

Multiple-Effect Distillation Units

MULTISTILL: MS 3000, MS 4000

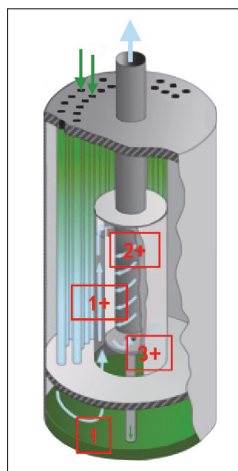


The BWT AQUA AG MS distillation units are designed to produce pharmaceutical grade Water for Injection (WFI) for the preparation of parenteral solutions, dilute samples in test laboratories, final flush in washers and similar applications. Water is produced by the evaporation, purification and condensation of feed water. MS units use the unique BWT AQUA AG internal preheating and separation systems for longer life and better performance.

The BWT AQUA AG MS distillation units consist of a series of heat exchangers (columns) and a condenser mounted vertically in a frame. Preheating, evaporation and separation take place within the column, minimizing external piping. The external piping transfers plant steam, feed water, cooling water, condensate, pure steam and WFI to and from the

- MULTISTILL Units for 200 up to 13,200 l/h
- Energy efficient and unique BWT AQUA AG 3+ separation system
- WFI production fulfills all the latest EU criteria and US Pharmacopoeias
- High Efficiency internal Pre-heating of feed water
- Efficient droplet and impurities separation system with >200 G centrifugal action
- Optional: full access from plant supervisor system via Ethernet communication
- Compliant with cGMP, optional compliant with GAMP and 21 CFR Part 11 requirements
- Uniform, complete documentation for all systems (FAT, SAT, IQ and OQ)

columns and the condenser. Automatic valves in the system are generally pneumatically operated and are controlled by the PLC-based control system. This is designed to operate automatically according to a validated program, but may also be operated manually. The MS series consistently produce WFI that meets and is typically better than Pharmacopoeia requirements. The BWT AQUA AG MS units are fully automatic in operation. The PLC control system can be delivered with documentation according to GAMP guidelines and is 21CFR Part 11 capable via Ethernet communication to client's control system. All alarms and set point parameters are entered / altered via a hierarchical password protected menu system. Data from the process may be collected from the PLC via a variety of industry standard network solutions.



BWT AQUA AG 3+ Separation System

The pre-heated "falling film" evaporation responds rapidly to load changes, and the 3+ separation system provides excellent impurity separation at all flow conditions. These features make the MS unit ideal for all WFI applications.

1 At the exit of the evaporation tubes the clean steam turns 180°. Non-evaporated feed water and large droplets are separated and fall to the bottom of the column. This effluent (typically 5–10%) is continuously discharged to drain as "blowdown", carrying away impurities from the separation system.

1+ The clean steam continues at low velocity upwards through the central tube within the column. Lower weight droplets continue to separate under gravity.

2+ The clean steam enters a tangential port to the cyclone chamber and accelerates at high velocity within the chamber. This centrifugal action further removes water droplets with impurities that drain to the base of the cyclone chamber.

3+ Finally, the steam turns again 180° and exits as pure steam from the top of the column.

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Type:			MS 3000				MS 4000			
Number of columns x			5	6	7	8	5	6	7	8
Capacity at heating steam pressure of:										
	WFI Capacity	l/h	6600				8800			
	Feed water	l/h	7260				9680			
8 bar (g)	Plant Steam	kg/h	1825	1520	1305	1140	2465	2055	1760	1540
	Cooling water	l/h	1980	440	0	0	2640	590	0	0
	WFI Capacity	l/h	6120				8160			
	Feed water	l/h	6740				8980			
7 bar (g)	Plant Steam	kg/h	1665	1390	1190	1045	2255	1880	1610	1410
	Cooling water	l/h	1835	405	0	0	2445	540	0	0
	WFI Capacity	l/h	5400				7200			
	Feed water	l/h	5940				7920			
6 bar (g)	Plant Steam	kg/h	1450	1210	1035	905	1960	1635	1400	1225
	Cooling water	l/h	1620	360	0	0	2160	480	0	0
	WFI Capacity	l/h	4650				6200			
	Feed water	l/h	5120				6820			
5 bar (g)	Plant Steam	kg/h	1230	1025	880	770	1665	1385	1190	1040
	Cooling water	l/h	1395	310	0	0	1860	415	0	0
	WFI Capacity	l/h	3750				5000			
	Feed water	l/h	4130				5500			
4 bar (g)	Plant Steam	kg/h	975	815	700	610	1320	1100	945	825
	Cooling water	l/h	1125	250	0	0	1500	335	0	0
	WFI Capacity	l/h	3000				4000			
	Feed water	l/h	3300				4400			
3 bar (g)	Plant Steam	kg/h	770	640	550	480	1040	870	745	650
	Cooling water	l/h	900	200	0	0	1200	270	0	0

Power consumption:										
Distillation heat emission *1)	kW		33.3	38.9	44.4	50.0	41.1	48.0	54.9	61.7
Electrical power approx. *2)	kW		6.5				8.5			
Voltage	VAC		400				400			
Frequency	Hz		50				50			

*1) Heat emission is worst case, based on experience.

*2) The electrical power depends on the pump capacity and on the feed water pressure.

Note: All capacity data is with a tolerance of +3–5%. Data is based on standard configured unit.

Feed water temperature of 20°C. Cooling water = 15°C.

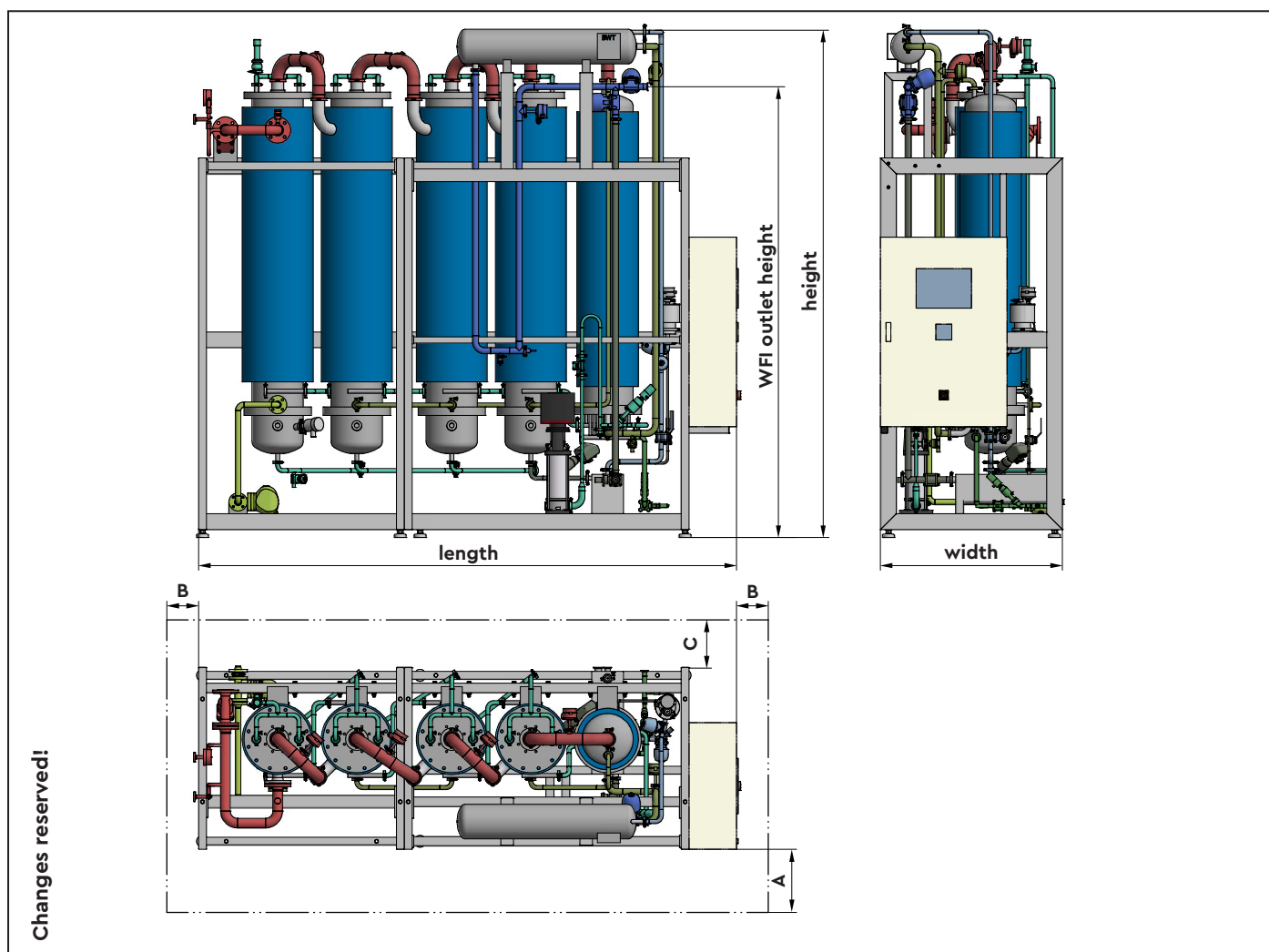
Dedicated data can be calculated based on customer's available utilities and requirements, including physical size.

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Type:		MS 3000				MS 4000			
Number of columns x		5	6	7	8	5	6	7	8
Dimensions: *3)									
Width	mm	1400				1600			
Height	mm	4300				4500			
Length	mm	5050	5700	6450	7100	5850	6750	7500	8400
Empty Weight	kg	5360	6040	6920	7600	7700	8600	9650	10500
WFI Outlet Height	mm	3750				3800			
Additional required free spaces for maintenance and installation:									
Width in front (A)	mm	1000				1000			
Length left and right side (B)	mm	1000				1000			
Width in behind (C)	mm	700				700			
Topside	mm	300				300			

*3) Length, width and height dimensions are based on basic unit configuration.
Dimensions and weights may vary depending on options selected.



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