

Our Expertise, Your Values



Gauging



Loading



Sealing



Automation



Terminal Automation Instruments & Solutions

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Providing Higher Values Of Products By Our Expertise In Liquid Measurement and Control Technologies

> About JOYO M&C

JOYO M&C is a high-tech company dedicated to developing and manufacturing measurement and control instruments and solutions for bulk liquid storage and transfer.

Based on 20 years experiences in the petrochemical industry, JOYO M&C developed many products and solutions are proven to be of high competence in terms of functions and performances. JOYO M&C was awarded 'Sinopec technology innovation awards 2017' for its innovative TGS technologies for bulk liquid storage and custody transfer used in Sinopec tank farms and terminals, which is turned out to facilitate customer operations and solve many problems for customers. JOYO M&C is one of the suppliers for SINOPEC and PETROCHINA for over ten years. Its products are also supplied to oil companies in Russia, Mongolia, Kazakastan, South Aisa, Middle east and other countries in the world.

Joyo M&C Technology Co., LTD, has been fully dedicated in the innovation and explorations of the up-to-date technologies, and manufacturing hi-end quality metering and control products. JOYO M&C will still adhering to the mission and provide higher values to his users worldwide with our expertise.



Efficient Production System

Efficient

Quality

High Standard

Safety



ISO System Certification

ISO9001



ISO14001



ISO 45001: 2018





TANK GAUGING

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	DH-50 Portable Tank Gauge

Overview

BJLM-80 series Servo Tank Gauge are designed for ambient and high pressure bulk liquid storage tank gauging system. It provide various tank gauging solutions (Traditional tank gauging system and innovational tank gauging system) according to different application. It provide measurement of level, temperature, water level, density (optional), and custody transfer based on volume or mass according to request.



Applications

- BJLM-80H is applicable to various liquid, such as oil products, petrochemicals, liquid chemicals, edible oil or liquid foods for ambient application; It is applicable to high pressure liquid such as LPG or other chemicals with high pressure;
- BJLM-80N is applicable to LNG;
- It is applicable to diverse type of tanks, such as fixed roof tanks, floating roof tanks, and spherical pressurized tanks.

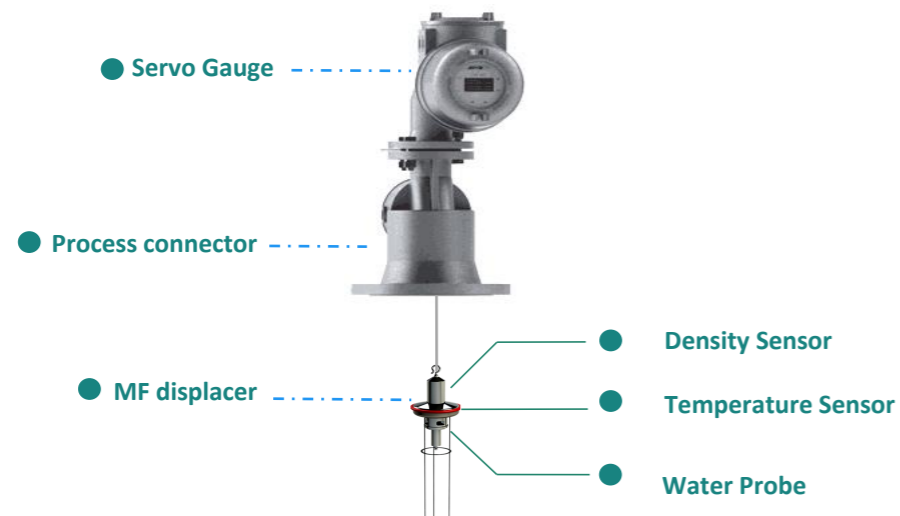
SMART TANK GAUGING SYSTEM

■ BJLM-80H *with MF displacer*



BJLM-80H with smart MF displacer are tank gauge designed for ambient pressure bulk liquid storage. It integrate multi-function in one including liquid level, interface density, temperature measurement, and can provide custody transfer based on volume or mass, It is easy for installation and replacement or revamp for existing TGS, especially for the case with only one hole for installation on site.

BJLM-80 H Structure:

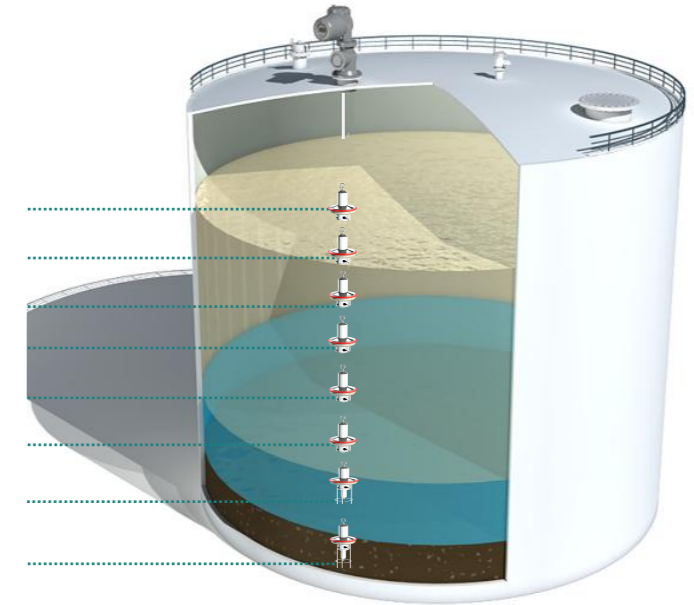


Application:

- BJLM-80H with MF smart displacer working as smart multi-functional tank gauging system is applicable to ambient pressure, especially for the application which precise density or custody transfer based on mass is required ;
- It is applied to the tough tank condition where not enough tank nozzle for more instrument installed;
- It is applicable to cone roof tank or floating roof tank with stilling well installed.

Measuring Process

- High Level
- Level
- 1st Temp. and Density
- 2nd Temp. and Density
- 3rd Temp. and Density
- Low Level
- Water Level
- Bottom



Features:

- Have very high accuracy of density measurement and provide custody transfer based on mass;
- Provide multiple functions in one unit, including measure level, temperature, density, and oil-water interface, tank bottom.
- Less components with maximum functions, easy for installation, wiring and commissioning
- Low maintenance cost and long life cycle saving expenses for the owner;
- Perfect applicability for challenging situations and demanding applications, easy to be installed on the existing tanks without modifying the tank body structure;

Technical Data

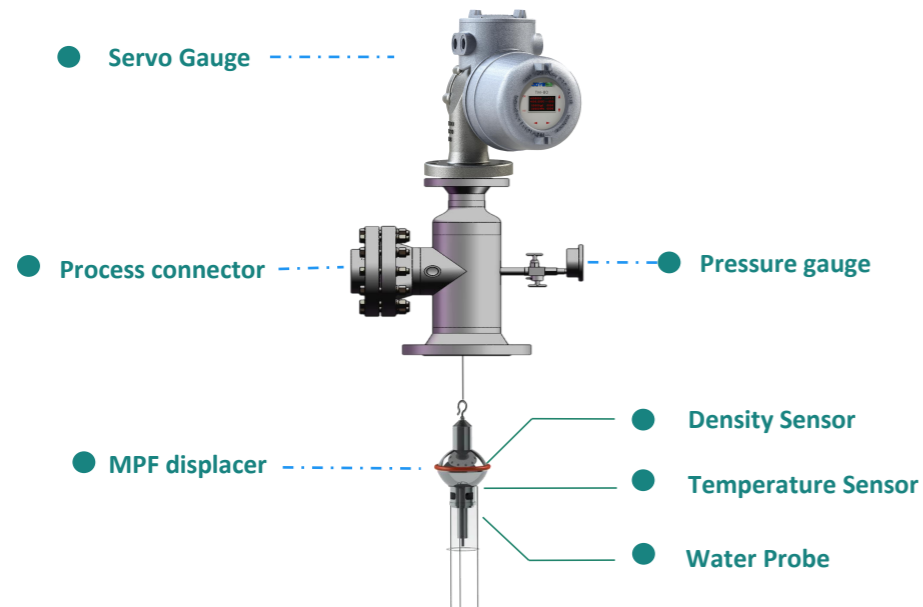
Level Accuracy	± 0.4mm	Voltage	DC 24~48V, AC 220V/110/ 24V~ 36V
Temp. Accuracy	± 0.1°C	Ambient Temp.	-40°C~+70°C
Density Accuracy	± 0.3kg/m3;	Cable entry	4* NPT 3/4
O-W interface	±2.0 mm	IP protection	IP 68
Sensitivity	± 0.1mm	Pressure	5Bar/0.5Mpa
Max Level Range	30m	Material	Casing: Aluminium Alloy Drum: Stainless steel Displacer: 316L
Density Range	650~1200kg/m3		
Max Viscosity	5 Cst		
Communication	BPM; RS485 MODBUS; V1; 4~20mA;	Explosion Rating	Ex d ia [ia Ga] II C T4 Gb

JOYO TANK GAUGE



■ **BJLM-80H with MPF displacer**

BJLM-80H with smart MF displacer are tank gauge specially designed for high pressure bulk liquid storage. It integrate multi-function in one including liquid level, interface density, temperature measurement, and can provide custody transfer based on volume or mass,It can applied for LPG or other liquid with high pressure

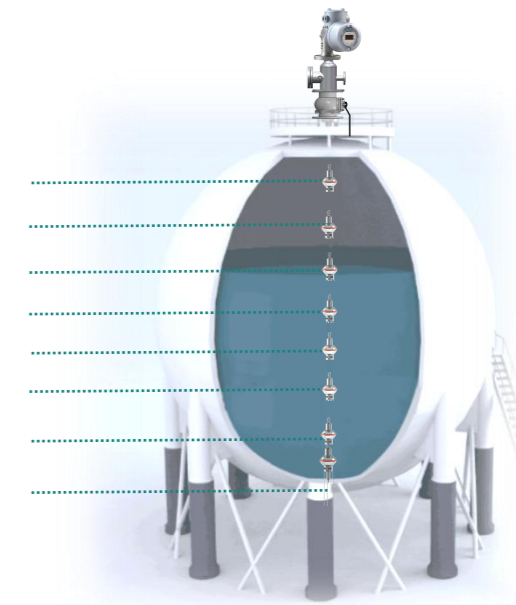


Application:

- BJLM-80H with MPF smart displacer is mainly applied to tank gauging for liquid with high pressure such as LPG;
- It is applicable to sperical tank with stilling guide built and with ball valve installed.

Measuring Process

- High Level
- Vapor Temp. and Density
- Level
- Liquid Temp. and Density 1
- Liquid Temp. and Density 2
- Liquid Temp. and Density n
- Low Level
- Bottom



Features:

- Featured with integration of LTD (level, temperature, density) in one unit, designed to measure level, temperature, density, bottom, and oil-water interface as well as calculate in volume or mass;
- Extremely density accuracy, availible for custody transfer by mass is available;
- Perfect applicability for challenging situations and demanding applications, easy to be installed on the existing tanks without modifying the tank body structure;
- Supporting a wide range of power supplies and a wide range of communication protocols;

Technical Data

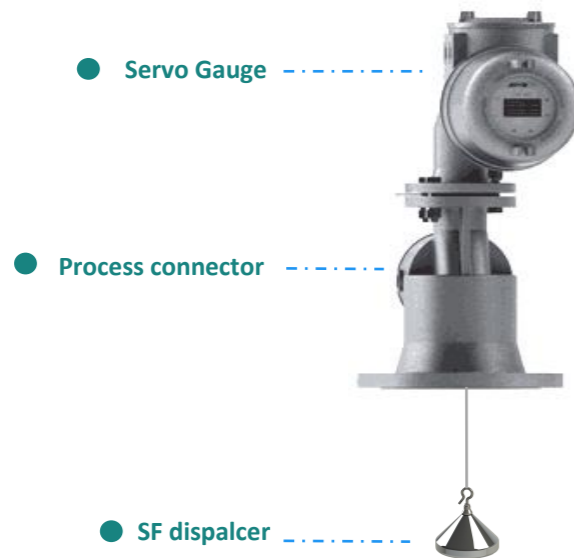
Level Accuracy	± 0.4mm	Voltage	DC 24~48V, AC 220V/110/ 24V~ 36V
Temp. Accuracy	± 0.1°C	Ambient Temp.	-40°C~+70°C
Density Accuracy	± 0.3kg/m3;	Cable entry	4* NPT 3/4
O-W interface	±2.0 mm	IP protection	IP 68
Sensitivity	± 0.1mm	Pressure	25Bar/2.5Mpa
Density Range	Max Level Range	Material	Casing: Aluminium Alloy for electrical chamber, SS316 for mechanical chamber Drum: Stainless steel Displacer: 316L
Measuring Range	Density Range		
Max Viscosity	5 Cst	Explosion Rating	Ex d ia [ia Ga] II C T4 Gb
Communication	BPM; RS485 MODBUS; 4~20mA;		

HYBRID TANK MANAGEMENT SYSTEM

■ BJLM-80H *with SF displacer*



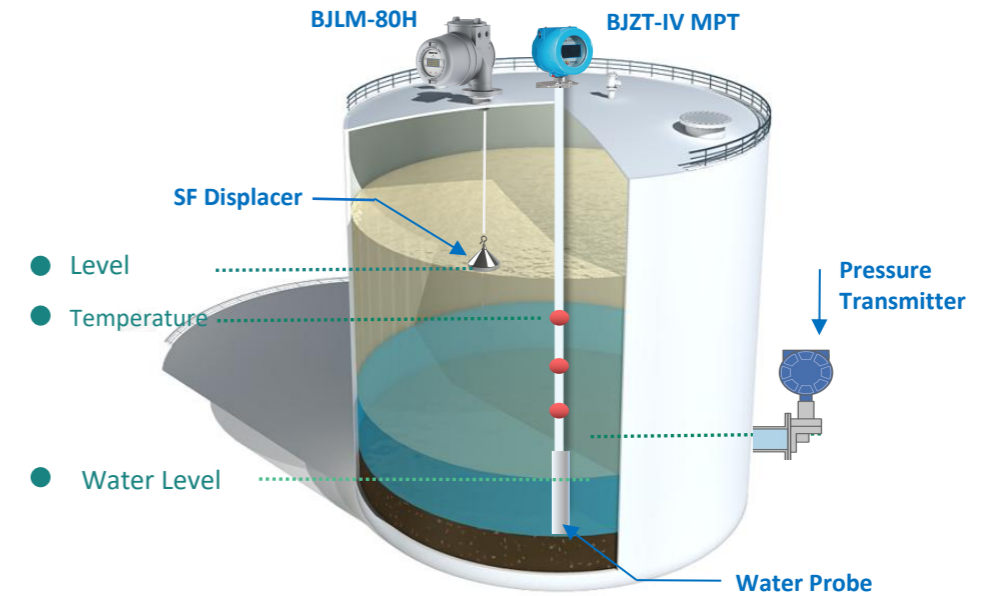
BJLM-80H with SF displacer are traditional level tank gauge designed for ambient bulk liquid storage together with multi-point thermometer to form a tank gauging system. It can only provide level measurement, temperature measurement is provided by multi-point thermometer.



Application:

- BJLM-80H with MPT /+pressure transmitter working as Hybrid Tank Management System;
- HTMS system applied to online temperature measurement and for the application which precise density measurement not required;

Measuring Process



Features

- More precise and advanced level gauging technology for bulk liquid storage;
- Perform online temperature measurement by Multi-point thermometer ;
- Available for rough density can be calculated by buoyancy principle;
- Low maintenance cost and long life cycle saving expenses for the owner;

Technical Data

Level Accuracy	± 0.4mm	Voltage	DC 24~48V, AC 220V/110/ 24V~ 36V
Temp. Accuracy	± 0.1°C (by M.P.T)	Ambient Temp.	-40°C~+70°C
Measuring Range	(0~30)m	Cable entry	4* NPT 3/4
O-W interface	±3.0 mm	IP protection	IP 68
Sensitivity	± 0.1mm	Pressure	5Bar/0.5Mpa
Resolution	±0.1mm	Material	Casing: Aluminium Alloy Drum: Stainless steel Displacer: 316L
Communication	BPM; RS485 MODBUS; V1; 4~20mA;	Explosion Rating	Ex d ia [ia Ga] II C T4 Gb

JOYO TANK GAUGE

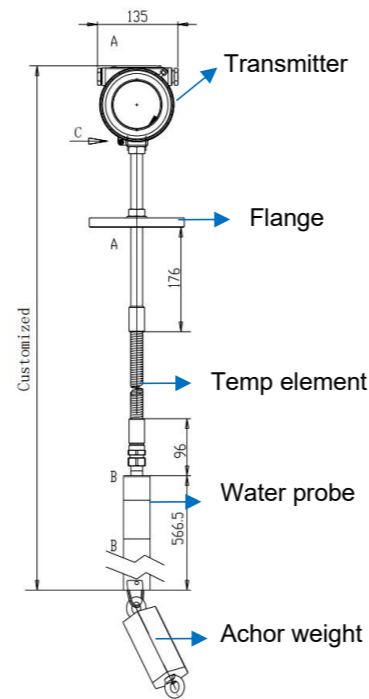


■ **BJZT-IV MultiPoint Thermometer**

BJZT-IV is a multi-point thermometer designed to meet the demand of temperature measurement for both custody transfer and inventory control applications. It is featured with integrating Water/Oil interface measurement. It can provide the temperature and water interface information to other instrument by Hart or Modbus communication, or it can work standalone.

Model Selection

Model Selection Table for BJZT Multi-Spot Thermometer					
BJZT-IV	Communication				
	Hart	Hart communication protocol			
	RS485	ModBus 485 communication protocol			
		Measurement Mode			
	Pt T	PT100+T type thermocouple			
	Pt	PT100			
	Pt W	All points with Pt100 + WL Probe			
		Temperature spots			
		1~16			
		Thermometer length			
		0.1~32 meter			
BJZT-IV	XX	YY	N	L	



Technical Data

Voltage	DC 24V for HART, DC 6 ~ 28V for RS485	Temp. element	Max. 16
Current	6mA for HART, <30mA for RS485	Accuracy of Temp.	± 0.1°C
Output	RS485 MODBUS、HART	Accuracy of WL	± 3 mm
Sensor Type	PT100+T thermo couple / PT100	Ambient Temp.	-40°C~+70°C
Legth	Max 30m	IP Protection	IP68
Water measurement range	Max 400mm	Cable Inlet	2*M20*1.5
Ex Rating	Ex ia II C T6 Ga	Flange	Customized, min 2"

■ **TS- I Tank Side Indicator**



TS- I Tank Side Display TS-1 is a unit installed nearby a tank at its bottom area and used for on-site showing the tank gauging data, such as the real time level, temperature, density, volume or mass. More convenience for the operator so that they do not need to climb up to the tank top to retrieve the data.

Technical Data

Voltage	10 ~ 28V/DC	Ambient Temp.	-40°C ~ +60°C
Current	< 6mA	IP Protection	IP 65
Comm.	HART	Ex Rating	Ex ia II B T6 Ga;

■ **BJCOM-V Communicator**



Communicator BJCOM-IV is designed to perform a safe communication connection hub between the servo tank gauge and PC/PLC where ATG data can be processed or managed at client end.

Technical Data

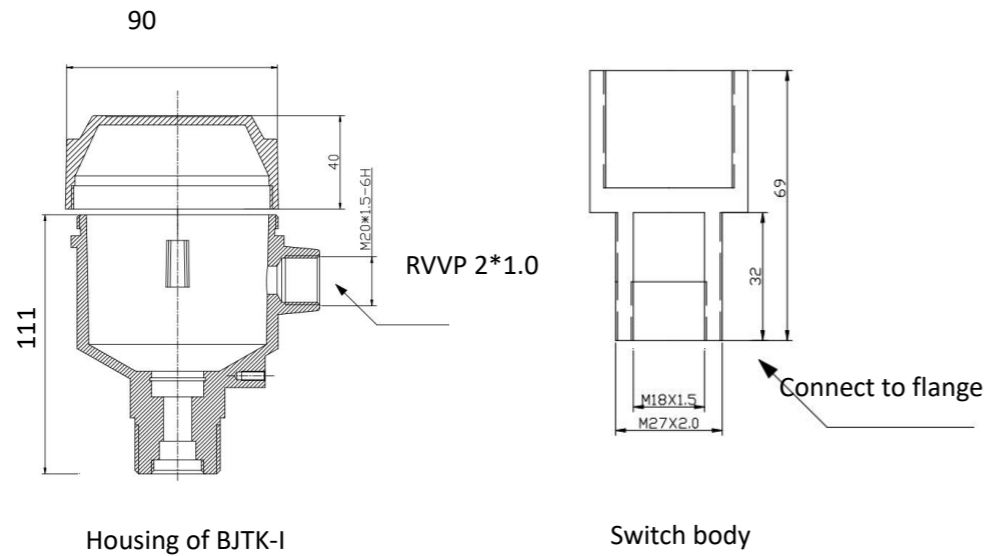
Voltage	220 V/AC	Input mode	Touch keypad
Input interface	2 com port for input interface;	Output interface	4 of com port for output interface; 1 of Wan com port;

JOYO | Level Switch

■ **BJTK-I Level Switch**



The BJTK-I Level Alarming Switch is specially designed for high high level alarming for liquid tanks to prevent overflow; It has remote alarming in sound and light via being connected with the PLC alarm controller.



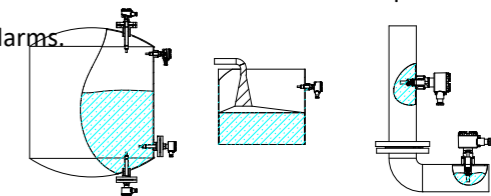
Technical Data

Voltage	< DC 24V	Installation	Thread M20x1.5
Alarm	Digital output	Ex Rating	Ex d II BT4 Gb
Contact	RS485 MODBUS、 HART	IP Protection	IP65

■ **FT-50 Vibronic Level Switch**



FT-50 is designed for indentifying high and low level and output singal to prevent overflow or use indication of empty liquid in the tank by identifying interface between two different media through inline density measurement . It identify the density difference in liquid by resonance principal. When the forks come in contact with a liquid, the resonant period are difference between the liquid and air, then the interface between the liquid and air will be detected and it output alarms.



Application

Providing indentifying Hi/Low level by measuring Interfaces between two different media and output alamsr.

Technical Data

Principle	Measuring Type	Resonance
	Frequency	1000Hz
Accuracy	Measuremetn Deviation	±1mm
	Delay	2mm
	Repeatability	0.1mm
Application	Density Range	500~1200 kg/m ³
	Viscosity Range	0.1~1000Cts
Process condition	Process Temperature	-40°C ~ +150°C
	Ambient Temp.	-40°C ~ +70°C
	Pressure	1~50Bar
Signal Output	NO/NC	NO/NC Relay output;
	Current	2-wire current (16A/8A))
Voltage	For Current output	DC 21V~25V
	For NO/NC output	DC 15V~32V
	For Instrinsic Safety Type	DC24V~48V
Material	Wetted parts	SS 316L
	Casing	Aluminium alloy
Fork Length		Customized
Cable Entry		2*NPT 1/2
Flange		Min 2inch (Class 300, Class 150)
Hazardous and Safety Approval	Ingress protection	IP68
	Safety Function	SIL 2
	Intrinsic safety	Ex d II C T6 Gb Ex ia II C T6 Ga

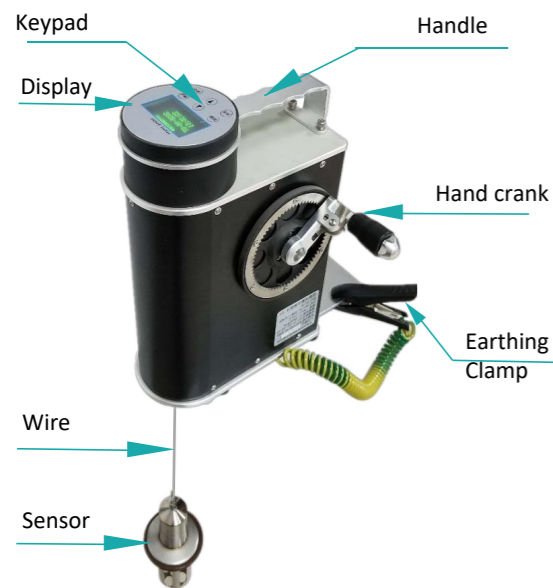
JOYO | TANK GAUGE

■ **DH-50 Portable Density Meter**

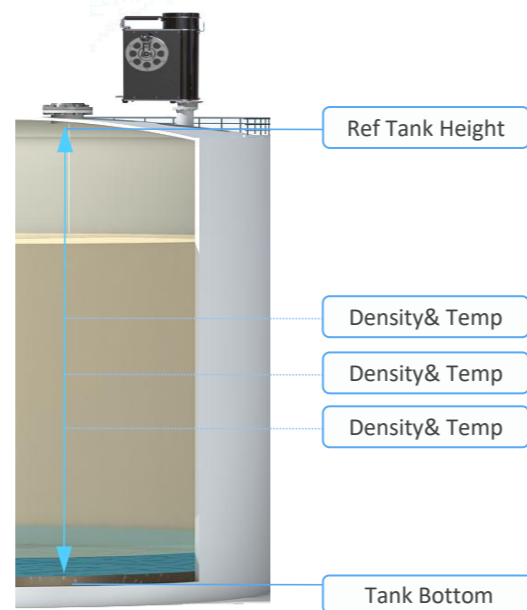


DH-50 portable density meter is used to measure the temperature and density of the liquid in a tank with the floater being set to stop at preset height points of the liquid. The data recordings can be transferred to your PC by wireless communication module. Its portable design makes it very easy to take along to any tank by hand for a measurement.

Structure



Measuring process



Applications

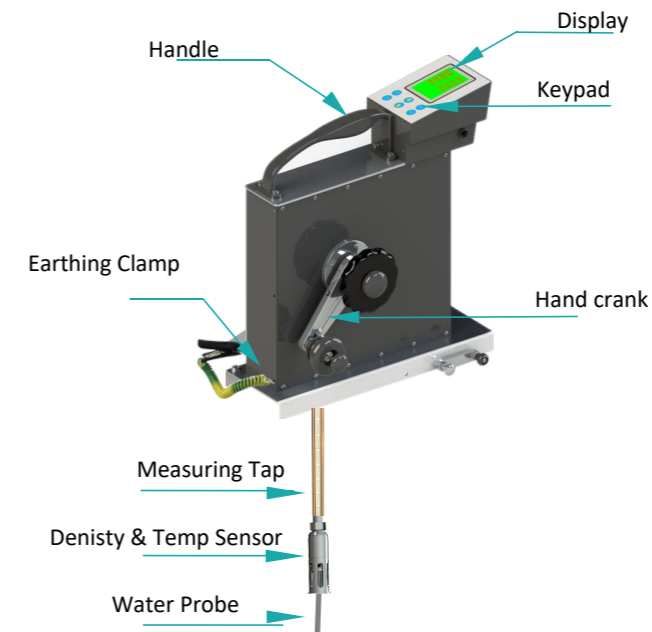
- Used for measurement of the density and temperature of the liquid in the vertical tanks, horizontal tanks, truck tankers and train tankers.



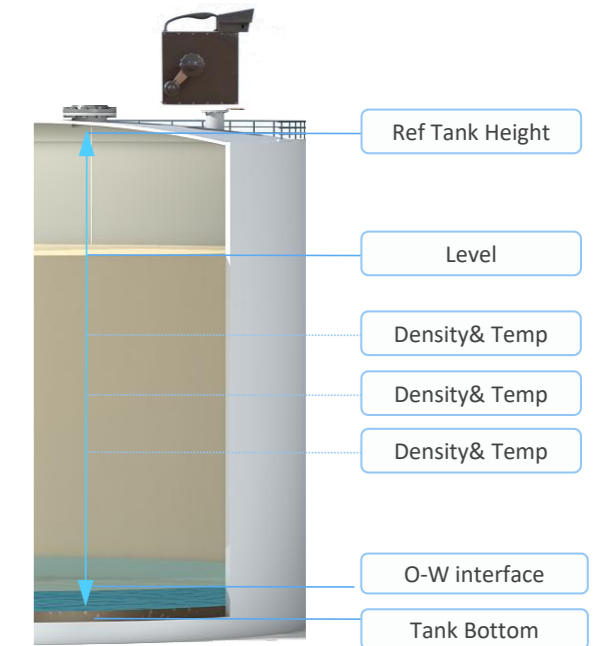
■ **DH-60 Portable Tank Gauge**

DH-60 is designed for **Portable Electronic Tank Gauging**, including multifunction in one single instrument. It is featured by electronic level gauging, and providing electronic density and temperature measurement and detecting oil-water interface.

Structure



Measuring process



Features

- Portable electronic level gauging;
- Electronic measurement of density and temperature;
- Providing Oil-Water interface detection;
- Multi-functions in one single instrument;
- Easy and convenient operation;
- Providing high accuracy measurement;

Technical Data

Measuring Accuracy		Measuring Range	
Accuracy of density	±0.3kg/m ³	Measure density range	650~1200kg/m ³
Accuracy of temperature	±0.2°C	Max wire/tap length	30 meters
Accuracy of level	±1mm (For DH60 only)	Temperature measuring range	-40°C ~ +70°C
Accuracy of water interface	±2mm (For DH60 only)		
Instrument Parameters		Hazardous Rating	
Ambient Temperature	-40°C ~ +70°C	Protect Class	Sensor: IP68; Other parts: IP65
Temperature compensation	Automatic	Explosion-proof Rating	Ex ia IIC T4 Ga (DH-50, DH-60)
Material of the measurement parts	Stainless steel 316; Hastelloy	Communication	
Data Storage	2024	433MHz wireless communication/bluetooth	



LOADING EQUIPMENT

- 18 BJJY- II -A Overfill & Grounding Monitor (Top loading) 23/24
- 19/20 KEY- I -T Loading Process Monitor 21/22
- 25/26 DM-50 Pipe Density Meter 27/28
- 29/30 FLS Rotor Flow meter 31/32
- DV Digital Flow Regulating Valve

JOYO^{m&c} | Loading Equipment

■ BJJY-880 Batch Loading Controller



Batch loading controller is designed to control the loading process of the preset volume loading system running in the inflammable and explosive circumstances in the petroleum, petrochemical, chemical or food industry.

Features:

- Modulized design for each functions such as loading control, Blending control;
- Valves is controlled in a stepless way, and the valve opening is controlled according to the flow rate;
- Built-in lightning protection module, filter circuit;
- 1~4 way batch loading controllers are optional

Technical Data

Voltage	220V/AC	on-off input	4 channel
Communication	1) RS485 2channel 2) BPM 1channel	Pump control signal output	220V/AC、 24V/DC
Display Mode	LCD display	Valve control signal output	220V/AC、 24V/DC
IC card interface	Standard RS232(built-in)	Loading Accuracy	< 3%(upoun flow meter accuracy)
Screen	Touch screen	Power-off Protection	Time out protection > 6 month
IP Protection	IP68	Temp.	-40°C ~ +80°C
Flow Pulse Frequency	1~600HZ	Ex Rating	Ex d II C T6 Gb
Flow accumulation signal	Low level 0-1.5VDC, High Level 3-24 VDC	Dimension	400x 278 x 123
Flow accumulation accuracy	± 1 pulse	Temperature signal input	1) 1 channel for 4-20 mA 2) 1 channel for PT100

JOYO | Loading Equipment

■ **BJJY- II -A Overfill & Grounding Controller**
(Top loading)

This system is used for overfill and grounding protection during a Top-Loading for truck or rail loading in petrochemical applications.



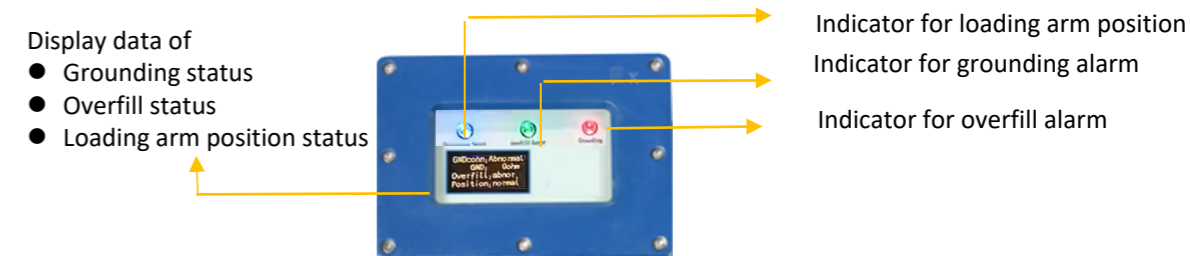
- Automatically and continuously monitor overfill sensors and grounding status during the loading operation;
- Light indication and alarms provide visual and audible monitor for the overfill status during loading operation, Red light blinking indicate static, Green light blinking indicate status for overfill, Blue light for loading arm position, LED display for displaying grounding resistance of grounding plug and grounding clamp to real time verify grounding status ;
- Loading will immediately shut down whenever overfill or grounding and other abnormal status is monitored;
- Alarm remind the operator to put clamp back to the seat after loading is finished to make assurance for the safety;
- Loading arm balancer installed on the loading arm to monitor its position to make sure it did put into tank loading port to avoid wrong loading.

Technical Data

Display	3LED lights indicate for static, overfill, and loading arm balance status;
Alarm Output	2 on/off alarming outputs, optional for NO and NC (Relay passive contact) Signal output capacity: 0.4A 125V/AC, 2A 30V/DC
Voice Alert	> 90 dB
Voltage	12V/DC, 24V/DC, 220V/AC
Power	< 2W
Sense Resistor	< 60 Ω
Response Time	Alarm for grounding < 1 sec, Alarm for overfill < 0.4 sec
Ambient Temp.	-40°C ~ +80 °C
Electrical Entry	4X M24X1.5, 2XM20X1.5
Ex Rating	Ex d ia[ia Ga] II C T6 Gb
Dimension	417 x 217 x 103(skid)

Features

- Built to function with all probes designed to the API standard, compatible with all commonly used overfill protection and grounding systems;
- Built in 12V, 24V, 220V voltage selection;
- Built-in lightning surge protection;
- Independent alarming for the electrostatic detection and the overfill protection;
- It can operate as an independent system or conjunction with your existing loading system;
- Self diagnosis function for overfill sensor.

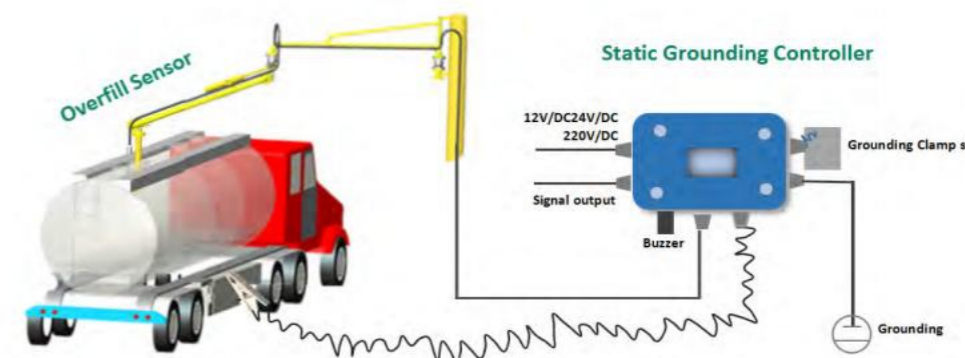


Overfill Probe



The advantage of capacitance-type overfill probe:

- With self-diagnose function, there is alarm for malfunction of the probe;
- The chance of false alarm is greatly reduced to ensure level detection is accurate and reliable;
- A unique design to prevent it from damage;
- Optional for equipped with additional loading arm position detection module.
- Default cable length 6 meters



JOYO | Loading Equipment

■ **BJJY- II -B Overfill & Grounding Controller**
(Bottom loading)



This system is used for overfill and grounding protection during a Top-Loading for truck or rail loading in petrochemical applications.

Features

- The system automatically and continuously monitor overfill sensors and grounding status during the loading operation;
- Light indication and alarms provide visual and audible monitor for the overfill status during loading operation;
- It will send status signal to loading controller or other automation system, loading shut down immediately shut down whenever overfill or grounding is monitored;
- Alarm will remind the operator to put clamp back to the seat after loading is finished to make assurance for the safety;
- Optional permissive and non permissive bypass conditions by the button on the truck plug.

Technical Data

Overfill probe connection	Connections available for API standards probe (including 2-wire and 5 wire)
Static Detection	One way static grounding status detection
Indicates	3LED lights indicats static, grounding and overfill status.
Alarm Output	2 on/off alarming outputs, optional for normal open and normal close (Relay passive contact) Signal output capacity: 0.4A 125V/AC, 2A 30V/DC
Voice Alert	> 90 dB
Voltage	12V/DC, 24V/DC, 220V/AC
Power	< 2W
Sense Resistor	< 60 Ω
Alarm Response Time	Alarm for grounding < 1 sec, Alarm for overfill < 0.4 sec
Ambient Temp.	-40°C ~ +80 °C
Electrical Entry	4-G3/4、 2-G1/2
Ex Rating	Ex d ia[ja Ga] IIC T6 Gb
Dimension	417 x 217 x 103(skid)

■ **BJJY-CZ Tanker Overfill Probe**

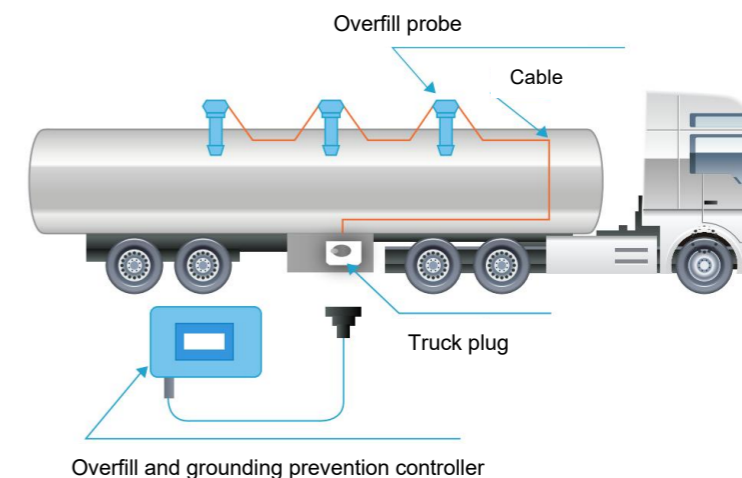


BJJY-CZ overfill probe is used to detect the overfill of the truck tanker in loading. it works with the bottom loading overfill alarming system. The data generated by the probe will be sent to the bottom loading overfill alarming system and loading controller when an overfill is detected, and the loading process will be immediately stopped controlled by the loading controller.

Ambient Temp.	-35°C~+70°C	Power supply	12V/DC
Probe Length	10~300mm	Electric Entry	2x M20 x 1.5

Installation Diagram

During loading process, when the liquid level reaches the safe height where the overfill probe is located, the overfill signal is send to monitor and alarm will be activated.



■ **Truck Plug902**

It is used for connection between overfill probe and overfill monitor and provide light indication for each tank status.

- API standard design;
- Built-in grounding sensor;
- Visible light indication for each tank status;
- Have permissive overfill bypass functions.





Loading Equipment

DM-50 Inline Density Meter



DM-50 Density meter is designed for the online measurement of liquid density and temperature in real time. It receives the pulse signals from the flow meter and calculates the volume totalization and weight of the liquid. It can also convert the value of the visual density into the standard density.

Application

- Measuring the density of the liquid in a tank;
- Measuring the online density of the product being loaded via a pipeline;
- Measuring the submarines' water density;
- Chemical and petrochemical process controls;
- Pharmaceutical industry process controls;
- Water and sewage treatment process controls;
- Alcohol production flow;
- Measuring the density of the aviation fuel;

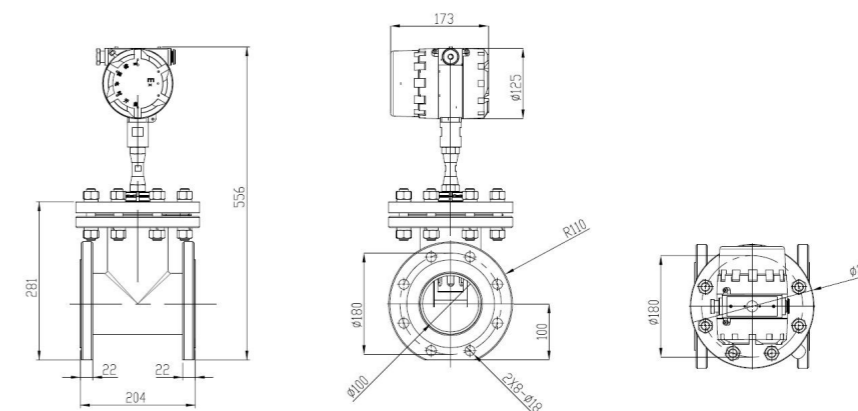
Technical Data

Density Range	650~1200kg/m ³	Voltage	DC 15~48V
Viscosity	Max 5Cst	Power	< 2.5W
Accuracy	±(0.3~0.5)kg/m ³	Communication	RS485 ModBus
Temp. of liquid	Refer to model selection	Temp. Accuracy	± 0.1°C (-5°C~ +45°C) ± 0.3°C (-40°C~ +85°C)
Pulse input from flow meter	One way		
Working Temp.	-40°C ~+70°C	Humidity	10%~90%RH
Calibration stability	< ± 0.1kg/m ³	Temp. compensation	Auto compensation
Ex Rating	Ex d ia [ia Ga] IIC T5 Gb	Material for the part contact liquid	316L, 3J53, Permalloy
Protection	IP68	Periodic Inspection	One time for every two year

Features

- Applicable for both flowing liquid and static liquid;
- Proven to be high performance and reliability;
- Realize continuous online measurements for the density and temperature of a liquid;
- Both density and temperature are displayed;
- Easy installation and free of regular cleaning and maintenance;

Dimension



Model Selection

DM-50

Measurement

1	Density & Temperature
2	Viscosity
3	Density& Temperature & Viscosity

Temperature

1	-10°C ~ +70°C
2	-40°C ~ +85°C
3	Per customized

Output

1	RS485 MODBUS
2	BPM
3	4~20mA + HART

Sensor Material

1	316L
2	3J53
3	Permalloy

Pressure

1	10Bar/145PSI/1M
2	20Bar/290PSI/2M
3	Per customized

DM-50 1 1 1 1 1



Loading Equipment

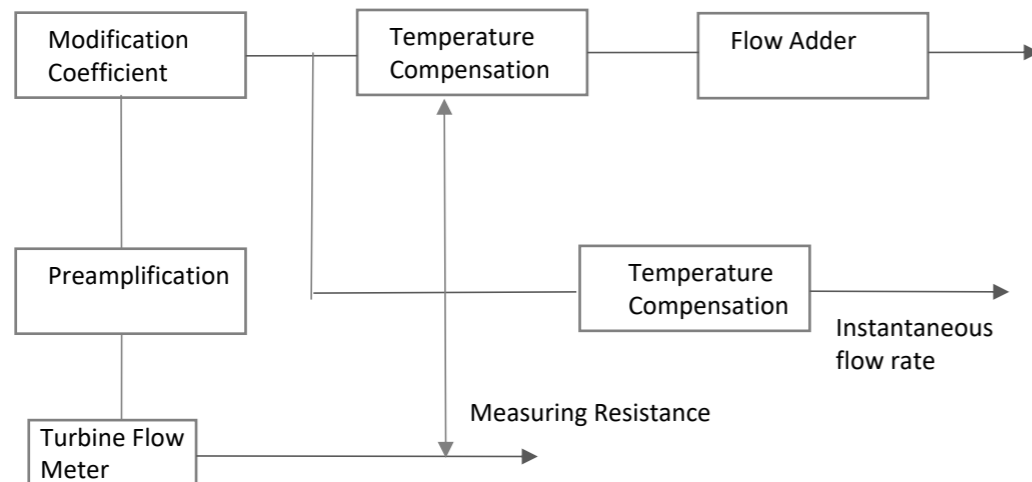


LS Flow Meter

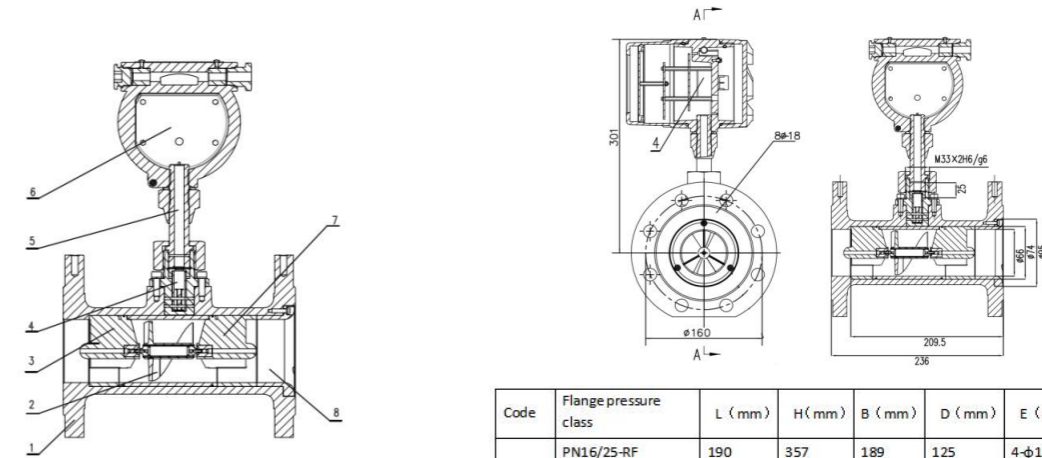
LS series flow meter is used to calculate the flow rate of the liquid by detecting the rotation of the turbine which is driven by the movement of the fluid. The rotating speed of the turbine is approximately proportional to the inlet flow rate.

Working Principle

For a fluid with a certain viscosity, the angular velocity (or pulse frequency) of the turbine is directly proportional to the instantaneous flow (or flow rate) of the fluid within the specified flow rate range. The edge of the turbine blade is equipped with a magnetic conductor, which is in the magnetic field of the signal detector. Rotating blades cut magnetic lines of force, periodically changing the flux of the coil so that electrical pulses are induced at both ends. The signal is amplified and reshaped to form a continuous rectangular pulse wave with a certain amplitude, which can be transmitted to the display instrument to calculate the instantaneous flow rate and the cumulative flow rate of the fluid, as shown in figure 2:



Dimension



- 1- Flow Meter Casing
- 2-Turbine
- 3-Rear Flow Guide Sleeve
- 4-Magnetic Head
- 5- Guide Rod
- 6-Junction Box
- 7- Front Flow Guide Sleeve
- 8- Flow Guide cover

Code	Flange pressure class	L (mm)	H (mm)	B (mm)	D (mm)	E (mm)	Weight (kg)
05	PN16/25-RF	190	357	189	125	4-φ18	10
	CLASS150-RF	190	357	189	120.6	4-φ19	10
08	PN16/25-RF	236	391	206	160	8-φ18	18
	CLASS150-RF	236	391	206	152.5	4-φ19	18
10	PN16-RF	270	412	216	180	8-φ18	22
	CLASS150-RF	270	412	216	190.5	8-φ19	22

Model Selection

LS	Code	DN	Flow Rate
	05	50	5~30 m ³ /h
	08	80	12~120 m ³ /h
	10	100	16~160 m ³ /h

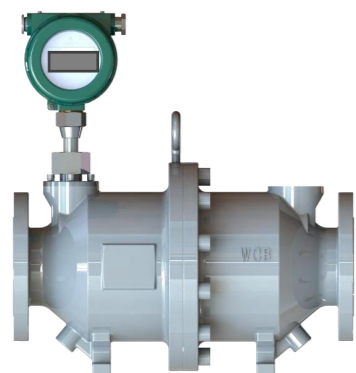
PN (Mpa)	
A	PN16 (1.6 MP/16Bar)
B	PN25 (2.5MP/25Bar)
C	class 150 (0.6MP/Bar)

Medium	
-L	Low viscosity medium
-H	High viscosity medium

Technical Data

Accuracy Class	0.15, 0.2	Communication	ModBus RS485
Viscosity of liquid	(0.2~800)cSt		Pulse output
Temp. of liquid	-40°C~+150°C	Voltage	24VDC
Ambient Temp.	-40°C~+70°C	Internal Battery	ER26500,3.6V
IP protection	IP65	Power	< 1W
Ex Proof Rating	Ex d IIC T5 Gb	Electrical Entry	2 * M20 * 1.5
Material	CF8 for housing and turbine, Aluminium for transmitter (Accuracy 0.15)		
	CF8 for housing and turbine, PEEK for transmitter (Accuracy 0.2)		

JOYO Loading Equipment



■ **FLS Flow Meter**

The FLS spiral dual rotor flowmeter is designed flow measurement demand for high-accuracy. It featured with simple structure, high accuracy, good repeatability, and convenient installation and maintenance. It is applied to liquid with high pressure and temperature changes, density and viscosity changes. The dual rotor made of special materials has good corrosion resistance. The rotor have no contact, friction, vibration or reciprocating components during its motion.

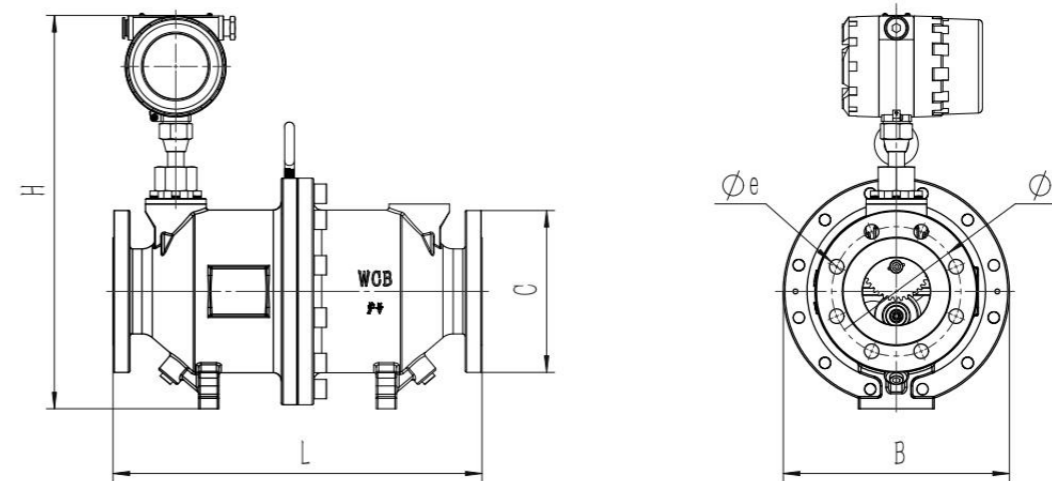
The instrument integrated with local display for instantaneous flow and cumulative totalized volume. The built-in battery can last for more than 6 years without external power supply. It also has functions such as pulse frequency signal output and power loss data protection. It is suitable for total volume measurement and also available for remote control by PC.

Working Principle

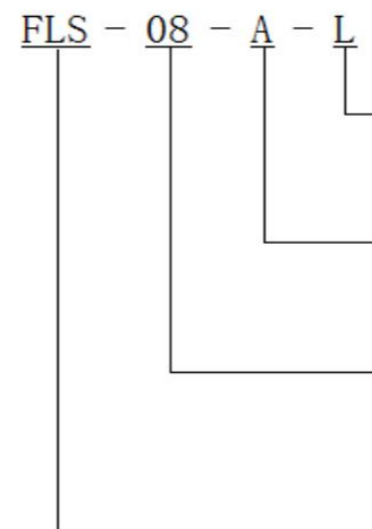
The FLS series spiral dual rotor flowmeter is a positive displacement volumetric high-precision flowmeter. A pair of spiral rotors together with the casing of the chamber, forming a known volume spiral cavity. Under the action of the liquid to be measured, the micro pressure difference between the inlet and outlet of the flowmeter drives two spiral rotors with the same geometric size and opposite rotation direction to mesh and rotate, continuously delivering liquid from the inlet to the outlet. By continuously dividing the fluid into equal volume units, direct measurement of the flow volume is achieved.

Model	Diameter	Apply	Flow range				Linearity	repeatability
			L/min		m ³ /HR			
			min	max	min	max		
FLS-08	DN-80	Standard	163	1609	10	97	±0.05%	0.01%
		extended	114	2082	7	125	±0.15%	
FLS-10	DN-100	Standard	265	2650	16	160	±0.05%	0.01%
		extended	125	3785	7	227	±0.15%	
FLS-15	DN-150	Standard	379	3785	23	227	±0.075%	0.01%
		extended	151	4083	9	245	±0.15%	

Dimension



Model Selection



- Viscosity
 - L low viscosity
 - H high viscosity
 - Nominal pressure
 - A PN16
 - B CLASS 150
 - Product code
 - 08- diameter 80mm
 - 10- diameter 100mm
 - 15-diameter 150mm
- Flow meter model

Technical Specification

Nominal Pressure	1.6/2.0/2.5 Mpa
Viscosity of liquid	(0.2~400)cSt
Temp. of liquid	-40°C~+70°C
IP protection	IP68
Ex Proof Rating	Ex db IIC T6 Gb
Communication	ModBus RS485 pulse output
Voltage	24VDC
Internal Battery	DC 3.6V
Electrical Entry	2 * M20 * 1.5
Material	carbon steel wac(casing) aluminiuma356 (rotors)

Features:

- High precision, long service life; Double chamber structure design, unaffected by environmental temperature and pressure changes;
- High range ratio: The range ratio can reach 1:20, and can also achieve relatively high measurement accuracy under extended flow.
- Flexibility of installation: can be installed horizontally and vertically to meet on-site needs. There is no contact, wear, vibration, or reciprocating components for the rotors with each other during rotation
- Data protection: with an internal battery for power supply. It can be used continuously for more than 6 years even without outside power supply.



Loading Equipment

■ DV Series Digital Control Valve



DV series digital flow control valve is widely used in the fluid flow control application. It can precisely control the percentage opening of the valve through the signal of switching on/off, and realize the functions of accurate flow rate control, batch control, fluid cut-off and the ratio of multi-media blending. It is able to turn on and shut off automatically. It has small resistance to liquid flow, suitable for flow control for all sorts of high viscosity fluids.

Application

- By actively controlling the opening and closing of piston valves through motors, there are fewer mechanical transmission components to enable longer service life, making it suitable for situations that require frequent opening and closing
- Achieve precise adjustment and control of liquid flow rate, with linear adjustment of valve opening. With significant advantages especially in requires precise quantitative loading ratio for ethanol gasoline loading;
- The working process has low flow resistance. Suitable for application when there is no request in pipe pressure;
- DV valves is less affected by liquid viscosity. Very suitable for the application in the case of product with high viscosity. It is an ideal replacement for electric hydraulic valve which the solenoid valve is easily blocked;
- Material CF8 and stainless steel is able to be applied for some of corrosive products (except for Acid)
- The valve automatically closes after power is off.
- Can be installed horizontally, vertically, and obliquely, with a wide range of applications

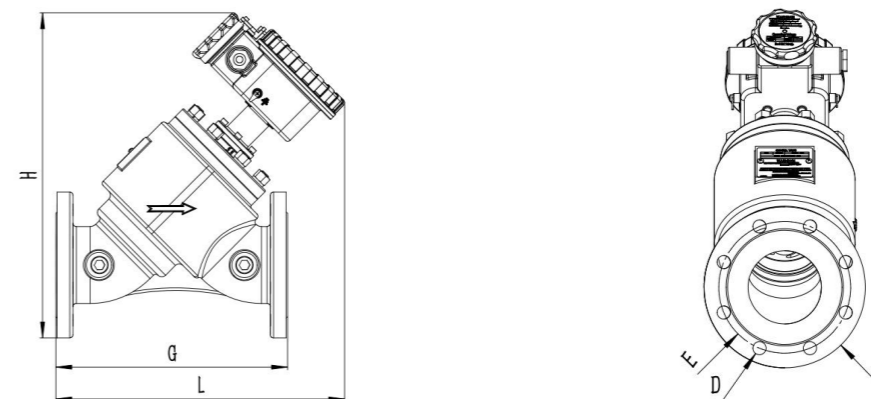
DV valve CV and KV

Model		DV-05D	DV-08D	DV-10D	DV-15D
Cv	GPM	55	125	180	261
Kv	M ³ /h	47	108	156	226

Technical Data

Voltage	24V/DC, 220V/AC
Control Mode	-NO/NC control; -4~20mA; -RS 485 Modbus control;
Working Temp.	-40°C~+85°C
Opening	0~100%
Ex Proof Rating	Ex d IIC T5 Gb
Power consumption	Valve acting: < 40W Valve remains open or closed: < 2W
Switch speed	Fully close to fully open: <4s; Fully open to fully close: <2s;
Material	Body: CF 8 ASTMA351 Trim : Stainless steel Diaphragm: FEP fluorine coated O-ring
Electrical Entry	2 of 3/4" NPT
IP Protection	IP 65

Installation dimensions



Flange Size	Class	L (mm)	H (mm)	G (mm)	B (mm)	E (mm)	D (mm)
2"	CLASS150	381	396.5	267	152	120.6	4-φ19
3"	CLASS150	434	454	310	190	152.5	4-φ19
4"	CLASS150	437	498.5	330	230	190.5	8-φ19
6"	CLASS150	485	571	432	280	241.5	8-φ22



▶▶▶ TANKER ELECTRONIC SEALING

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SEAL-III Series of Electronic Seaking

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BJTC- II Sealing Controller / Sealing Management Software

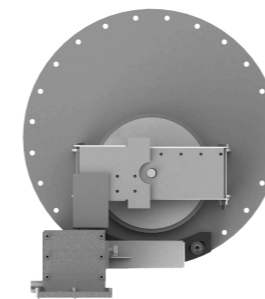
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Electronic Sealing Monitoring process

JOYO^{m&c} | Tanker Electronic Sealing

■ SEAL-III Series of Electronic Sealing

The product can be automatically sealed or opened controlled by the monitor. It can real-time detection for seal state and illegal state and timely alarm. The electronic seal is equipped with CPU module, micro-motor driven opening and locking structure, and lead blocking state detection components. The electronic seal regularly communicates with the vehicle controller, the communication information includes the state of the seal, the alarm, etc. The vehicle controller decides when to open and lock the seal according to the requirements of the control center.

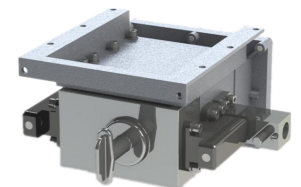


SEAL-III-U Top Sealing for Manhole

It is an automatic electronic Top seal designed for oil discharge hole on the top of loading truck. It can effectively seal the top manhole. The lead seal and manhole cover integrated design as a hole device, it realize the direct and rapid modification for the the existing oil tanker.

SEAL-III-D Bottom Sealing for loading outlet

It is an electronic sealing designed for the oil discharge port at the bottom of the oil tanker. It is installed on the top of the oil discharge tanker and control the opening of the door as a lock. It is also used together with the valve seal installed on the submarine valve, which greatly increases the safety monitoring and effectiveness of the seal.



SEAL-III-V Valve Sealing for Bottom Valve

Valve seal is designed for the bottom valve sealing to control the loading and unloading of the oil. Applied to API valves, it will not affect the normal use of the API valve, and do not need to make any changes to the API valve. It provide perfect solution to seal problem for the bottom loading and unloading API valves .



Technical Data

Voltage	12V/DC	Life span	100 thousand times
Temp.	-40°C~+80 °C	IP Protection	IP 65
Comm.	RS485	Ex Rating	Ex d II B T6 Gb

JOYO m&c Tanker Electronic Sealing

Electronic Sealing Monitor BJTC-II



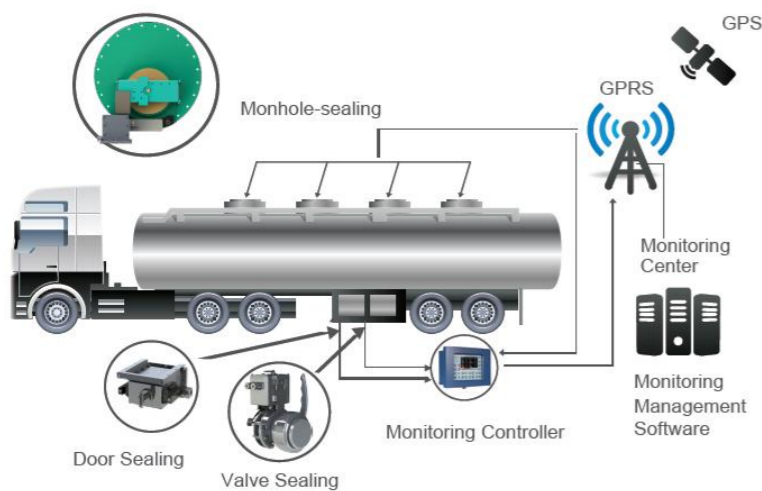
This sealing monitoring controller is used on the tank truck where electronic sealing and level probes have been installed. It hosts the communications between the electronic sealing devices, level probes and the remote monitoring center, and realizes the local control and management of the tank gauging and sealing components on the truck by the remote center.

The controller is equipped with GSM mobile phone communication module, GPS global positioning module, RF card swipe module, display module and RS485 module for communication with liquid level probe, Seal III electronic sealing. As the command center, CPU realizes liquid level acquisition, seal management, vehicle positioning and data exchange by the monitoring center through the above modules.

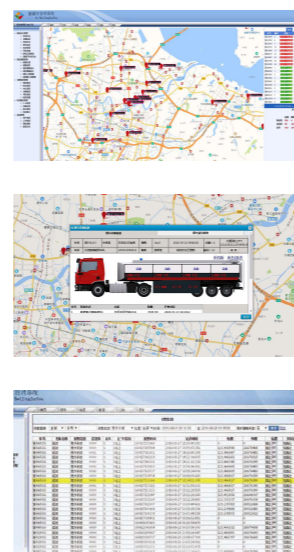
Technical Data

Voltage	24 V/DC	Current	< 1.85A
Comm.	GPRS RS485	Temperature	-40~+80°C
Pressure	1.5Mpa	Humidity	15%~90%
Ex Rating	Ex d II B T6 Gb	IP Protection	IP 68

Seal-III sealing software

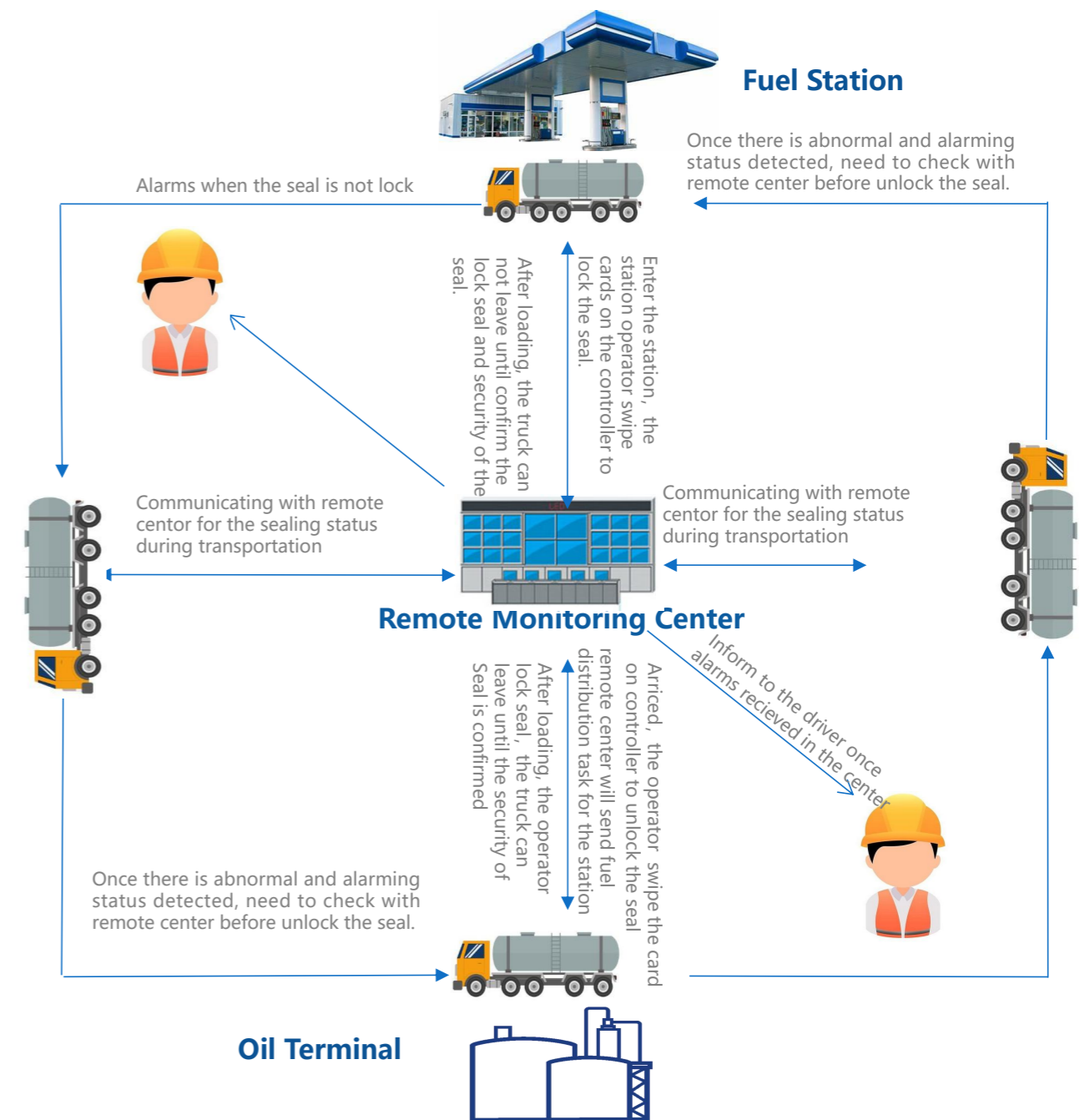


Software photo



Electronic Sealing Monitoring process

- When truck arrives at oil terminal for loading, the terminal operator swipe cards on the CONTROLLER to unlock the SEAL, once there is any abnormal status is monitored, the lock will not be opened until confirmed by the Remote center;
- When the truck driving transit between terminal and fuel station, whenever it is in the driving status or in the parking status, the driver is not authorized to open the seal;
- After the truck arrives at the fuel station, the operator swipe the cards on the controller, the SEAL only can be opened after confirmation of the truck sealing is in good condition and no abnormal status is detected.





Terminal Automation System

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Terminal Automation System

JOYO^{m&c} | Terminal Automation System

Terminal Automation System

Accuracy, efficiency, security and visualization of the operations are always the key concerns of the terminal owners. Based on 20 years of industrial experiences in TAS related business and close cooperations with prevailing customers in the petrochemical sector, such as Sinopec, CNPC, etc., JOYO M&C has successfully implemented various kind of solutions on terminal automation systems for multiple customers, including those covering the ATG and tank-farm inventory monitoring systems, truck loading/unloading control systems, oil-tanker/rail-car loading/unloading systems, inflammable gas detecting and alarming systems, CCTVs, access control systems, border fencing and alarming systems, remote electronic seal monitoring system, integrated terminal information platforms and integrated security monitoring platforms, etc. Our solutions is very beneficial to our customers with a lot of true values and made their daily performances in safety, security, delivery efficiency and accuracy greatly enhanced and improved. Consequently, their productivity in overall has been significantly increased with higher accuracy in inventory management, better planning in daily operations and quicker responses in accidents.

