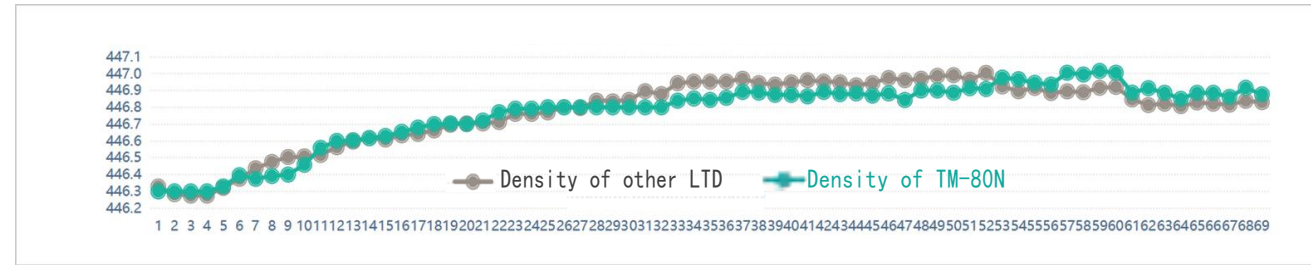


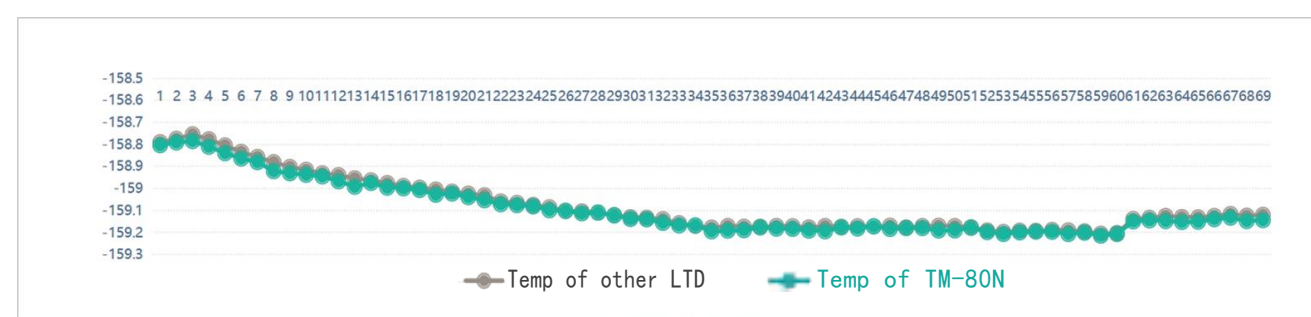
At the beginning of 2023, the first Made-in-China Level gauge with the first LTD gauge and LNG Monitoring system designed by JOYO was put into operation in LNG tanks in China market, marking that the localization of LNG tank gauging system has entered the substantive verification stage in China2023.



Density performance - TM-80N LTD vs other LTD



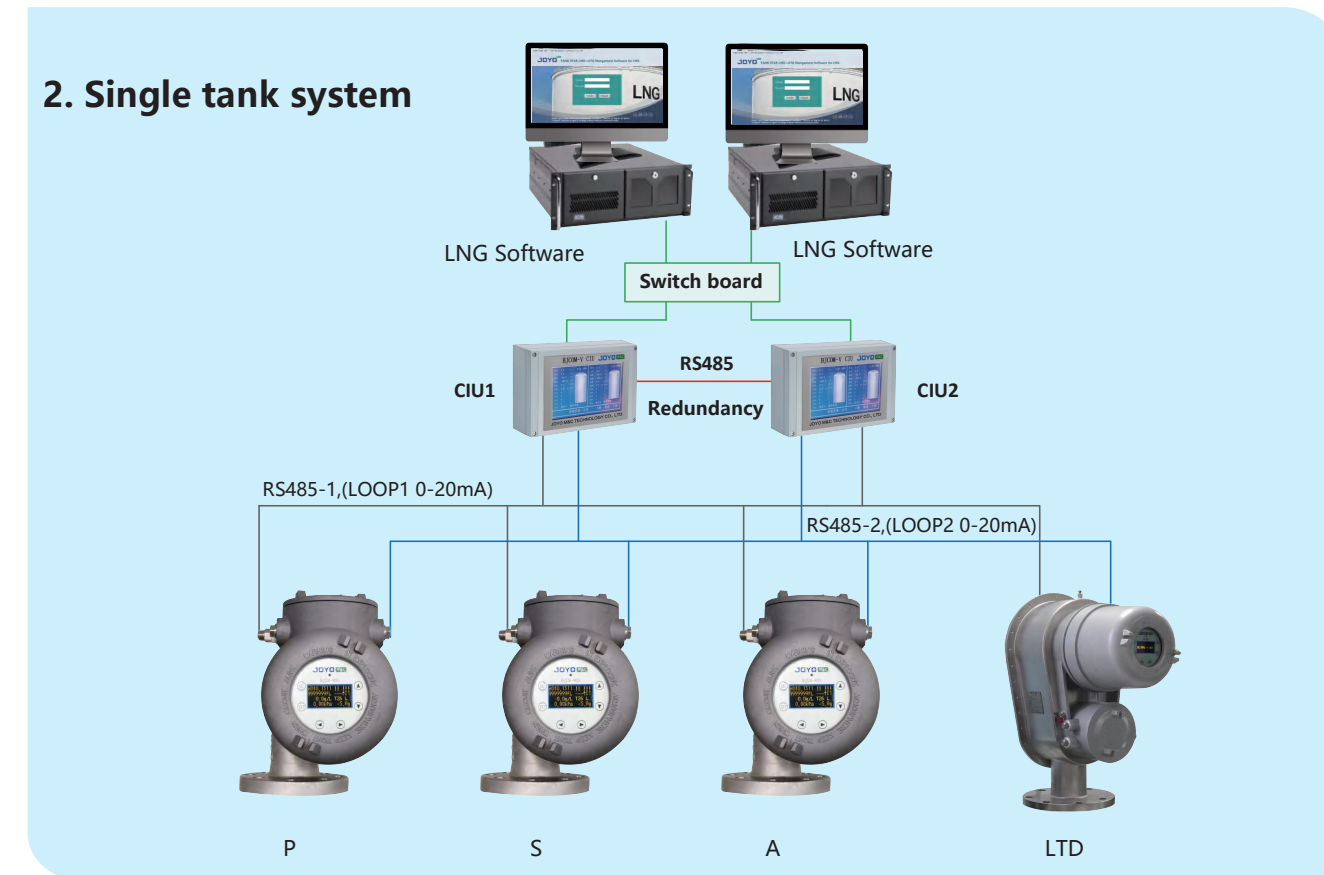
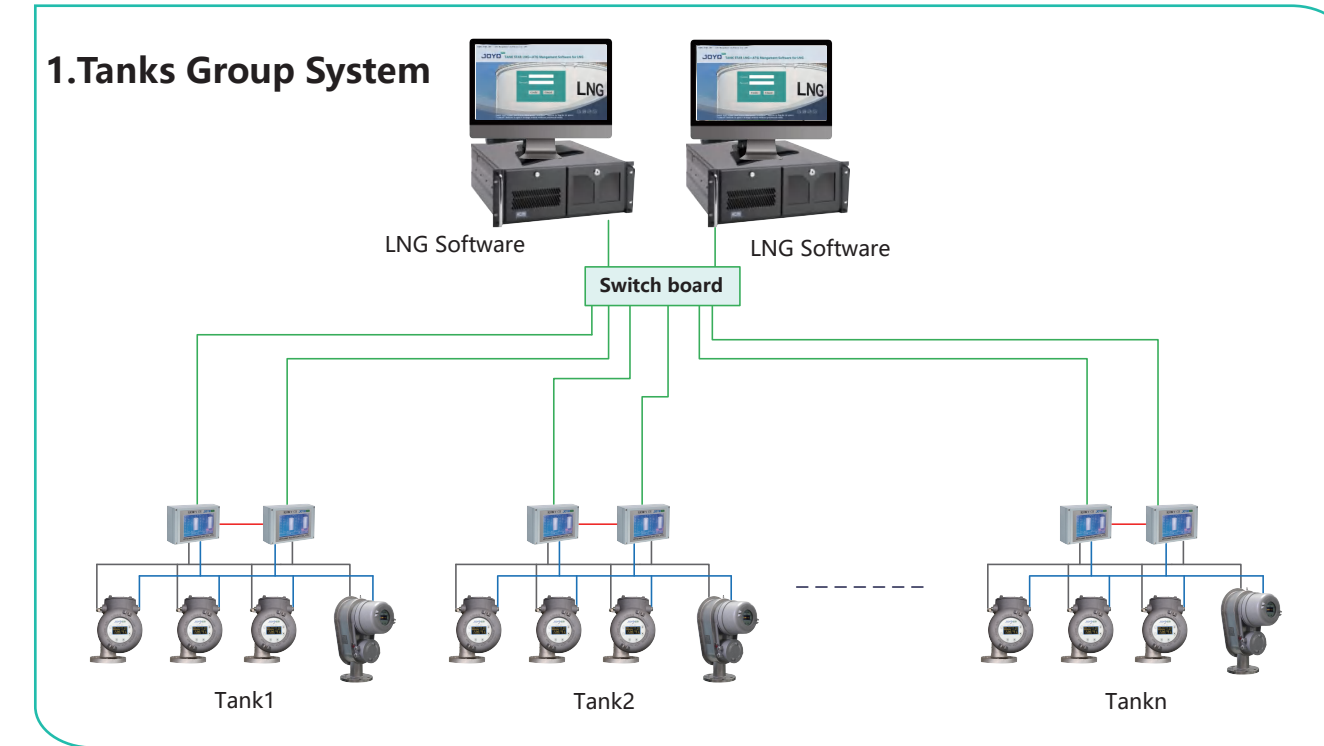
Temperature Performance- TM-80N LTD vs other LTD



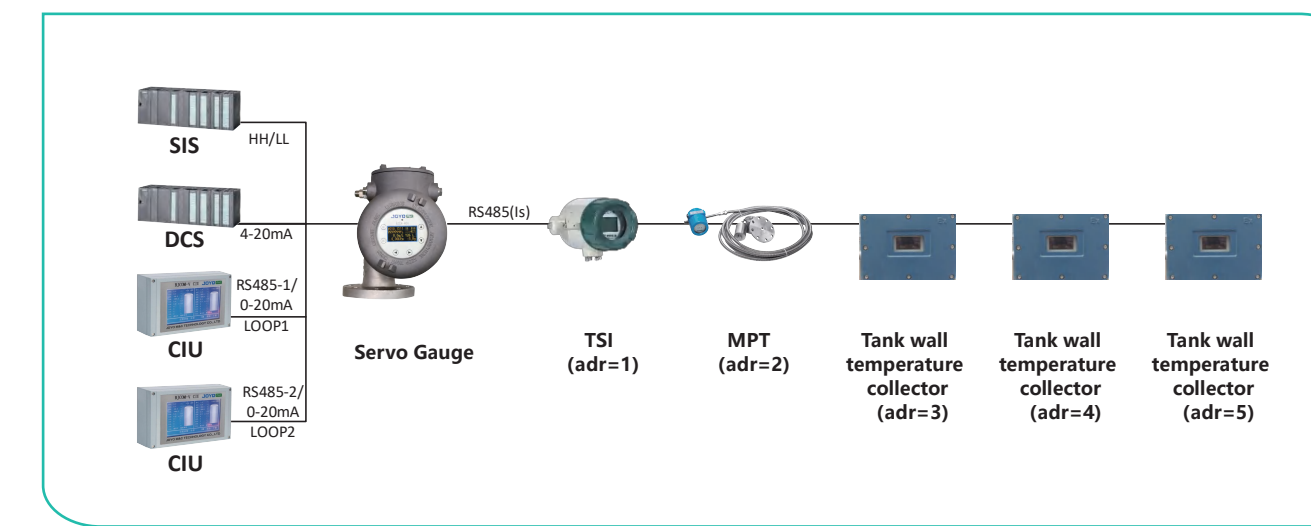
LNG Tank Gauging System

LNG tank gauging system

By different selections of configurations, it can meet the application requirements of various LNG storage tanks.

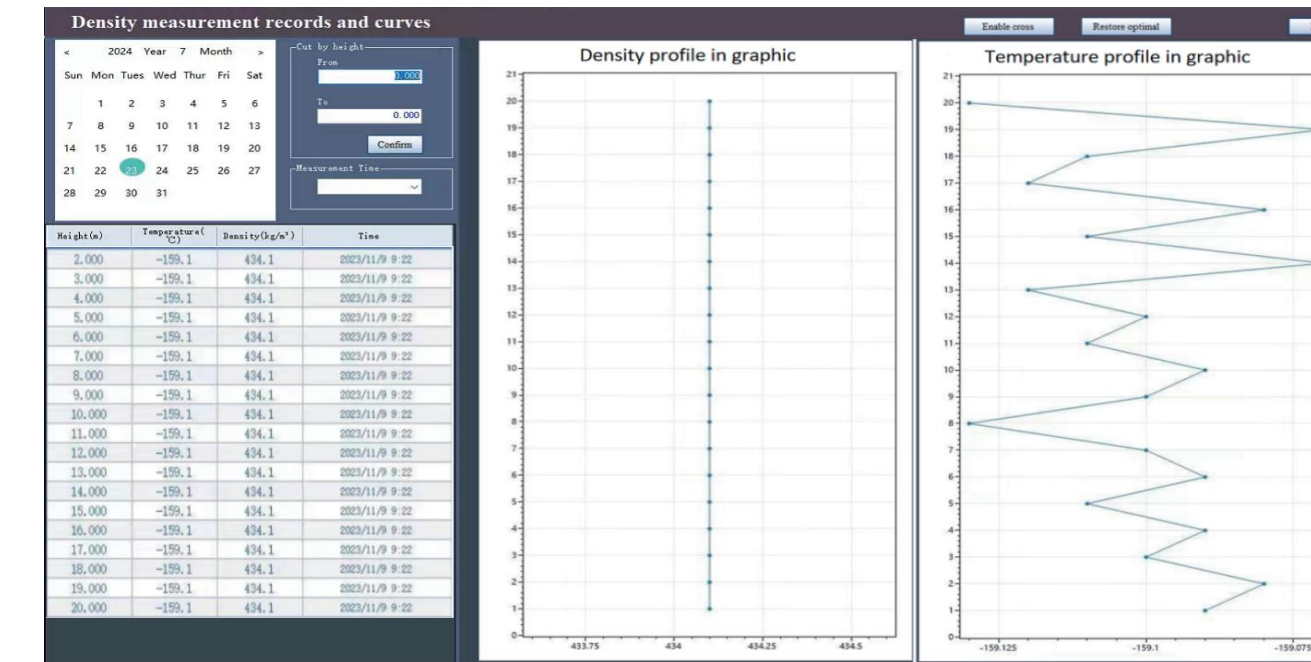


3. Level Gauge Wiring Diagram



LNG Tank Gauging Management Software

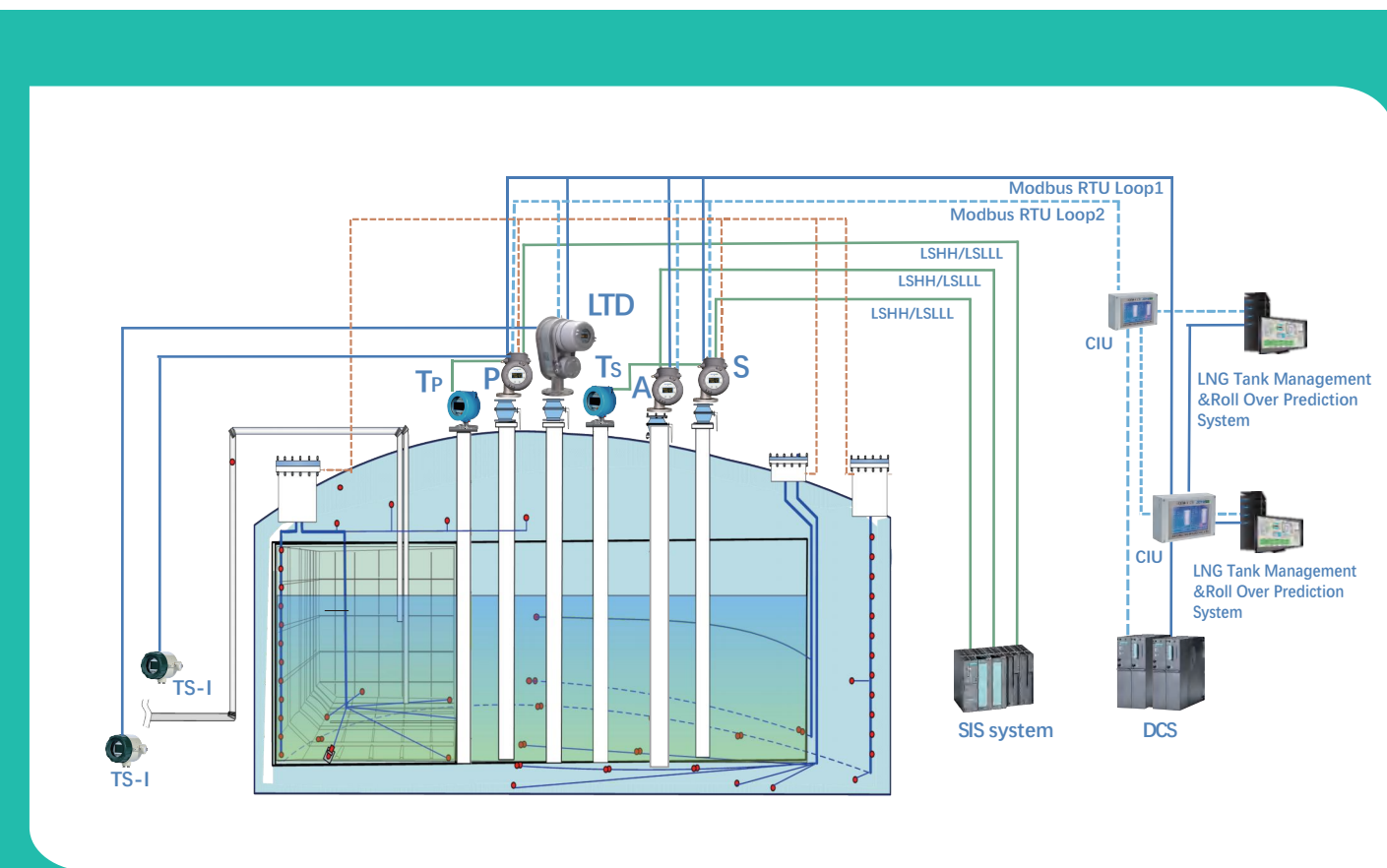
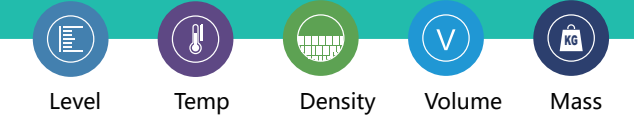
LNG tank management and roll over prediction software



The first Made-In-China LNG tank gauging system solution in China Market



- ★ P: BJLM-80H primary servo gauge
- ★ S: BJLM-80H Secondary servo gauge
- ★ Tp :BJZT Prim ary multi-point thermometer;
- ★ Ts: BJZT multi-point thermometer ;
- ★ LTD: TM-80L LTD gauge;
- ★ A: BJLM-80H servo gauge for high alarming;
- ★ TS-I: TS-I Tank Side Indicator;
- ★ CIU: BJCOM-V communicator;
- ★ Software: LNG tank management software



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LNG TGS Instrumentation

Main equipment of LNG tank gauge system

SERVO GAUGE



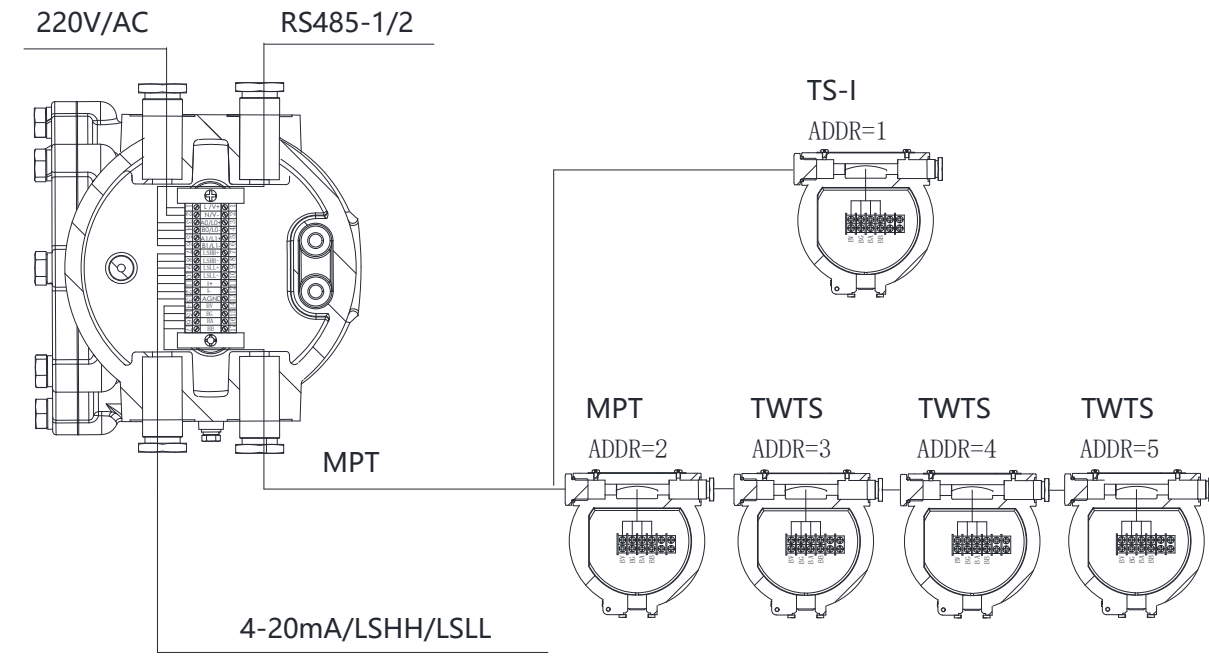
The moving up and down of displacer wing on the drum of the servo gauge is mainly driven by the stepping motor, causing the torque of the drum changing with the weight of the displacer. By measuring the torque of the drum, the displacer weight can be accurately measured when it is in the air, liquid, and liquid level by which the position of the liquid level is determined. The liquid level can be accurately calculated by calculating the number of motion steps of the stepping motor.

Servo level gauge is available communicate to upper host platform or other management system through CIU by Modbus, supporting 4-20mA output to DCS and high/low level alarm output to SIS. It is able to connect with 1 of tank side display, 1 of MPT thermometer, and 3 tank wall temperature collectors.

Technical Specification

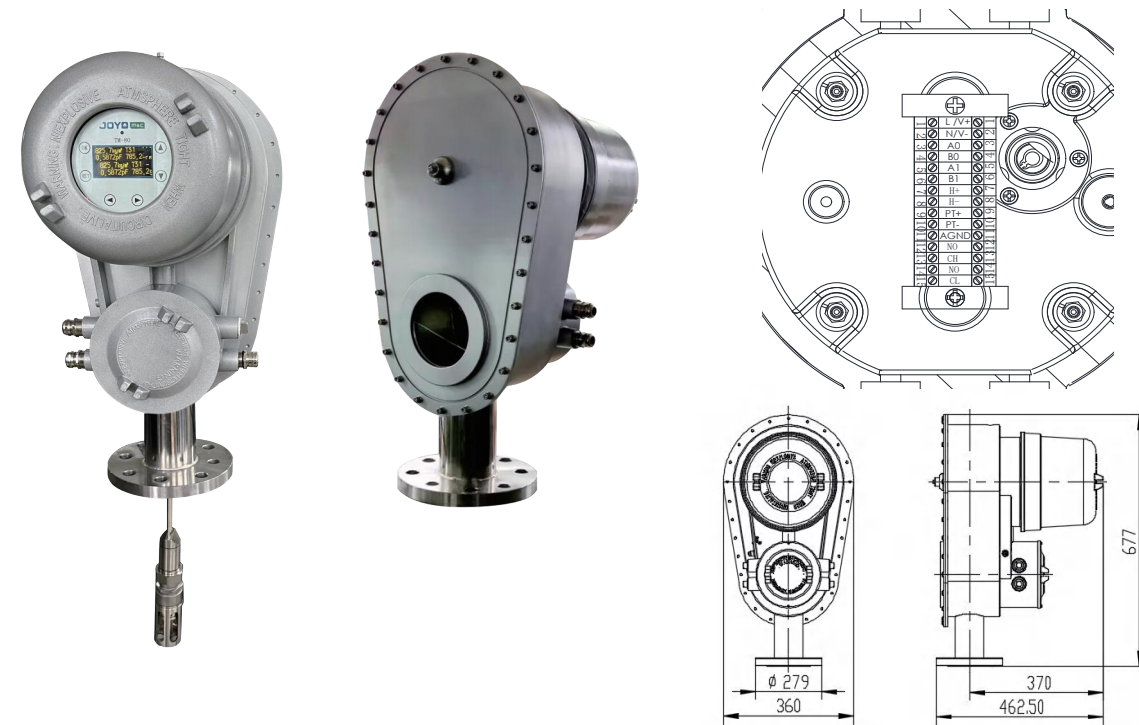
Item	
Level Accuracy	±0.4mm
Repetitiveness	±0.1mm
Level range	<55 m
Communication input	RS485 (ia), Hart
Signal output	4~20mA (level)
Alarms	2-way relay NO/NC output, Low Alarm, Hi Alarm, (LO, LC)
Power supply	220V/AC, 24V/DC
Communication output	RS485*2, 0~20mA*2
Protocol	MODBUS RTU, WM550/WM660, BPM
Safety rating	Ex db ia [ia Ga] IIC T6 Gb
Ingress protection	IP68
Electrical entry	4*3/4NPT-F
Displacer size	Φ90*50
Process connection	ASME B16.5 6" 150 RF

Servo Gauge Wiring:



LTD

TM-80N LTD tank gauges are designed for the LTD (Level +Temperature+Density) measurements of cryogenic bulk stocks with one integrated instrument in which multiple measurement functions are involved, for the LNG tank gauging system, aiming at providing a detailed and accurate LTD profile.



Technical Specification

Item		Item	
Level accuracy	±1mm	Temp. range	-200°C~+70 °C
Resolution	±0.1mm	Signal output	RS485 X 2, MODBUS; 0~20mA X 2, WM550/WM660; BPM
Level range	<55 m	Voltage	220V/AC
Density accuracy	±0.5kg/m³	Watts	20W
Density repeatability	±0.1kg/m³	Safety rating	Ex db ia [ia Ga] IIC T4 Gb
Density range	(1~600)kg/m³	Ingress protection	IP68
Temp. accuracy	±0.2 °C	Electrical entry	3/4NPT-F (4pcs)
Temp. resolution	±0.01 °C	Process connection	ASME B16.5 6" 150 RF

MPT

Multi point thermometer realize accurate temperature measurement at different position of liquid.



Technical Specification

Item		Item	
Sensor type	PT100/PT1000	Output	RS485 Modbus (ia)
Temp. accuracy	±0.1°C	Voltage	10~28VDC (Hart), 6~28 VDC (485)
Temp. points	1~16	Safety rating	Ex ia IIC T6 Ga
Thermo well	SS 316	Ingress protection	IP68
Length	≤55 m	Electrical entry	1/2 NPT-F (2pcs)

TANK WALL TEMPERATURE SENSOR

The armored PT100 metal platinum resistance temperature sensor is used, with thread fixation.

The lead wire is made of Teflon low-temperature resistant cable, with a max lead length of 200 meters.

Technical Specification

Item		Item		Item	
Sensor size	Φ6*60	Thread	1/4NPT-M	Cable material	PTFE 4*1.0
fixing plate size	35*35*100	Sensor type	3wire-two pair PT00, class A		

TANK WALL TEMPERATURE COLLECTOR

Designed to realize accurate acquisition temperature measurement data from TWTS.



Technical Specification

Item		Item	
Sensor type	PT100	Power supply	5~12VDC (ia)
Accuracy	±0.1°C	Safety rating	Ex ia IIC T5...T6 Ga
Temp points	16	Ingress Protection	IP68
Output	RS485 Modbus (ia)	Electrical Entry	3/4NPT(4pcs)+1/2NPT(3pcs)

CIU Communicator

BJCOM-V communicator is used as communication hub collecting and transmitting data from instruments to PC software or DCS/PLC platform.



Functions:

- Collection of measurement data, facilitating parallel retrieval by multiple devices;
- Data transmission function, facilitating debugging of instruments and expansion of applications;
- With LCD displays the measurement data collected. It will prompt for abnormal communication indication if there are communication problems;
- Providing data to multiple hosts simultaneously for different platform.

Technical Specification

Item		Item	
Voltage	AC220V±10% 50Hz	Output	3 of Modbus RTU, 1 of Modbus TCP
Current	<60mA	Ambient Temp.	-20°C ~ +70°C
LCD	800*480 color LCD	Humidity	40% ~ 70%
Input	touch screen	Interface	RS485/232 (3pcs), ethernet (1pc)
Input Protocol	2 pcs of RS485/BPM, connecting with up to 36 pcs of instruments		



