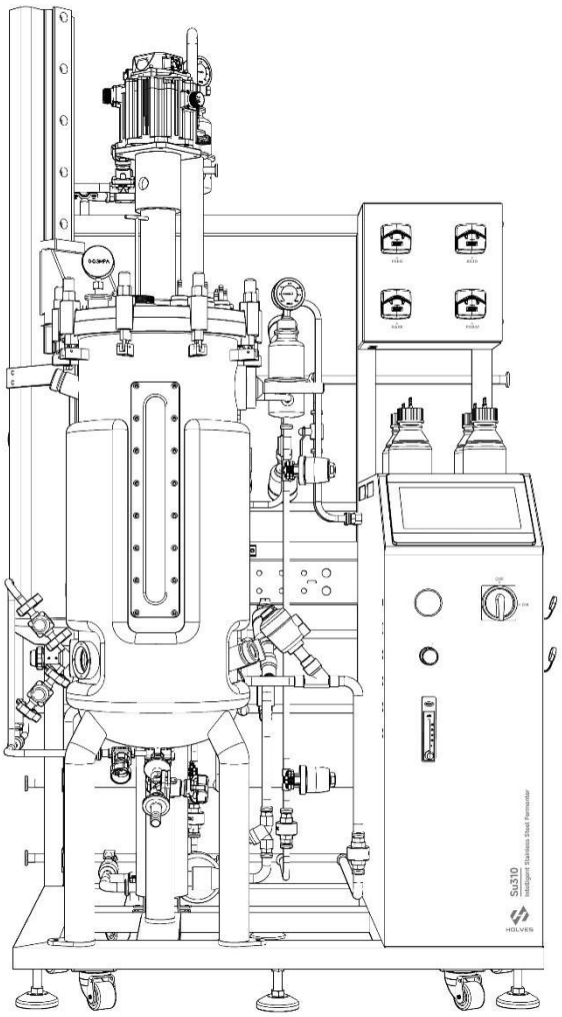
Thank you very much for your trust and support in our company. We are honored to provide you with information regarding the Su310 series intelligent stainless steel fermenter, researched, developed, and produced by HOLVES:

Su310

Intelligent Stainless Steel Fermenter



Schematic Diagram

An Intelligent Fermenter Leading Efficient Fermentation

- The Su310 intelligent stainless steel fermenter precisely focuses on the advanced needs of pilot-scale amplification and small-scale production scenarios.
- The Su310 achieves breakthrough structural optimization by fully integrating the control system into the equipment frame, eliminating the traditional external chassis and significantly reducing the footprint. Models of 50 liters and below come standard with a high-performance servo motor drive system, offering far superior stirring accuracy, operational stability, and quietness compared to traditional systems. On the software side, the equipment is equipped with a new generation 3.0 holographic intelligent control system, providing greater computing power and an optimized algorithm platform for smarter process control and quicker response.
- To meet diverse scenario requirements, the Su310 offers extremely strong expansion flexibility and customization capabilities. From stringent GMP compliance upgrades for the pharmaceutical industry to the integration of PAT process detection, feeding systems, and off-gas analysis modules, HOLVES can provide deeply personalized solutions to precisely match the equipment to your process.

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I. Technical Configuration Description

No.	Name	Parameter		Std.	Opt.
1	50L Vessel	Specification	– Single vessel volume: 50L, Max. working volume 80% – Diameter/Height ratio: 1:2.5	●	
		Effective Volume	– 12L~40L	●	
		Design Pressure	– Max. 0.35MPa	●	
		Vessel Material	– Inner wall: AISI 316L stainless steel, mirror polish, Ra≤0.4 – Outer wall and jacket: AISI 304 stainless steel, Ra≤0.8	●	
		Vessel Observation	– Large window glass side viewer – Dedicated sanitary explosion-proof viewer light	●	
		Guided Flow Jacket	– Designed with guided flow baffle plates for a more rational overall temperature control process – Equipped with a safety valve to prevent risks caused by excessive jacket pressure	●	
		Integrated Bottom Valve	– Eliminates dead ends prone to contamination in traditional vessels, supports online steam sterilization – Works with one-click system for automated control, improving work efficiency	●	
		Vessel Ports	– Liquid and gas inlets/outlets: inoculation valve port, feed valve port (supports off-position probes, four-valve groups, etc.), online sampling port, PAT spare port, bottom valve, surface aeration port, subsurface aeration port, safety rupture disc/pressure relief valve – Probe ports: pH, DO, level, pressure, foam, etc.	●	
		Manufacturing Standard	– ASME BPE-2019, PED welding standards	●	
		Vessel Documentation	– Pressure vessel affiliated documents, material reports	●	
2	Vessel Lid Lift	Lifting Device	– Power unit: Electric hydraulic cylinder – Stroke: 400mm, fine-tunable on-site	●	
		Operation Method	– Local PLC control, HMI display and operation	●	
3	Mixing	Mixing Motor	– Leadshine servo motor	●	

	System		– Speed range: 0~800 rpm, resolution 1 rpm		
		Baffles	– Equipped with four baffle structure, baffle material AISI 316L	●	
		Impellers	– Central vertical agitation, impeller position adjustable – 2 sets of six-blade straight turbines, 1 set of six-blade pitched blade turbine	●	
		Mechanical Seal	– Original German Burgmann mechanical seal	●	
		Impeller Replacement	– Can flexibly change to other types of impellers		○
4	Auto Sterilization	Empty Sterilization	– When no material is placed in the fermenter, steam is introduced directly into the entire vessel for sterilization to eliminate potential microbial contamination – Sterilization temperature: 121~135℃ – Max. heat-up time: 30min	●	
		Real Sterilization	– After material is placed in the fermenter, steam is first introduced into the jacket and then into the vessel to reduce the generation of condensate inside the vessel and ensure the microbial environment during fermentation meets production requirements – Sterilization temperature: 121~135℃ – Max. heat-up time: 30min	●	
5	Steam System	Pressure Regulating Valve	– Regulates steam pressure for greater stability	●	
		Steam Filter	– Filtration accuracy: 1μm, filters steam impurities	●	
		Steam Trap	– Used to discharge steam condensate	●	
		Pipe Insulation	– Reduces steam condensate generation	●	
		Independent Steam Drain System	– Optional independent steam drain system for secondary drainage and drying of steam in pipelines, faster heat-up process		○
6	Sampling System	Sanitary Sampling Valve	– Equipped with independent sanitary sampling valve, can be used with manual steam valve to flush and sterilize the sampling line with high-temperature steam for a certain period before sampling/harvest, ensuring sanitary requirements of the pipeline	●	

		Disposable Sampling System	– PAT spare port can be equipped with disposable sampling bags, independently equipped with 5 sets, allowing 5 uninterrupted samplings per batch using sterile disposable sampling bags, reducing steps like sterilization		○
7	Inlet/Outlet Gas System	Aeration Method	– Subsurface aeration, equipped with bottom ring gas sparger	●	
		MassFlowmeter	– Equipped with an imported glass MFC(VOGTLIN)	●	
		Inlet Air Filter	– Equipped with inlet air filter, accuracy 0.01μm, easy disassembly, supports online sterilization	●	
		Exhaust Gas Condenser	– Equipped with exhaust gas condenser, shell and tube heat exchanger, effectively condenses exhaust gas, preventing loss of active components	●	
		Exhaust Air Filter	– Optional exhaust air filter, accuracy 0.01μm, easy disassembly, supports online sterilization		○
		Gas Types	– Supports expansion of gas types, such as O2, CO2, N2		○
		Gas Sparger Ring	– Can flexibly change to other types of gas spargers		○
8	Auto Vessel Pressure	Sensor	– BD|SENSORS sensor	●	
		Proportional Valve	– Communicates with main PLC, automatic PID control via exhaust gas proportional regulating valve, brand Germany Bürkert	●	
		Pressure Range	– Vessel pressure detection range: -1~0.4MPa	●	
9	pH	Sensor	– Equipped with imported sensor, Hamilton – Range: 0.00~14.00 pH, accuracy ±0.02, resolution 0.01	●	
		Control System	– Automatic control via PID algorithm – Customizable dead band – HN-K integrated transmitter, with filter, signal isolator, RS-485 communication	●	
		Associated Control	– pH control system automatically regulates pH by controlling the operation of acid and base pumps – Smart-SC® intelligent sequential control allows customizing pH parameters within any defined time period	●	

10	DO	Sensor	– Equipped with imported dissolved oxygen sensor, Hamilton – Range: 0~100% O2 saturation, accuracy ≤±(1%+6ppb), resolution 0.01	•	
		Control System	– Automatic control via PID algorithm – Customizable dead band – HN-K integrated transmitter, with filter, signal isolator, RS-485 communication	•	
		Associated Control	– DO control system achieves automatic DO regulation through association with agitation speed and aeration flow rate	•	
11	Temp Control Module	Temperature Monitoring	– Equipped with PT100 temperature electrode, brand Germany JUMO – Measuring range 0~150℃, accuracy ±0.1℃, resolution 0.01 – Equipped with stainless steel electrode sheath	•	
		Control System	– Automatic control via PID algorithm – Control range: cooling water temp +6~50℃, accuracy ±0.2℃ – Customizable dead band	•	
		Temp Control Method	– Automatically regulates vessel temperature via hot water internal circulation in the jacket (with booster pump and electric heater) and cold water circulation (with solenoid valve)	•	
		Dual Water Switching	– Tap water or cooling water can be switched based on ambient temperature	•	
12	Antifoam Module	Antifoam Impeller	– Equipped with mechanical antifoam impeller	•	
		Foam Sensing	– Equipped with antifoam electrode, can sensitively detect foam generation inside vessel, detection height freely adjustable	•	
		Auto Antifoam	– When foam sensing time exceeds the set time threshold, the system automatically runs the antifoam pump	•	
13	Feeding Module	Peristaltic Pump	– Speed range 0~300rpm – Includes four peristaltic pumps: feed pump, acid pump, base pump, antifoam pump – High precision flip-top pump, supports variable speed adjustment – Supports switching between three sizes of silicone tubing: 16#, 25#, supports manual calibration	•	

			– Supports real-time display of peristaltic pump speed and flow rate values		
		Feeding Method	– Equipped with independently developed Feed-Sup® feeding system, supports multiple feeding methods: manual feeding, timed feeding, equation feeding, exponential feeding	•	
14	Control Cabinet	Touch Screen	– 10-inch HMI touch screen, brightness >350 cd/㎡	•	
		Electrical Components	– Germany Siemens PLC SIMATIC S7-1200 series – Low-voltage components use internationally renowned brands such as Schneider	•	
		Graphical Interface	– Second-generation graphical interface, data visualization, information charting, convenient experimental operation	•	
		Emergency Stop Button	– Equipped with emergency stop button, easily accessible location, used for quick shutdown under emergency conditions	•	
		Control Cabinet	– Uses stainless steel integrated control cabinet, surface brushed finish – Sensors, low-voltage, pneumatic circuits, etc., all use quick-disconnect interfaces for easy connection and maintenance replacement	•	
15	Operating System	Software	– Embedded HF-Control V2.0 embedded control software configuration for local full operation	•	
		Multi-level User	– System has two user levels: admin and technologist – Different levels have different operation permissions	•	
		Data Curves	– Supports automatic generation of parameter curves, each curve can be manually displayed and hidden – Curve display range supports time-based query	•	
		Data Query	– Supports automatic recording of parameter data, recording period adjustable – Parameter data supports export and time-based query	•	
		Alarm Configuration	– Supports over-limit alarms for pH, DO, vessel temperature – Alarm information supports date-based query	•	

		Batch Data	– Supports manual creation of fermentation batches – Data within a batch supports individual query and export	●	
		Audit Trail	– Meta-Tri® audit trail, exclusively developed system automatically stores operation records – Key operations are automatically recorded – Audit data supports export and date-based query	●	
		Data Export	– Supports USB drive data export – Exported data in CSV format	●	
16	Smart Association	DO Association	– Supports association of DO with agitation speed and aeration flow rate – During association, if DO deviates from the set value, the associated parameters will change proportionally to the DO within their set upper and lower limits	●	
		Feeding Association	– Supports association of feed pump speed with pH/DO – During association, when the detected value of pH/DO falls within the association condition range, the feed pump will run at the set associated feed speed	●	
		Smart Sequential Control	– Smart-SC® intelligent sequential control supports association of set values for pH, DO, vessel temperature, agitation speed, and feed pump speed with time – During association, the system automatically writes the set parameter values at the set time points	●	
17	Multi-unit Expansion System	Equipment Expansion	– Multi-unit chassis and vessels, only requires minor changes to the connection methods for electrical lines, pneumatic circuits, and water circuits to achieve control of multiple vessels		○
		Screen Expansion	– Multi-unit expansion system adds a master screen, intuitively displaying fermentation parameters of all vessels – Within the master screen, clicking on different fermenter panels allows quick jump to the main control screen of any fermenter		○
18	PAT process monitoring	pH	– Equipped with pH electrode, brand Hamilton, supports online high-temperature sterilization	●	

			– Equipped with stainless steel electrode sheath – Supports pH electrode calibration		
		DO	– Equipped with polarographic dissolved oxygen electrode, brand Hamilton, supports online high-temperature sterilization – Equipped with stainless steel electrode sheath – Supports electrode polarization and calibration	●	
		MFC	– Optional MFC, brand Switzerland Vögtlin – Supports online monitoring of aeration flow rate		○
		Turbidity	– Optional turbidimeter, multiple brands available – Supports online monitoring of turbidity		○
		Feed Weighing	– Optional electronic balance, brand US OHAUS – Supports online monitoring of feed weight		○
		Vessel Weighing	– Optional imported load cells – Supports online vessel weighing		○
		Off-gas Analysis	– Optional off-gas analyzer – Supports online monitoring of oxygen and carbon dioxide – Enables PAT process analysis such as CER, OUR, RQ, Kla		○
19	Online Monitoring	Host Computer (SCADA)	– Uses HW-Control V2.0 fermentation control software		○
		IoT Remote	– HF-LOT V2.0 enables monitoring functions for fermentation equipment, paired with H-Box for stable transmission and data reading – Cloud uses Alibaba Cloud server, supports multi-terminal direct connection via mobile phone, computer, iPad, etc.		○

II. Selected Components

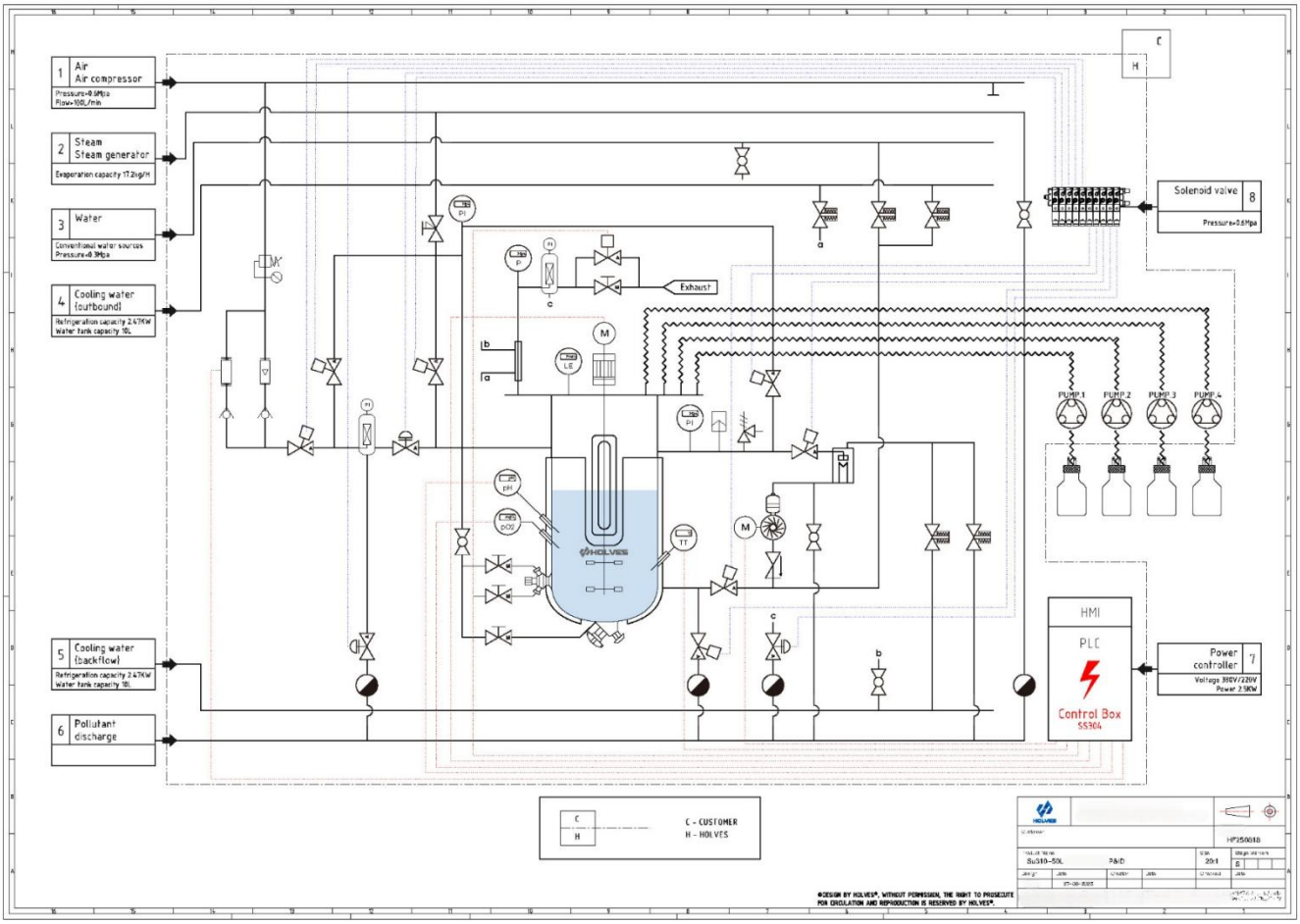
No.	Name	Brand Description
1	pH Sensor	Hamilton
2	DO Sensor	Hamilton
3	Controller	Germany Siemens SIMATIC S7-1200 original series, PID program control with independent intellectual property rights
4	Touch Screen	HMI TPC10
5	Mechanical Seal	Burgmann
6	Peristaltic Pump	HOLVES
7	Feed Bottle	SCHOTT
8	Mass Flowmeter	Vögtlin
9	PT100 Sensor	JUMO
10	Low-voltage Electrical	Schneider
11	Manual / Auto Diaphragm Valve	Hebron
12	Auto Angle Seat Valve	Hebron
13	Sampling Valve	Hebron
14	Integrated Bottom Valve	Hebron
15	Circulation Water Pump	GRUNDFOS
16	Mixing Motor	Leadshine
17	Solenoid Valve	Airtac
18	Steam Trap	ESG
19	Vessel Pressure Sensor	BD|SENSORS
20	Vessel Pressure Regulating Valve	ESG / Bürkert

Note: If a single component in the above table involves multiple brand options, the user's final choice shall prevail. If not specified, the manufacturer's standard configuration will be used by default.

III. Configuration List

No.	Function	Name	Brand	Model / Specification	Qty.
1	Control Main Unit	Chassis	HOLVES	HF-ASM	1
2		PLC	SIEMENS	SIMATIC S7-1200	
3		Touch Screen	HOLVES	HMI TCP10 inch	
4		Peristaltic Pump	HOLVES	Flip-top Pump *4 sets	
5		Electrode Cable	METTLER TOLEDO	1m	
6		Control System	HOLVES	HF-Control V2.0 Control System	
7	Stainless Steel Vessel And Platform	Vessel	HOLVES	50L, inner wall 316L, outer 304	1
8		Mixing Motor	Leadshine	Servo Motor	
9		Circulation Water Pump	GRUNDFOS	—	
10		Integrated Bottom Valve	Hebron	Sanitary grade	
11		Proportional Valve	Bürkert	Exhaust gas control	
12		Pressure Sensor	BD	Vessel pressure monitoring	
13		Angle Seat Valve	Hebron	—	
14		Diaphragm Valve	Hebron	—	
15		Steam Trap	ESG	—	
16		Sampling Valve	Hebron	Sanitary grade	
17		Solenoid Valve	AirTAC	—	
18		Safety Valve	OR	Steam pipeline	
19		Filter	Chinese Brands	0.01μm	
20		Feed Bottle Platform	HOLVES	304	
21		Frame Platform	HOLVES	304	
22	Electrodes	pH Electrode	METTLER TOLEDO	Inpro 3030/120	1
23		DO Electrode	METTLER TOLEDO	Inpro 6800/120	
24	General Package	Antifoam Electrode	HOLVES	High sensitivity	1
25		Temperature Sensor	JUMO	PT100	
26		Feed Probe	HOLVES	—	
27	Consumables	Silicone Tubing	HOLVES	16# / 25#	1
28	Documentation	Vessel Documents	HOLVES	Pressure vessel affiliated documents, material reports	1
29		User Manual	HOLVES	—	
30		Packing List	HOLVES	—	

IV. Process Flow Diagram



V. 3D Dimension Diagram (50L Vessel Reference Diagram)

