Professionals in Process /Product Technologies

SM Biosystems

We are '*Professionals in Process/ Product Technologies*' with following expertise-

- **Conceptualization and Engineering of Projects**
- **Module and skid building**
- **Custom-built solutions**
- **Innovative hygiene Products for Pharma/ Dairy Industry**
- **Expertise in Pharma, Food, Natural resource based projects**
- **Business partners of world class products from Europe and USA**

Our Offerings-

- **Bio-Reactors And Fermenters**
- **Bio - Waste Decontamination Systems / Sterilization Systems / Inactivation Systems**
- **PWDS, WFIDS, CSDS Systems**
- **CIP Plants**
- **Pharmaceutical Machinery and Bio-pharma Custom Built Modules**
- **Mixing And Blending Vessels**
- **Dairy/Starch Projects**
- **Drying And Evaporation Projects**
- **Biorefineries**
- **Piping Engineering**
- **Plug-in Temperature / Brix / pH / Pressure/ Flow Control Modules**
- **Electrical And Automation Engineering**
- **Flow Control Equipment**
- **All Types Of Valves And Valve Automation**

Temperature Control Modules

Life science processes require carefully controlled temperature within a very narrow range to create the most favorable environment for growth of microbes and production. At the same time the ability to rapidly heat up and cool down is critical during sanitization and sterilization steps. SM Biosystems has developed temperature control modules (TCMs) that provide not only fast and dependable temperature control but also an economical design.

Application

SM Biosystems' standard TCMs are suitable for installation not only at large scale manufacturing facilities but also for smaller operations such as pilot plants or labs that require a reliable and economical method for temperature control. These can be used on a wide variety of process systems such as

- Fermenters and bioreactors
- Media or buffer preparation and hold vessels
- Purification processes
- Formulation equipment
- Other process vessels

Standard design

SM Biosystems' TCMs deliver long lasting performance and accurate temperature control. They can be incorporated as part of a larger process skid or module, or can be installed in the field as a stand –alone unit. These are designed for ease of maintenance and operation with a minimal footprint. The standard modules are designed for installation in mechanical areas, but total stainless steel modules are also available for installation in clean rooms. All the units meet the stringent performance and regulatory requirements of the life science industry.

Available Options for Temperature control modules-

- Plug in heating modules On/Off control
- Plug in heat / cool modules PID controllers
- Thermic fluid temperature control system modules
- Electrical heater PID proportional control modules

Available Accessories for TCMs-

- Steam supply pressure regulator
- Steam supply pressure indicator with pigtail and valve
- Steam supply safety relief valve
- Steam supply strainer with blowdown valve
- Pressure indicators with isolation valves
- Isolation ball valves
- Local jacket temperature indicator with thermowell
- Spirax Sarco condense pump

Working Principle

The standard TCM uses water or similar fluids as the heat transfer medium to control the temperature. A closed –loop piping system heats or cools the water circulating through the vessel jacket. Heating is achieved by the flow of steam through a modulating control valve to the plate heat exchanger. Cooling is done by adding chilled water to the loop through a modulating control valve and returning to the chilled water system.

A controller or an optional programmable logic controller (PLC) is provided for temperature control. The temperature controller obtains the product temperature from a temperature sensor on the process vessel and adjusts the temperature of the medium circulating in the jacket accordingly. A sensor located at the plate heat exchanger outlet reads the jacket temperature. As an option, the jacket medium pressure and temperature may be viewed at local indicators on the jacket piping.

Vessels with multiple jacket zones can turn on the heating or cooling medium when the bottom zone is covered with product and follow the same principle for other zones until the vessel is full.

Factory acceptance (FAT)

SMB Biosystems operates and fully tests all systems at the factory before shipment to reduce on-site commissioning and validation efforts. The factory testing facility is equipped to provide plant system, clean steam, distilled water, instrumental air and electrical power to perform full system testing.

Documentation

SMB Biosystems provides a comprehensive turnover package (TOP) with each system containing information required to validate the system. In the addition to the original set of documents, a CD containing TOP documents in

PDF format with hyperlinks to document sections and tables, is provided. Standard elements of the package include:
-Drawing section, including general arrangement, P&ID for vessel, drawing and weld map.
- Detailed process and automation design package
- Valve instrumentation and equipment manuals and certificates.
- Qualification package, including material certification.
- Comprehensive FAT documentation.

Technical specifications

The table below lists the performance of the five standard sizes of TCMs for both heating and cooling operations. Customized TCMs of any size are also available.

Heat time from 20°C to 37°C limiting jacket temperature to 50°C, minutes

Norm. Size	Norm Flow Rate LPM	Max Heat Transfer Btu/HR	Max Steam Flow lb/hr	Steam Line Size Pipe	Vessel Working Volume, Liters											
					50	100	250	500	750	1,000	2,000	3,000	5,000	7,500	10,000	15,000
0.5"Tube	3	19,863	21	0.5"	21	35	79									
1.0"Tube	25	154,888	168	1.0"	12	14	21	30	37	44	78					
1.5"Tube	90	515,170	558	1.5"		13	17	22			38	46	65	86		
2.0"Tube	175	995,861	1,078	2.0"				20	23	24	33	37	48	60	71	95
3.0"Pipe	650	1,965,343	2,127	3.0"							29	31	38	43	48	58

Cool down time from 25°C to 5°C using 2°C chilled supplies, minutes

Norm. sie	Norm Flow Rate LPM	Max Heat Transfer Kbtu/hr	Chilled Water supply lb/hr	Chilled water line size	Vessel Working volume, Liters											
					50	100	250	500	750	1,000	2,000	3,000	5,000	7,500	10,000	15,000
0.5"Tube	3	15,050	394	0.5"Tube	52	85	188									
1.0"Tube	25	122,356	3,285	1.0"Tube	31	38	54	75	94	110	188					
1.5"Tube	90	401,609	11,825	1.5"Tube		35	45	51	65	69	99	117	162	212		
2.0"Tube	175	726,226	22,994	2.0"Tube				48	60	63	85	96	125	152	180	236
3.0"Tube	650	1,366,634	85,406	3.0"Tube					56	58	76	81	100	113	127	152

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