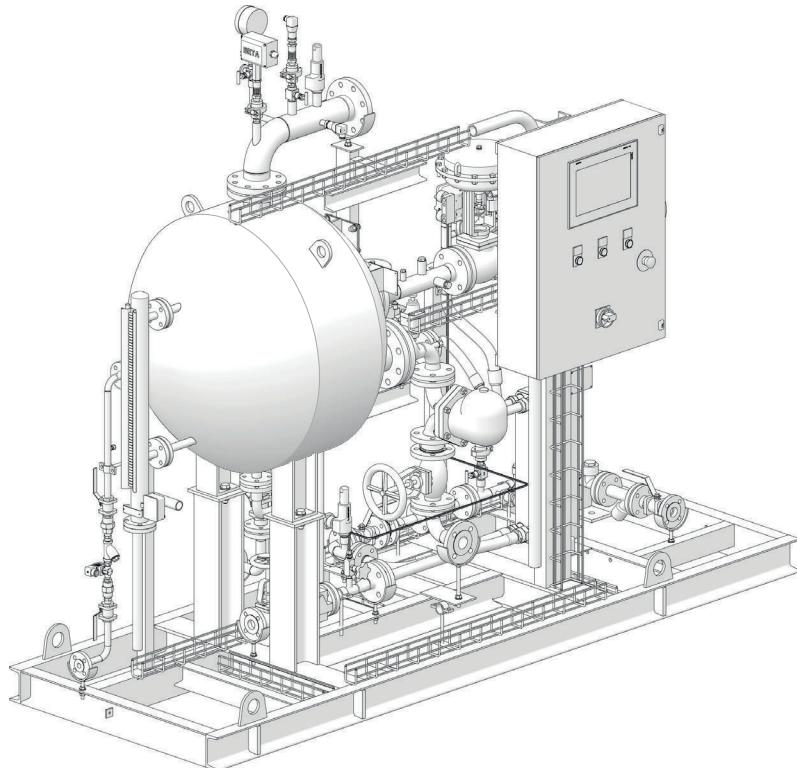


TI-P664-05  
TES Issue 1

## High pressure clean steam generation system for Food & Beverage

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### 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.

### Product range

**CSG FBHP-130** maximum production capacity 1300kg/h (2866 lbs/h)\*

**CSG FBHP-185** maximum production capacity 1850kg/h (4080 lbs/h)\*

**CSG FBHP-235** maximum production capacity 2350kg/h (5180 lbs/h)\*

#### Size:

**CSG FBHP-300** maximum production capacity 3000kg/h (6614 lbs/h)\*

**CSG FBHP-375** maximum production capacity 3750kg/h (8267 lbs/h)\*

**CSG FBHP-470** maximum production capacity 4700kg/h (10,362 lbs/h)\*

**CSG FBHP-600** maximum production capacity 6000kg/h (13,228 lbs/h)\*

**Versions/Applications:** **FBHP** Food and Beverage steam injection for high pressure applications

(\* ) max steam production at reference operating conditions: primary steam at 10.7 bar g (155.2 psi g), production at 8 bar g (116 psi g ), feed water at 20 °C (68 °F).

## Heat transfer solutions

### Clean steam generators

#### 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

	STD	On request
- <b>CE</b> 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.	-	

#### Design conditions

<b>Primary side</b>	Design pressure	12 bar g
	Design temperature	200 °C
<b>Secondary side</b>	Design pressure	12 bar g
	Design temperature	200 °C
<b>Feedwater</b>	Safety valve set pressure	12 bar g
	Design pressure	12 bar g
	Design temperature	without pump 200 °C with pump 80 °C

For a bespoke design, contact Spirax Sarco

**Operating limits**

	<b>Without pump</b>	<b>With pump</b>	
<b>Production</b>	Clean saturated steam, up to 8 bar g/175 °C (Clean saturated steam, up to 125 psi g /353 °F)		
<b>Primary side</b>	Plant steam, up to 12 bar g/191.7 °C (Plant steam, up to 174 psi g/345 °F)		
<b>Feedwater</b>	P min. $\geq$ P clean steam + 2 bar g (P min. $\geq$ P clean steam + 29 psi g)	Net positive suction head required (see IM)	Ambient Temperature: 0-40 °C Designed for indoor installation only, protect from freezing.
	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 $\leq$ 0.02 mmol/l Chloride Please refer to the table below Conductivity $\leq$ 20 $\mu$ S/cm		
	Chlorides concentration limit in inlet feedwater		
	Blowdown set	Inlet feedwater pH	
		pH = 5.5	pH = 6.5
	5%	$\leq$ 0.5 mg/l	$\leq$ 1 mg/l
	10%	$\leq$ 1 mg/l	$\leq$ 2 mg/l
		<b>Unit without pump</b>	<b>Unit with pump</b>
<b>Electrical supply (cabinets)</b>	1 x 230 V +N 50/60 Hz 0.4 kW (instr.)	3 x 380 to 500 V + N 50/60 Hz (0.37kW - 5.5kW) + 0.4kW depending upon package size and csg pressure	
<b>Air supply (filters)</b>	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)		

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Heat transfer solutions  
Clean steam generators  
Performance of the units

	Max clean steam production (kg/h), with feedwater at 20 °C:	Clean steam pressure/bar g			
		8	7	6	5
<b>CSG-FBHP-130</b>	<b>10.7</b>	1345	1275	1191	1095
	<b>9</b>	-	1275	1191	1095
	<b>7.6</b>	-	-	1191	1095
	<b>6.5</b>	-	-	-	1062*
<b>CSG-FBHP-185</b>	<b>10.7</b>	1883	1785	1668	1533
	<b>9</b>	-	1785	1668	1533
	<b>7.6</b>	-	-	1668	1533
	<b>6.5</b>	-	-	-	1514*
<b>CSG-FBHP-235</b>	<b>10.7</b>	2354	2231	2085	1916
	<b>9</b>	-	2231	2085	1916
	<b>7.6</b>	-	-	2085	1916
	<b>6.5</b>	-	-	-	1916
<b>CSG-FBHP-300</b>	<b>10.7</b>	3027	2868	2680	2463
	<b>9</b>	-	2868	2680	2463
	<b>7.6</b>	-	-	2642*	2463
	<b>6.5</b>	-	-	-	2338*
<b>CSG-FBHP-375</b>	<b>10.7</b>	3767	3569	3335	3065
	<b>9</b>	-	3569	3335	3065
	<b>7.6</b>	-	-	3335	3065
	<b>6.5</b>	-	-	-	3065
<b>CSG-FBHP-400</b>	<b>10.7</b>	4708	4461	4169	3832
	<b>9</b>	-	4461	4169	3832
	<b>7.6</b>	-	-	4169	3832
	<b>6.5</b>	-	-	-	3832
<b>CSG-FBHP-600</b>	<b>10.7</b>	6034*	5736	5360	4926
	<b>9</b>	-	5251*	5286*	4926
	<b>7.6</b>	-	-	4550*	4586*
	<b>6.5</b>	-	-	-	4027*

\*primary pipe velocity limited to 40ms-1

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

## Performance of the units (continued)

	Max clean steam production (lbs/hr), with feedwater at 68 °F:	Clean steam pressure/psi g			
		116	102	87	73
<b>CSG-FBHP-130</b>	<b>155</b>	2965	2811	2626	2414
	<b>131</b>	-	2811	2626	2414
	<b>110</b>	-	-	2626	2414
	<b>94</b>	-	-	-	2341*
<b>CSG-FBHP-185</b>	<b>155</b>	4151	3935	3677	3380
	<b>131</b>	-	3935	3677	3380
	<b>110</b>	-	-	3677	3380
	<b>94</b>	-	-	-	3338*
<b>CSG-FBHP-235</b>	<b>155</b>	5190	4919	4597	4224
	<b>131</b>	-	4919	4597	4224
	<b>110</b>	-	-	4597	4224
	<b>94</b>	-	-	-	4224
<b>CSG-FBHP-300</b>	<b>155</b>	6673	6323	5908	5430
	<b>131</b>	-	6323	5908	5430
	<b>110</b>	-	-	5825*	5430
	<b>94</b>	-	-	-	5154*
<b>CSG-FBHP-375</b>	<b>155</b>	8305	7868	7352	6757
	<b>131</b>	-	7868	7352	6757
	<b>110</b>	-	-	7352	6757
	<b>94</b>	-	-	-	6757
<b>CSG-FBHP-400</b>	<b>155</b>	10379	9835	9191	8448
	<b>131</b>	-	9835	9191	8448
	<b>110</b>	-	-	9191	8448
	<b>94</b>	-	-	-	8448
<b>CSG-FBHP-600</b>	<b>155</b>	13303*	12646	11817	10860
	<b>131</b>	-	11576*	11654*	10860
	<b>110</b>	-	-	10031*	10110*
	<b>94</b>	-	-	-	8878*

\*primary pipe velocity limited to 40ms-1

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

## Heat transfer solutions

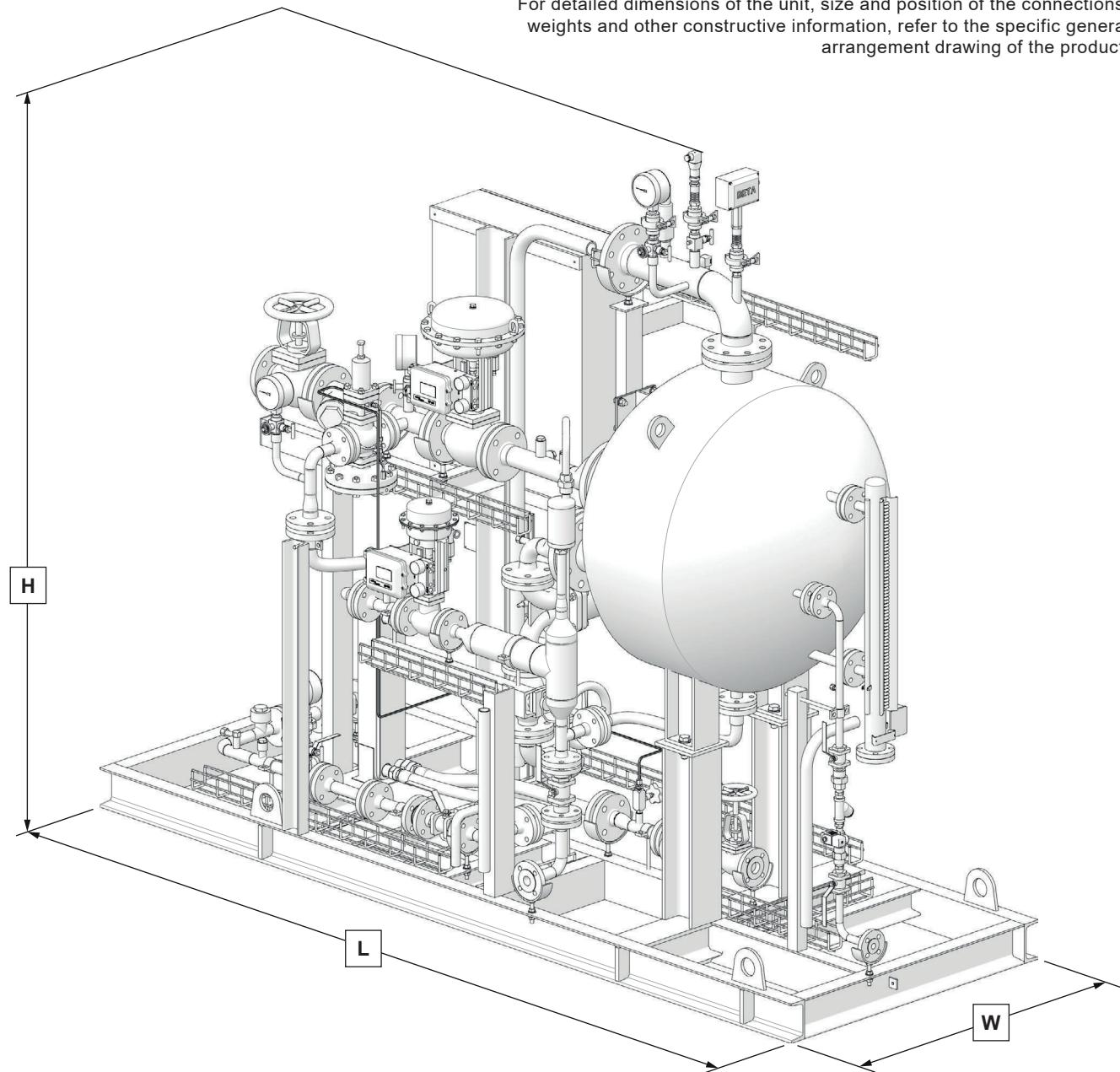
### Clean steam generators

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

	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.

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.



**Connections - Metric**

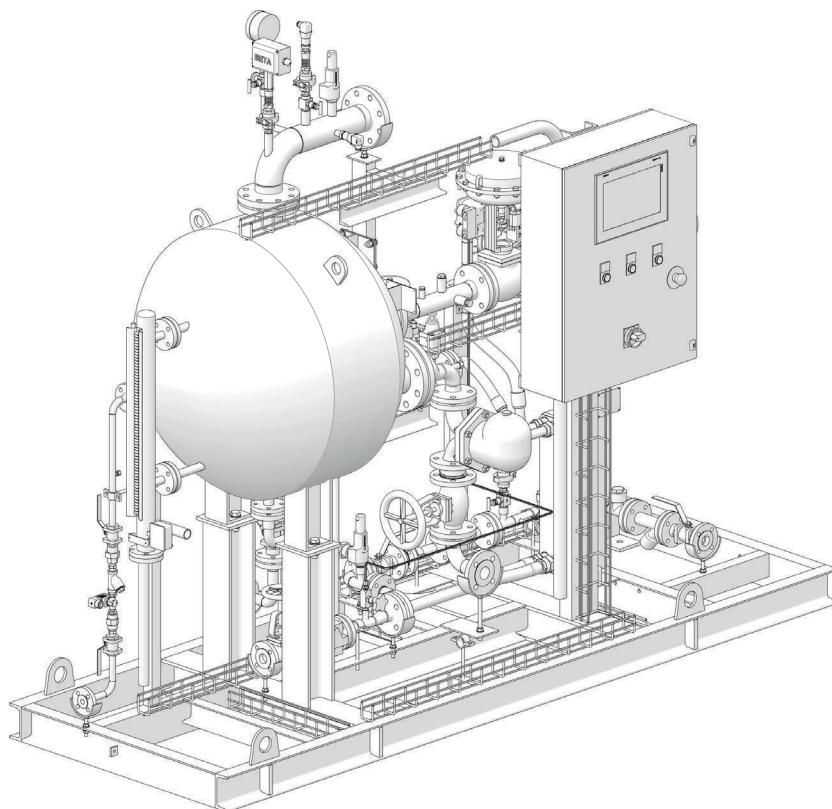
	<b>130</b>	<b>185</b>	<b>235</b>	<b>300</b>	<b>375</b>	<b>470</b>	<b>600</b>
Plant steam Inlet	DN50 * PN16	DN65 PN16	DN80 PN16	DN80 PN16	DN100 PN16	DN100 PN16	DN100 PN16
Preheater Condensate Outlet	DN25 PN16	DN25 PN16	DN25 PN16	DN25 PN16	DN25 PN16	DN40 PN16	DN40 PN16
CSG Condensate Outlet	DN40 PN16	DN40 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			
<b>Options</b>							

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

\*\* Clean steam outlet connection is PN40 or PN24 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.

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## Heat transfer solutions

### Clean steam generators

#### Product nomenclature and selection guide

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

<b>Design code</b>	E	EN	EN
<b>Shell Type</b>	W	Welded – not openable	W
	130	Up to 1300 kg/h (X lbs/hr)	
	185	Up to 1850kg/h (X lbs/hr)	
	235	Up to 2350kg/h (X lbs/hr)	
	300	Up to 3000kg/h (X lbs/hr)	
<b>Unit Size</b>	375	Up to 3750kg/h (X lbs/hr)	130.10.1
	470	Up to 4700kg/h (X lbs/hr)	
	600	Up to 6000kg/h (X lbs/hr)	
	Plant steam Kv	10, 16, 36, 46, 63, 100, 160	
	Feedwater Kv	1, 1.6, 2.5, 4, 6.3	
<b>Control Valve Actuation</b>	PN	Pneumatic (fail safe)	PN
	EL	Electric (fail safe)	
<b>Control</b>	P1	ABB AC500 + 7" Display	
	P2	Allen-Bradley CompactLogix 1700 + 7" Display	P1
	P3	Siemens S7.1200 + 7" Display	
<b>Communication interface</b>	C0	None	
	C1	BACnet IP	
	C2	Profinet	
	C3	Modbus TCP/IP	
	C4	BACnet MSTP	C0
	C5	Profibus	
	C6	Modbus RTU	
	C7	BACnet (BTL cert.) IP	
	C8	BACnet (BTL cert.) MSTP	
<b>Frame and cabinet</b>	0	Basement and cabinet made of carbon steel, painted *	0
	3	Base and cabinet made of stainless steel (304)	
<b>Control Panel Location</b>	S	Side	S
<b>Insulation</b>	1	Steam Generator Body only to EnEV (100 mm)	
	3	Steam Generator Body to EnEV + Piping (50mm)	1
	0	Not insulated	
<b>Wheels and feet</b>	N	None (plates with anchor holes provided)	N
	F	Adjustable feet	
<b>Plant steam inlet shut-off</b>	M	Manual stop valve	M
	AE	Automated stop valve (Electric)	
<b>Plant steam line trapping</b>	N	None	N
	T	Plant steam line trapping station	

Product nomenclature and selection guide continued on next page

## Product nomenclature and selection guide (continued)

<b>TDS Control</b>	1	Timed TDS Blowdown (no control)	1
	2	TDS Control with external probe (discontinuous metering)	
<b>Sample Cooler</b>	N	None	N
	S	Sample Cooler and Sampling Valve	
<b>Feedwater pressurisation</b>	N	None (water P = clean steam P + 2.0 barg)	N
	P1	Pump with VFD (for 1 barg clean steam)	
	P2	Pump with VFD (for 2 barg clean steam)	
	P3	Pump with VFD (for 3 barg clean steam)	
	P4	Pump with VFD (for 4 barg clean steam)	
	P5	Pump with VFD (for 5 barg clean steam)	
	P6	Pump with VFD (for 6 barg clean steam)	
	P7	Pump with VFD (for 7 barg clean steam)	
	P8	Pump with VFD (for 8 barg clean steam)	
<b>Plant protection</b>	N	None	N
	L	Self monitoring low level probe LP30 (available only with LP20)	
	V	Viscorol with low level limit switch	
<b>Feedwater pre-heating</b>	N	Pre-heating from primary steam supply	N
<b>Intelligent diagnostics</b>	N	None	N
	I1	System Diagnostics	
	I3	Integrity test	
	I4	System diagnostics + Integrity test	
<b>Clean steam shut off</b>	N	None	N
	M	Manual stop valve	
	AE	Automatic stop valve (electric)	
<b>Test and certification</b>	S	EU PED test and  marking of the assembly and conformity declaration according to EC1935	S
<b>Level indicator</b>	V	Viscorol (Magnetic Level Indicator)	V
	L	LP20 (Capacitance Level Probe)	

**Product nomenclature example**

CSG-FBHP EN W 130.10.1 PN P1 C0 0 S 1 N M N 1 N 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.

