

T&J CloudReady™

High-throughput bioreactor platform

A complete system ready to be deployed to build your own cloud-enabled high-throughput lab

- Centralized management, distributed control
- Standard ports and connections
- Open-source toolkit for integration with your existing workflow
- Python-based scripting for automation
- Live video streaming for remote monitoring and computer vision
- Real stirred tank reactor for more reliable scaling-up

Product of T&J Bioengineering Co., Ltd.

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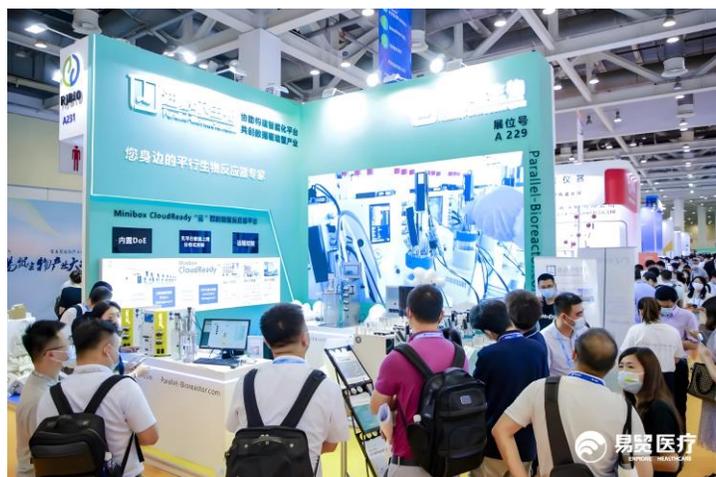
Who we are and what we do

Founded a decade ago in Shanghai, T&J Bioengineering remains the only domestic high-throughput parallel bioreactor systems provider in China. As of June 2022, the company has 3000+ units in operation¹, predominantly in research labs as well as in production plants where automation features are obligatory.



T&J has three facilities in Shanghai and Shenzhen and employs over 100 full-time staff. The Shanghai factories design and manufacture glass and steel bench-top systems as well as GMP-compliant pressure vessels up to 20,000 Liters. Recently, T&J opened its new site in Shenzhen, China's Silicon Valley, focusing on developing cutting-edge process analytical technologies including biosensors, software, and automation.

T&J Bioengineering is partnering with TJX Bioengineer LLC (Boston) to bring its CloudReady™ high-throughput bioreactor platform to the North American market. TJX bio is the sole channel partner for T&J and will provide on-site pre- and after-sales services and technical support to T&J's customers in the US.



¹ A unit is an independently controlled bioreactor vessel. A high-throughput system may contain dozens of such units.

What makes it CloudReady™

A fully integrated software and hardware platform

Launched at the end of 2021, CloudReady is the 6th generation of T&J's main product line, the Minibox series. CloudReady has already been adopted by Institutes of the Chinese Academy of Sciences, established industry leader such as China State Institute of Pharmaceutical Industry (CSIPI), as well as biotech companies such as Bluepha, among others.



Rich Remote control

Monitoring process data and live videos with dedicated cameras for each reactor



Management features

Control software with integrated LIMS such as project management and user management



High scalability

A distributed control system architecture that supports hardware expansion and multi-user access



Workflow automation

Batch operation and python-script-based UDF control make operating 100s of reactors a few clicks of the mouse



Data traceability

FDA 21 CFR Part 11 compliant reporting and audit trail



Standard SQL database API/Open Source Toolkit

Easy integration with your homebrew or third-party data analysis pipelines

“We needed such a system so badly that we started building it ourselves with parts from different vendors. It kind of worked, but what we ended up with is a Frankenstein’s Lab.”

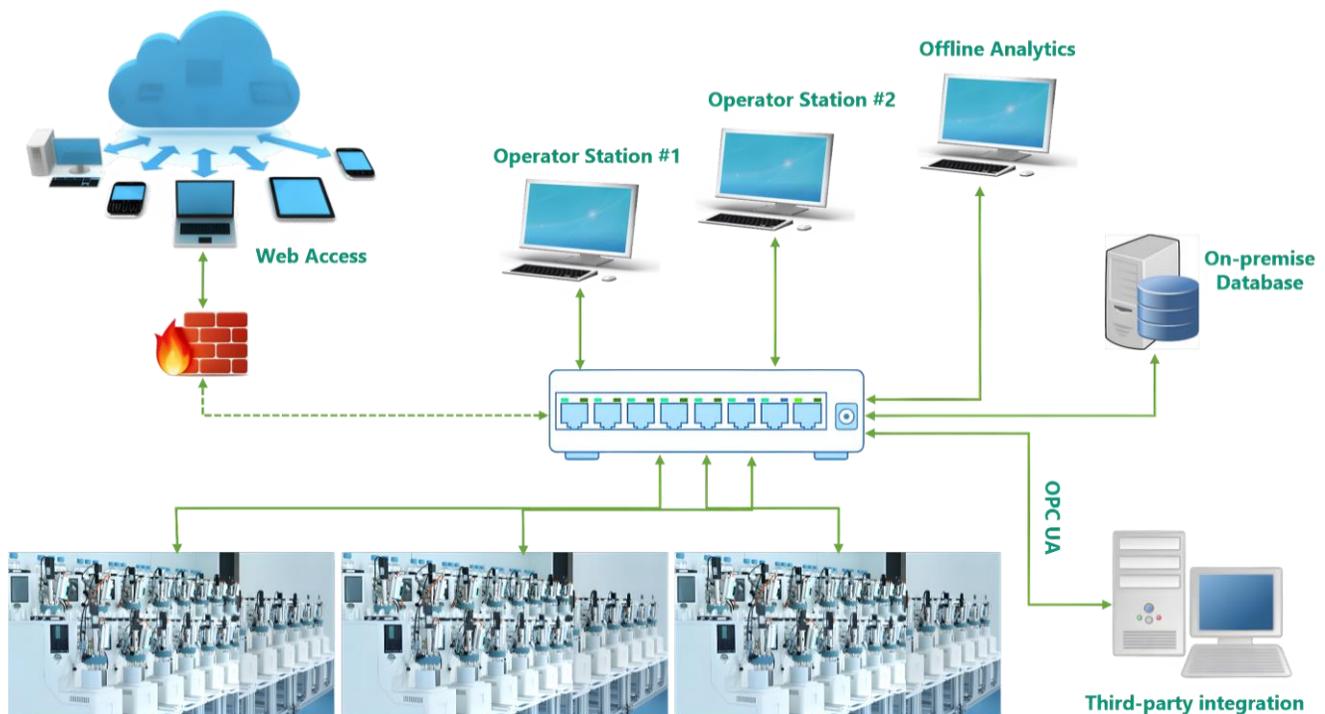
CloudReady is designed from the ground up as an integrated software and hardware platform that enables a customer to efficiently operate 10s or 100s of bioreactors through a single user interface over the network. With its highly customizable automation functions and remote-control capabilities, you can design and execute experiments entirely remotely². Whilst this has been the classical usage scenario of our

² A person or a robotic system is needed to perform some set-up tasks

high-throughput system for over a decade, as your business grows, so does our platform, and we are entering the territory of the Cloud business model.

Building your "Private Cloud"

With the integrated software and hardware, the scalable architecture of the CloudReady system enables your organization to set up high-throughput bioreactor systems that can be used by authorized teams (and partners) who may not even be in the same geographic location. You will no longer need to equip each team or subsidiary with separate hardware and manpower. Instead, a dedicated operations and maintenance squad can perform all the basic tasks from one centralized location, whilst your scientists can do the more advanced experiment design and in-depth data analysis in remote offices, or even work from home.



Upgrading CRO/CDMO to "Cloud Services"

In recent years, CDMOs and CROs are becoming increasingly popular in the bioindustry. However, there is no way that CDMOs and CROs understand your product and process as well as you do, which results in slow progress and sub-par performance, while your scientists and engineers eagerly wait for the results. The

only way a CDMO or CRO can solve this problem is to pour in more resources, which incur considerable costs. Thanks to its rich remote control and monitoring features, our Cloudready system enables a CXO's customer to see the results in near real-time and make operational changes directly if necessary. This effectively turns a CXO's facility into the customers' lab in the cloud.

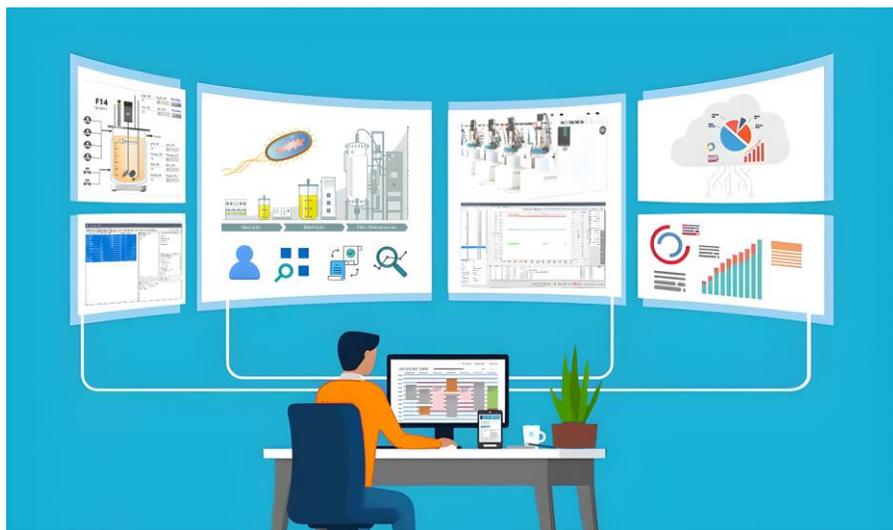


The “Android” of smart bioreactors

Although the smallest working volume of a CloudReady reactor vessel is just 100 mL, our engineers managed to fit standard-sized pH and DO probes onto the head plate, which means you can use probes from any vendor. Together with standard sample ports, and programmable pump functionalities, Python-based User Defined Functions (UDF) for advanced process control, or an open-source toolkit for deep integration with your existing workflow, CloudReady's openness brings great flexibility to your day-to-day operation and gives the control back to you.

Just like the core difference between a dumb phone and a smart phone is that the latter allows the end user to run third party apps, CloudReady provides multiple ways for the end user to access its hardware, software and data.

T&J Device & Data Management System (D²MS)



D²MS runs at the supervisory-control layer and communicates with industry-grade PLCs at the regulatory control layer. It is designed from the ground up to meet the needs of automated high-throughput operations. For example, you can change the setpoints of tens or hundreds of reactors at once, simply by selecting multiple reactors, and that is just the "tip of the iceberg".

		NATIVE LITE	NATIVE BASIC	NATIVE PRO	Full PROFESSIONAL	COMMUNITY	COMMUNITY PRO
	Project Management User Management Device Management	✓	✓	✓	✓	✓	✓
	Run Management Sample Management Data Management	✓	✓	✓	✓	✓	✓
	Basic Operations Advanced Control V1 Advanced Control V2		✓	✓	✓		✓
	Built-in DOE "Golden Batch" Setpoint Profiles		✓	✓	✓		
	Process control by User Defined Functions, Python		✓	✓	✓	✓	✓
	PID Tuning Pump Calibration Probe Calibration Process Alarms			✓	✓		
	3 rd Party Integration by OPC Other protocols (Service)				✓	✓	✓

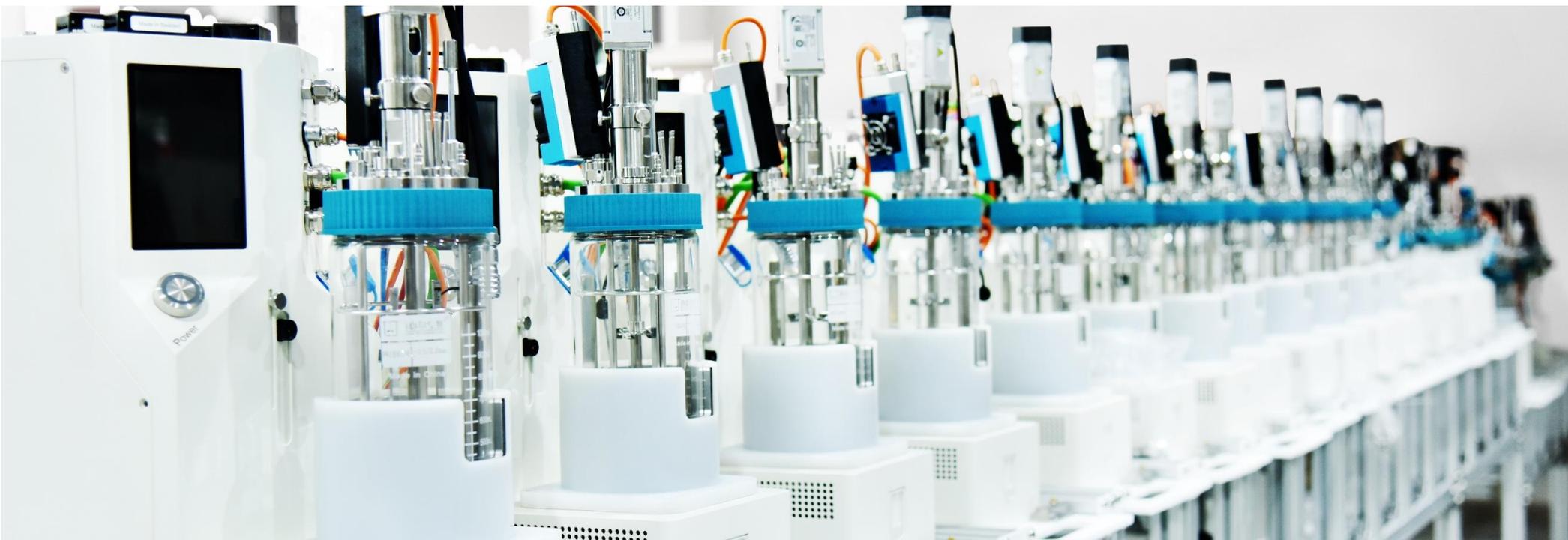
PARAMETER	MICROBIAL FERMENTATION		CELL CULTURE		
WETTED MATERIALS	Vessel	Borosilicate glass		Borosilicate glass	
	Head plate	316 Stainless Steel		316 Stainless Steel	
	agitator	316 Stainless Steel		316 Stainless Steel	
	Baffles	316 Stainless Steel		316 Stainless Steel	
	Sparger	316 Stainless Steel		316 Stainless Steel	
VESSEL DIMENSIONS	Nominal Volume	500ml	1500ml	500ml	1500ml
	ID (mm)	70	97	70	97
	Height (mm)	130	223	130	223
	Total volume (mL)	490	1590	500	1500
	Working volume (mL)	100-350	300-1100	100-350	300-1100
SPARGER*	Type	open/drilled pipe		sintered sparger	
	Size	8holes-Φ0.8mm	11holes-Φ1mm	40-50μm	
IMPELLER*	Type	Rushton turbine×2+Pitched bladex1		Marine impeller	
	Impeller diameter(mm)	28	44	28	44
	Clearance (mm)	28(adjustable)	44(adjustable)	28(adjustable)	44(adjustable)
	Power number	6		1.5	
HEADPLATE PORTS	Pg13.5	5	6	5	6
	RTD	1	1	1	1
	Feed (1x 3mm)	4	4	4	4
	Sparger (4x 6mm)	1	1	1	1
	Condensor	Pg13.5	Pg13.5	Pg13.5	Pg13.5
KLA (1/HR)**	300	300	20	20	

POWER DENSITY* (KW/M3)					
TIP SPEED (M/S)		2.20 at 1500rpm	3.45 at 1500rpm	0.44 at 300rpm	0.69 at 300rpm
MIXING TIME (S)					
AGITATION SPEED (RPM)		50~1500	50~1500	50~800	50~800
TEMPERATURE	Heating and cooling methods		Peltier		Peltier
	Range (°C)		10-45		10-45
	Accuracy (°C)		±0.2		±0.2
	Max RoC (°C/min)		1.0 (cooling from 37°C to 20 °C)		1.0 (cooling from 37°C to 20 °C)
	Control stability** (°C)		±0.1		±0.1
PH	Probe type		glass		glass
	Range		0~14		0~14
	Accuracy		±0.02		±0.02
	Control stability**		±0.02		±0.02
DO	Probe type		Polarographic or Optical		Polarographic or Optical
	Range		0~150% (Air saturation)		0~150% (Air saturation)
	Accuracy		±0.1%		±0.1%
	Control stability**		N/A		N/A
MFC* (SUBMERGED)	Air	0-1000 sccm	0-3000 sccm	0-250 sccm	0-750 sccm
	O2	0-500 sccm	0-1500 sccm	0-50 sccm	0-150 sccm
	CO2	N/A	N/A	0-50 sccm	0-150 sccm
MFC (OVERLAY)	Air/N2	N/A	N/A		

VENT GAS ANALYZER*	O2	
	CO2	
	Other	
PUMPS	Type	Peristaltic pump head, precision stepper motor
	Count	4/6 (programable)
	Flow rate	0.03mL/min ~ 30 mL/min

* Item customizable, user-specified, or operation dependent

** Typical values





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