min. ≥ P clean steam + 29 psi g)		Minimum supply pressure (see IM)		* Note A single leg is taken from the three phase supply to power the PSU, ensure the single leg will have a voltage in the range required for single phase.
	P max 12 bar g/T max 200 °C (P max 174 psi g/T max 392 °F)		P max 12 bar g/T max 100 °C P max 174 psi g/T max 212 °F		
	Feedwater quality: pH 5.5 + 7.5 (at 20 °C/68 °F) Hardness ≤ 0.02 mmol/l Chloride Please refer to the table below Conductivity ≤ 20 µS/cm Temperature 15 °C minimum				
	Chlorides concentration limit in inlet feedwater				
	Blowdown set	Inlet feedwater pH			
		pH = 5.5	pH = 6.5	pH = 7.5	
	5%	≤ 0.5 mg/l	≤ 1 mg/l	≤ 3 mg/l	
	10%	≤ 1 mg/l	≤ 2 mg/l	≤ 6 mg/l	
	Unit without pump		Unit with pump		
Electrical supply (cabinets)	1 x 90-132 V AC or 1 x 180-264 V AC 50/60 Hz 0.4 kW (instr.)		3 x 200-460 V AC* 50/60 Hz (0.37kW - 5.5kW) + 0.4kW depending upon package size and csg pressure		
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)				
Safety valve protection Recommended but is not fitted to the package	Note, it is recommended to install a safety valve upstream of the CSG-FBHP to ensure that overpressure can never be supplied to the package. The supply pressure into the package may need to be limited due to the safety valve and this needs to be taken into consideration when sizing.				
Turndown	The packages have a turndown of 10:1 and therefore the minimum operating condition is 10% of the rated performance. The system should be sized according to typical use demands. Oversizing of the system will lead to oversized control valves that result in poor control at low load. If the Clean Steam Flow rate turndown ratio exceeds 10:1, a bespoke solution will be required and this must be specified at point of order.				

Insulation

The generator and hot piping should be insulated to prevent thermal losses. Where insulation options don't provide complete coverage, additional insulation should be applied as needed.

Option (see nomenclature)	Generator Body Thickness (mm)	Hot Piping Thickness (mm)
0 - not insulated	none	none
1 - Steam Generator body only to EnEV	100mm	none
3 - Steam Generator body to EnEV specification + hot piping	100mm	50mm

Insulation Material: Rockwool

Cladding Material: Stainless steel 304

Performance of the units (kg/h)

		Clean steam pressure (bar g)			
	Plant steam pressure (bar g)	8**	7	6	5
CSG-FBHP-130	10.8	1250	1280	1190	1100
	10.2	1050	1280	1190	1100
	9.6	-	1280	1190	1100
	8.2	-	-	1190	1100
	7.1	-	-	-	1100
CSG-FBHP-185	10.8	1800	1790	1670	1530
	10.2	1550	1790	1670	1530
	9.5	-	1790	1670	1530
	8.1	-	-	1670	1530
	7	-	-	-	1530
CSG-FBHP-235	10.8	2200	2230	2090	1920
	10.2	1900	2230	2090	1920
	9.3	-	2230	2090	1920
	8	-	-	2090	1920
	6.8	-	-	-	1920
CSG-FBHP-300	10.8	2900	2870	2680	2460
	10.2	2500	2870	2680	2460
	9.6	-	2870	2680	2460
	8.2	-	-	2680*	2460
	7.1	-	-	-	2460
CSG-FBHP-375	10.8	3500	3570	3340	3070
	10.2	3000	3570	3340	3070
	9.4	-	3570	3340	3070
	8	-	-	3340	3070
	6.9	-	-	-	3070
CSG-FBHP-470	10.8	4400	4460	4170	3830
	10.2	3700	4460	4170	3830
	9.6	-	4460	4170	3830
	8.2	-	-	4170	3830
	7.1	-	-	-	3830
CSG-FBHP-600	10.8	5300	5740	5360	4930
	10.2	4350	5740	5360	4930
	9.9	-	5740	5360	4930
	8.6	-	-	5360	4930
	7.5	-	-	-	4930

Note: Plant steam pressure must be sufficiently greater than clean steam pressure for clean steam production

** 8 bar g clean steam flowrates have been limited due to supply pressure. Higher capacity units can be considered as a bespoke.

Performance of the units (lbs/hr) (continued)

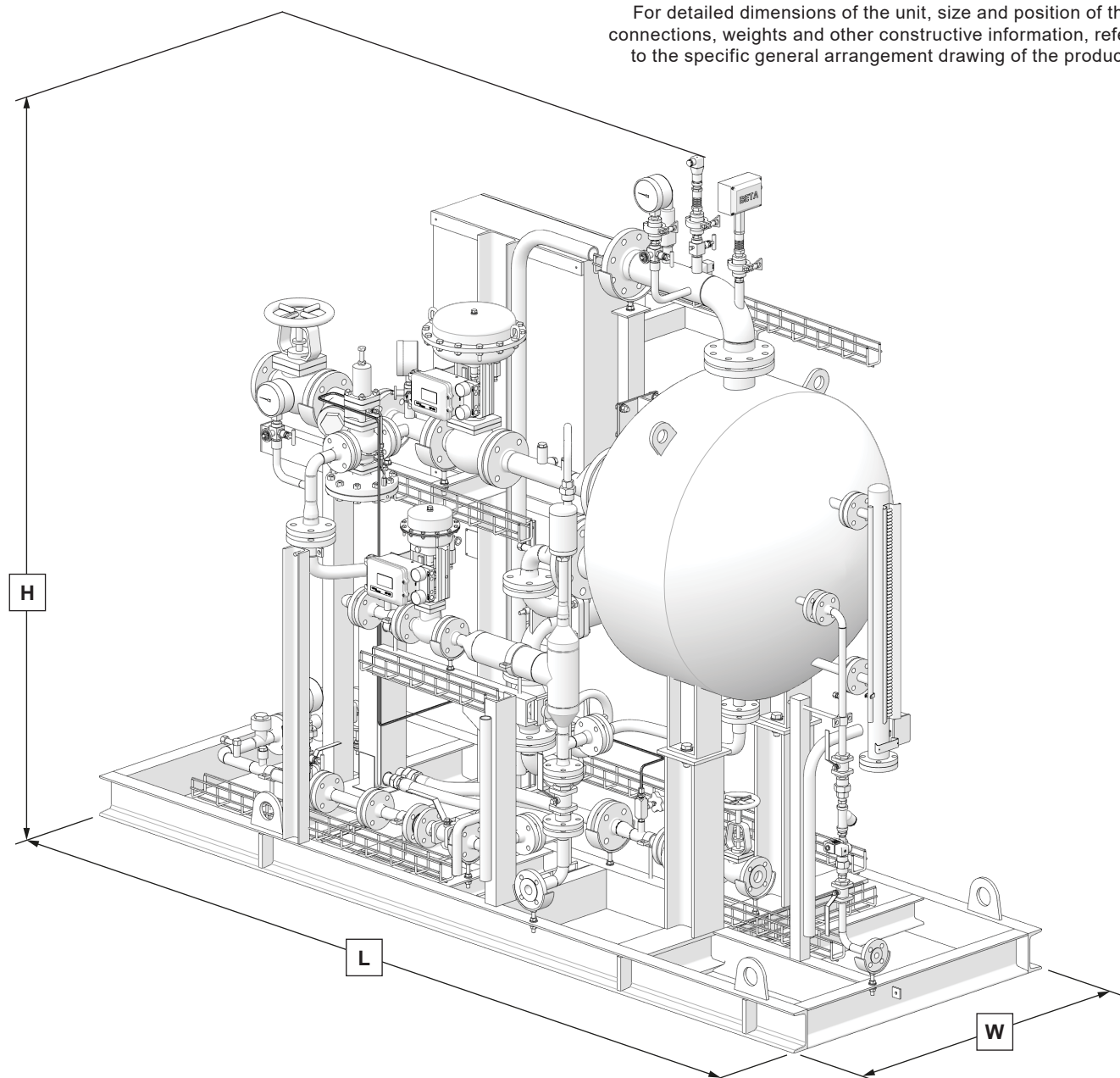
		Clean steam pressure (psi g)			
	Plant steam pressure (psi g)	116**	102	87	73
CSG-FBHP-130	156	2756	2821	2623	2425
	148	2315	2821	2623	2425
	139	-	2821	2623	2425
	119	-	-	2623	2425
	103	-	-	-	2425
CSG-FBHP-185	156	3968	3946	3681	3373
	148	3417	3946	3681	3373
	138	-	3946	3681	3373
	117	-	-	3681	3373
	102	-	-	-	3373
CSG-FBHP-235	156	4850	4916	4607	4232
	148	4189	4916	4607	4232
	135	-	4916	4607	4232
	116	-	-	4607	4232
	99	-	-	-	4232
CSG-FBHP-300	156	6390	6327	5908	5423
	148	5512	6327	5908	5423
	139	-	6327	5908	5423
	119	-	-	5908	5423
	103	-	-	-	5423
CSG-FBHP-375	156	7716	7870	7870	6768
	148	6614	7870	7870	6768
	136	-	7870	7870	6768
	116	-	-	7870	6768
	100	-	-	-	6768
CSG-FBHP-470	156	9700	9832	9193	8443
	148	8157	9832	9193	8443
	139	-	9832	9193	8443
	119	-	-	9193	8443
	103	-	-	-	8443
CSG-FBHP-600	156	11685	12654	11817	10868
	148	9590	12654	11817	10868
	144	-	12654	11817	10868
	125	-	-	10817	10868
	109	-	-	-	10868

Note: Plant steam pressure must be sufficiently greater than clean steam pressure for clean steam production

** 116 bar g clean steam flowrates have been limited due to supply pressure. Higher capacity units can be considered as a bespoke.

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

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



	Dimensions mm (inches)			Weights kg (lbs)		
	L Length	W Width	H Height	Empty	In operation	Maximum
130	2800 (110)	1000 (39)	2400 (94)	2100 (4630)	2250 (4960)	2400 (5291)
185	3100 (122)	1000 (39)	2450 (96)	2346 (5172)	2500 (5512)	2700 (5952)
235	3400 (134)	1100 (43)	2550 (100)	2573 (5672)	2750 (6063)	2900 (6393)
300	3700 (146)	1100 (43)	2060 (81)	2800 (6173)	3000 (6614)	3200 (7055)
375	3900 (154)	1100 (43)	2070 (81)	4968 (10953)	5200 (11464)	5400 (11905)
470	4000 (157)	1100 (43)	2080 (82)	5095 (11233)	5300 (11685)	5600 (12346)
600	4200 (165)	1100 (43)	2090 (82)	5350 (11794)	5600 (12346)	5900 (13007)

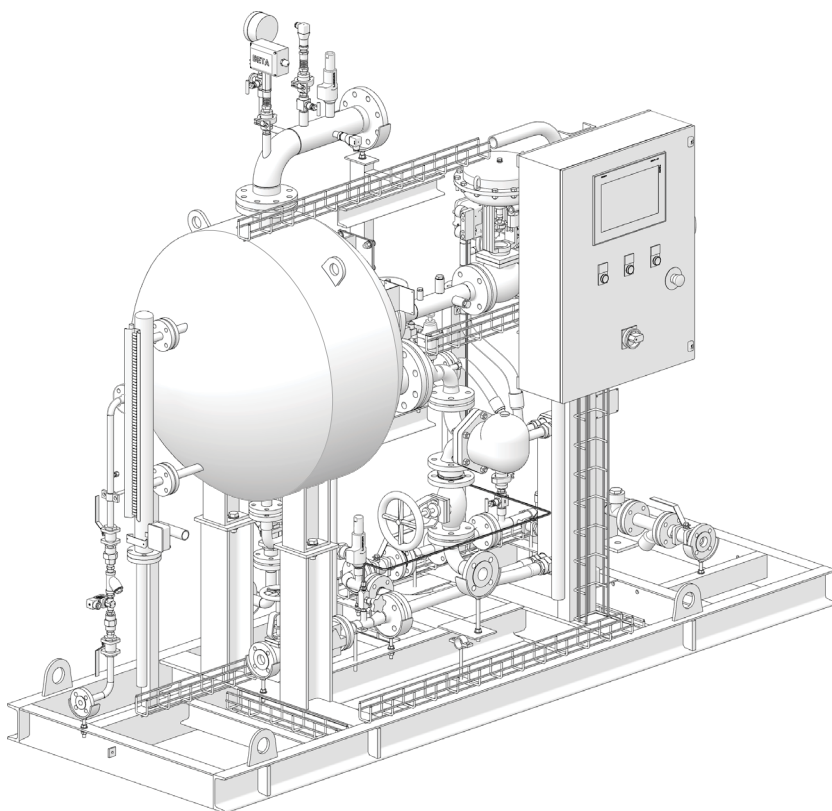
Indicated dimensions are the maximum dimensions for a specific configuration of the package.

Connections - Metric

	130	185	235	300	375	470	600
Plant steam Inlet	DN50 * PN16	DN65 PN16	DN80 PN16	DN80 PN16	DN100 PN16	DN100 PN16	DN100 PN16
Preheater Condensate Outlet	DN25 PN16	DN25 PN16	DN25 PN16	DN25 PN16	DN25 PN16	DN40 PN16	DN40 PN16
CSG Condensate Outlet	DN40 PN16	DN40 PN16	DN40 PN16	DN40 PN16	DN40 PN16	DN40 PN16	DN50 PN16
Feedwater Inlet	DN25 PN40	DN25 PN40	DN25 PN40	DN32 PN40	DN32 PN40	DN32 PN40	DN32 PN40
Drain Outlet	DN25 PN40	DN25 PN40	DN25 PN40	DN25 PN40	DN32 PN40	DN32 PN40	DN32 PN40
Blowdown Outlet /TDS	DN15 PN40	DN15 PN40	DN15 PN40	DN15 PN40	DN15 PN40	DN15 PN40	DN15 PN40
Clean Steam Outlet	DN80 PN40/PN25**	DN100 PN40/PN25**	DN125 PN40/PN25**	DN125 PN40/PN25**	DN150 PN40/PN25**	DN150 PN40/PN25**	DN200 PN25
Clean Steam Safety Valve Discharge Outlet	¾" NPT-F	¾" NPT-F	¾" NPT-F	1" NPT-F	1" NPT-F	1" NPT-F	1" NPT-F
Plant Steam Condensate Outlet (Drain)	DN15 PN40						
Comp. Air Line for Integrity Test	¼" NPT-F						
Pneumatic Air Supply Inlet	¼" BSP-F						
Sampling system (cooling water in/out-sample out)	½" BSP- 6 mm						
Options							

* If the Auto Plant Steam Isolation is selected, then this should be PN40

** Clean steam outlet connection is PN40 or PN25 on sizes 130, 185, 235, 300, 375 and 470, depending if the option of automatic clean steam isolation is selected. However, PN25 and PN40 flange connections on these sizes are interchangeable.

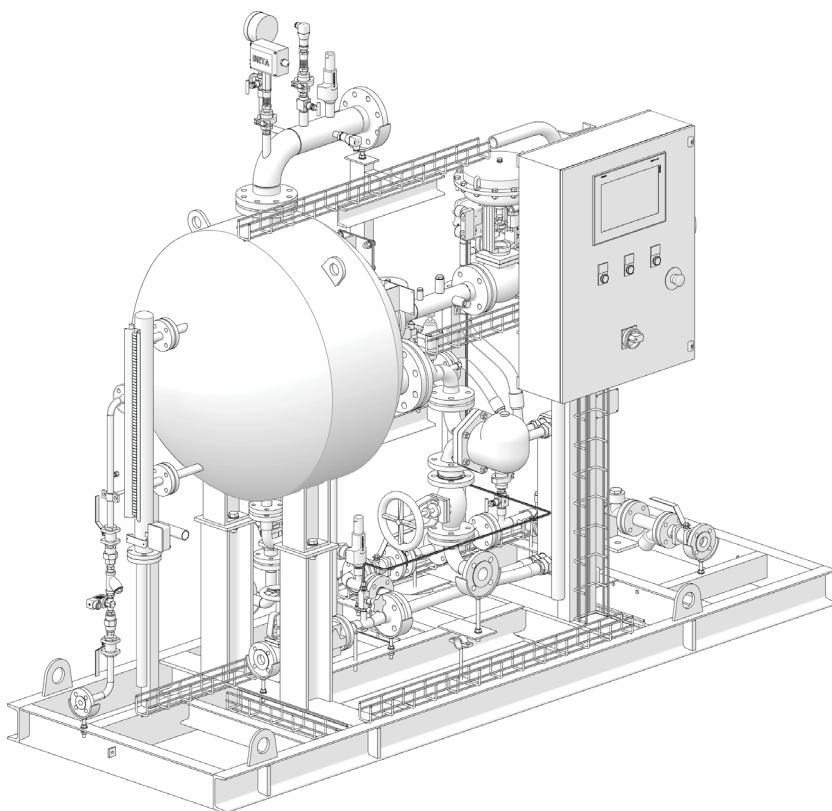


For imperial connections, see next page

Connections - Imperial

	130	185	235	300	375	470	600
Plant steam Inlet	2" * ANSI 150	2½" ANSI 150	3" ANSI 150	3" ANSI 150	4" ANSI 150	4" ANSI 150	4" ANSI 150
Preheater Condensate Outlet	1" ANSI 150	1" ANSI 150	1" ANSI 150	1" ANSI 150	1" ANSI 150	1½" ANSI 150	1½" ANSI 150
CSG Condensate Outlet	1½" ANSI 150	1½" ANSI 150	1½" ANSI 150	1½" ANSI 150	1½" ANSI 150	2" ANSI 150	2" ANSI 150
Feedwater Inlet	1" ANSI 300	1" ANSI 300	1" ANSI 300	1¼" ANSI 300	1¼" ANSI 300	1¼" ANSI 300	1¼" ANSI 300
Drain Outlet	1" ANSI 300	1" ANSI 300	1" ANSI 300	1" ANSI 300	1¼" ANSI 300	1¼" ANSI 300	1¼" ANSI 300
Blowdown Outlet /TDS	½" ANSI 300	½" ANSI 300	½" ANSI 300	½" ANSI 300	½" ANSI 300	½" ANSI 300	½" ANSI 300
Clean Steam Outlet	3" ANSI 150**	4" ANSI 150**	5" ANSI 150**	5" ANSI 150**	6" ANSI 150**	6" ANSI 150**	8" ANSI 150**
Clean Steam Safety Valve Discharge Outlet	¾" NPT-F	¾" NPT-F	¾" NPT-F	1" NPT-F	1" NPT-F	1" NPT-F	1" NPT-F
Plant Steam Condensate Outlet (Drain)	½" ANSI 300						
Comp. Air Line for Integrity Test	¼" NPT-F						
Pneumatic Air Supply Inlet	¼" BSP-F						
Sampling system (cooling water in/out-sample out)	½" BSP - 6 mm						
Options							

* If the Auto Plant Steam Isolation is selected, then this should be ANSI 300.



For metric connections, see previous page


Product nomenclature and selection guide

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

Design code	E	EN	E
Shell Type	W	Welded – not openable	W
Unit Size	130	Up to 1250 kg/h (2756 lbs/hr)	130
	185	Up to 1800 kg/h (3968 lbs/hr)	
	235	Up to 2200 kg/h (4850 lbs/hr)	
	300	Up to 2900 kg/h (6390 lbs/hr)	
	375	Up to 3500 kg/h (7716 lbs/hr)	
	470	Up to 4400 kg/h (9700 lbs/hr)	
	600	Up to 5300 kg/h (11685 lbs/hr)	
	Plant steam Kv (Cv)	10, 16, 36, 46, 63, 100, 160 (12, 18, 42, 53, 73, 116, 185)	10
	Feedwater Kv (Cv)	1, 1.6, 2.5, 4, 6.3 (1.2, 1.8, 2.9, 4.6, 7.3)	1
Control Valve Actuation	PN	Pneumatic (fail safe)	PN
	EL	Electric (fail safe)	
Control	P1	ABB AC500 + 7" Display	P1
	P2	Allen-Bradley CompactLogix 1700 + 7" Display	
	P3	Siemens S7.1200 + 7" Display	
	D1	ABB AC500 (PLC + 7" display) + RUT240/RUT241 (excluding SIM and connected service)	
	D3	Siemens S7.1200 (PLC + 7" display) + RUT240/RUT241 (excluding SIM and connected service)	
Communication interface	C0	None	C0
	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	
Frame and cabinet	0	Basement and cabinet made of carbon steel, painted *	0
	3	Base and cabinet made of stainless steel (304)	
Control Panel Location	S	Side	S
Insulation	1	Steam Generator Body only to EnEV (100 mm)	1
	3	Steam Generator Body to EnEV + Piping (50mm)	
	0	Not insulated	

Product nomenclature and selection guide continued on next page

Product nomenclature and selection guide (continued)

Wheels and feet	N	None (plates with anchor holes provided)	N
	F	Adjustable feet	
Plant steam inlet shut-off	M	Manual stop valve	M
	AE	Automatic electric isolation valve*	
Plant steam line trapping	N	None	N
	T	Plant steam line trapping station with pocket	
TDS Control	1	Timed TDS Blowdown (no control)	1
	2	TDS Control with external probe (discontinuous metering)	
Sample Cooler	N	None	N
	S	Sample Cooler and Sampling Valve	
Feedwater pressurisation	N	None (water P = clean steam P + 2.0 barg)	N
	P1	Pump with VFD (for 1 bar g clean steam)	
	P2	Pump with VFD (for 2 bar g clean steam)	
	P3	Pump with VFD (for 3 bar g clean steam)	
	P4	Pump with VFD (for 4 bar g clean steam)	
	P5	Pump with VFD (for 5 bar g clean steam)	
	P6	Pump with VFD (for 6 bar g clean steam)	
	P7	Pump with VFD (for 7 bar g clean steam)	
Plant protection	N	None	N
	V	Viscorol with low level limit switch	
Feedwater pre-heating	N	Pre-Heating by primary steam supply	N
Intelligent diagnostics	N	None	N
	I1	System Diagnostics	
	I3	Integrity test	
	I4	System diagnostics + Integrity test	
Clean steam shut off**	N	None	N
	M	Manual stop valve	
	AE	Automatic electric isolation valve*	
Test and certification	S	EU PED test and  marking of the assembly	S
Level indicator	V	Viscorol (Magnetic Level Indicator)	V

Product nomenclature example

CSG-FBHP E W 130-10-1 PN P1 C0 O S 1 N M N 1 N N N N N S V

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

** Enabling this option will cause the design limits for the whole package to be reduced to 10.3 bar g and 185°C