ZTD DISPLACER LEVEL TRANSMITTER

Summary

Our company has been developing and producing since 1992. After years of technical research and accumulation of experience, the product performance has reached the international leading level. ZTD Displacer level transmitter can be used to measure level, interface or density, output 4-20mA current signal, and have HART communication protocol. Through the compatible HART communicator, the level controller can be inquired, configured, calibrated or tested. It can also accept the information of a single measurement loop, and can transmit the information from the field to the control system.

Operating principle

Displacer level transmitter is composed of level controller and measuring chamber, displacer, torque tube and other components. The change of the measured medium level causes the buoyancy of the float to change, and the change is transmitted to the torsion tube component, which makes the torsion tube rotate one angle with the mandrel synchronously. A sensing system coupled to the torsion tube mandrel generates a voltage signal. The level controller electronic assembly measures the level (interface) signal and provides a 4 to 20 mA current output. The microcontroller measures the ambient temperature to compensate for changes in liquid density caused by changes in process temperature, and the LCD displays information such as the analog output, process variables, process temperature (RTD installation required), torsion tube rotation angle, and percentage range of the level (interface).

ZTD Displacer Level Transmitter with DLT9010 Level Controller

ZTD displacer level transmitter with DLT9010 level controller is a product of DDTOP has achieved international leading level after years of research and development and improvement. Exquisite craftsmanship and mature technology make the product performance more stable and reliable, a number of authoritative certifications ensure that users can use the product safely and safely.

Certifications, Patents, Software copyrights, Certificates and Awards Certifications

Functional safety, SIL 2 certification certified by Bureau Veritas

European Union CE ATEX directive explosion-proof certification certified by TÜV Rheinland

IECEx explosion-proof certification certified by TÜV Rheinland

European Union CE PED directive certification certified by TÜV SÜD

Patents

Displacer level transmitter adjustment device zero point - utility model patent (Patent No.: ZL 2014 2 0097716.3).

Displacer level transmitter with overload protection agencies - utility model patent (Patent No.: ZL 2014 2 0801088.2).

Displacer level transmitter calibration, self-check institutions - online utility model patent (Patent No.: ZL 2009 2 0203039.8).

Displacer level transmitter appearance design patent (Patent No.: ZL 2010 3 0660336.3).

Software copyrights

DDTOP - Embedded software for displacer level transmitter with functional safety V1.0' (Soft Registration No. 0694038).

DDTOP - Embedded software for smart level transmitter V1.0' (Soft Registration No. 0225313).

Certificates and Awards

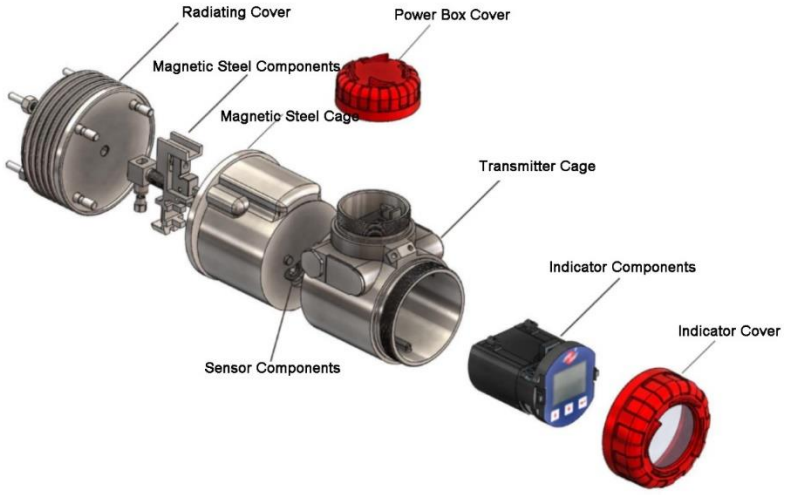
Liaoning provincial scientific and technological research achievements certificate' awarded by the Liaoning Provincial Department of Science and Technology (2012.3)

Outstanding specialized new product certificated' awarded by Liaoning Provincial Department of Small and Medium Enterprises (2012.6)

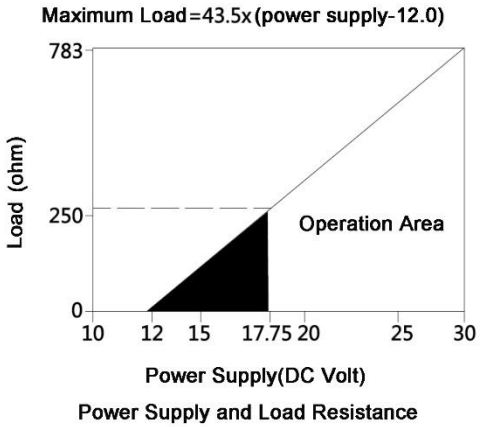
Outstanding new product' awarded by Liaoning Provincial People's Government (Certificate No.: 09 XCP - 2-060), (2012.7)

Outstanding new product' awarded by Liaoning Provincial People's Government (Certificate No.: 10 XCP - 3-158) (2014.8)

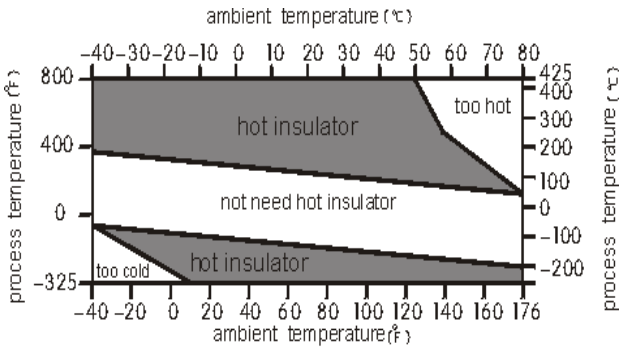
2012 Outstanding Product Award' awarded by China Instrument Association (2012.8)



DLT9010 Level Controller Exploded View



Power Supply and Load Resistance



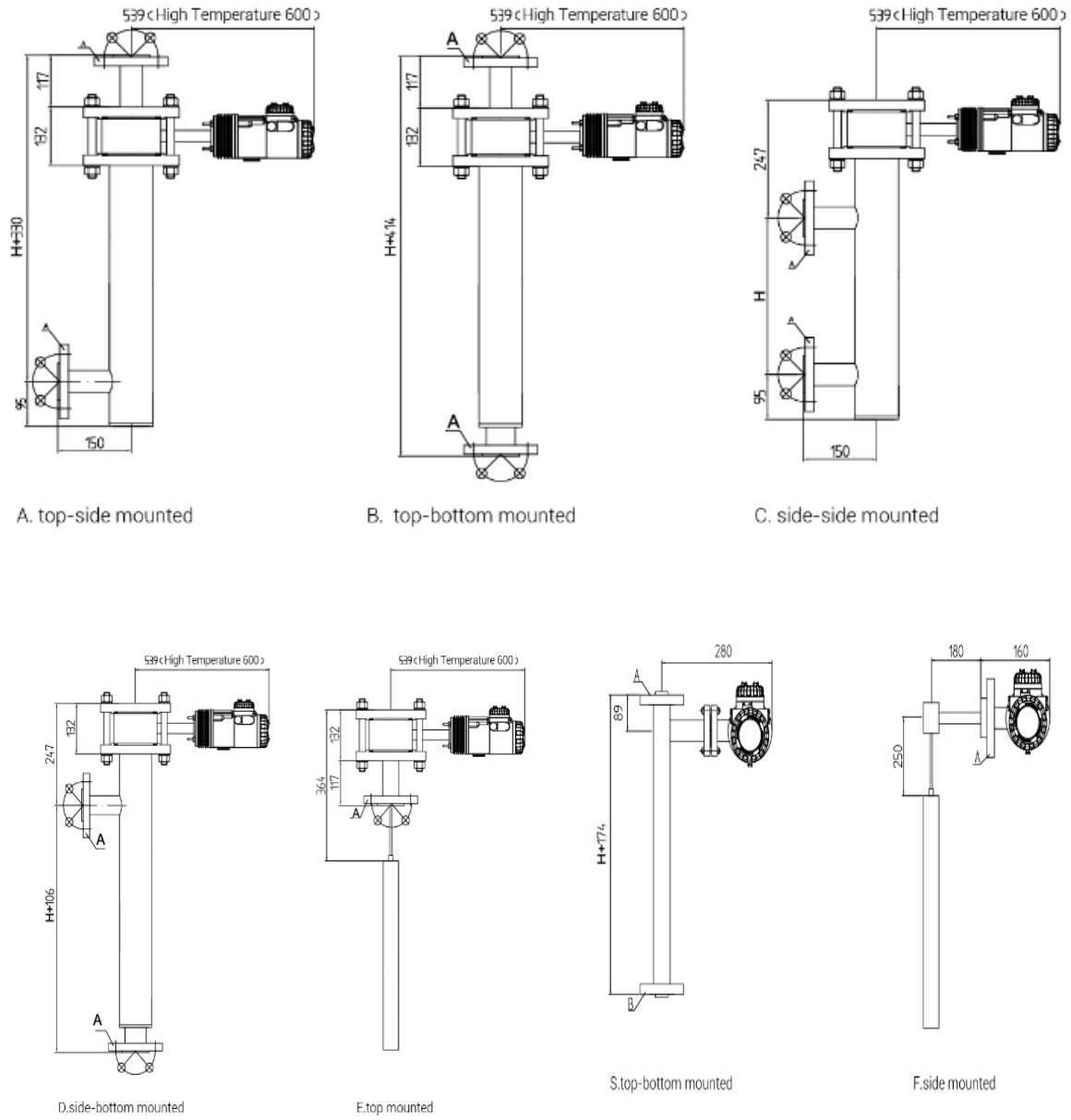
Note: If the ambient temperature is higher than process temperature, the error will be occurred on the instrument with ice to decrease the effectiveness of insulator.

Technical Parameters

Power supply: 12~30V DC; with reverse-polarity protection. (When HART communication is used, the voltage of controller should be larger or equal to 17.75V DC)
Output: 4 ~ 20mA DC+HART (Positive effect - increased output due to increased level, interface or density; or negative effect - decreased output due to increased level, interface or density)
Range: 300mm - 2500mm (to order; customized design if out of range)
Nominal pressure: ≤42.0MPa(Class2500)
Nominal diameter: DN40 or to order
Ambient temperature: -40 ºC to +80 ºC (When ≤ -20 ℃, LCD no display, remote transmission can be used normally.)
Medium temperature: − 196℃≤T≤+450℃
Accuracy: 0.5
Influence by power supply: When the voltage of the power supply varies between min. and max. ,the output change is within < ±0.2% of the output range.
LCD display: Output current signal, process variable, process temperature, percentage range, rotation angle of torque tube.
Density:0.2≤ρ≤1.9g/cm3
Medium density difference: ≥0.04g/cm³
Torque tube material: Standard configuration Inconel 600, or Monel, HasetlloyC-276
Chamber material: CS, 304, 316 or as customer required.
Displacer material: 304,316 or as customer required.
Flange standard: HG/T20592-2009、HG/T20615-2009 or on request
Power inlet: Two M20×1.5 (female) or on request
Hazardous Area Explosion-proof:
IECEx Ex ia II C T5 Ga; Ex d II C T5/T6 Gb.
TUV Ex ia II C T5 Ga; Ex d II C T5/T6 Gb.
PCEC Ex ia II C T5 Ga; Ex d II C T5/T6 Gb.
Functional safety: SIL 2
IP Rating: IP66
Alarm configuration: For the self-diagnosis to the inaccuracy failure of the process variables (for example, the electronic module failure). Configure the process variables for high and low alarms.

Outline Drawing and Parameters

H in following drawing is measuring range; Nominal pressure ≤PN63. Dimension in the bracket is suitable for product with insulation cover.



A. top-side mounted

B. top-bottom mounted

C. side-side mounted

D.side-bottom mounted

E.top mounted

S.top-bottom mounted

F.side mounted

ZTD Displacer Level Transmitter with DLC3000 Level Controller

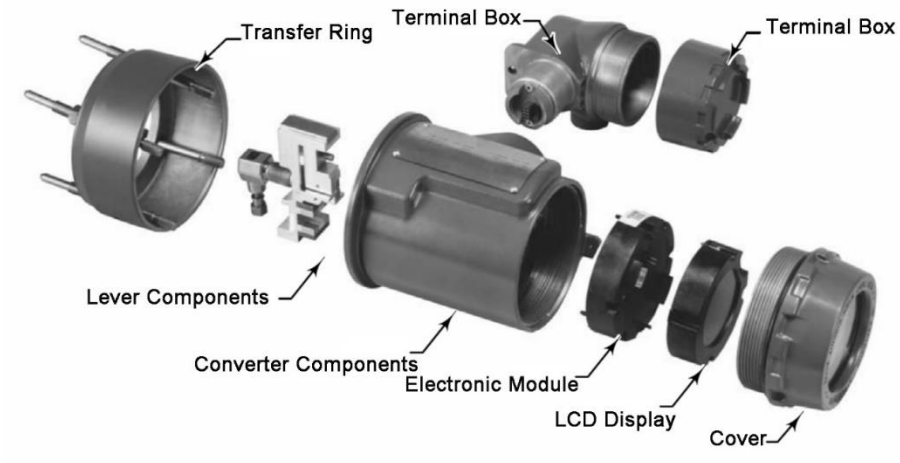
Our company is the authorized OEM manufacturer by Emerson fisher for DLC3000 series and we are the largest displacer level transmitter OEM manufacturer in the world. DLC3000 series level controller is produced by Emerson Fisher. Our company has accumulated rich experience in the process of supporting manufacturing and maintenance for many years to ensure the long-term and safe use of this series of products.

Configuring the DLC3010/DLC3020f Level Controller

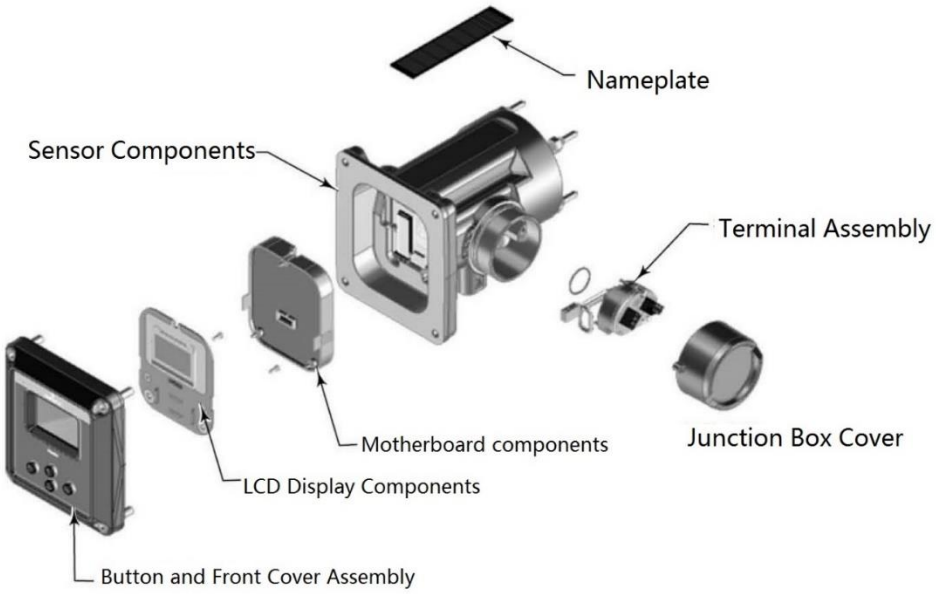
Displacer Level Transmitter

Configuring the DLC3100 Level Controller

Displacer Level Transmitter



DLC3000 Transmitter Exploded View



Configuring the DLC3100 Level Controller Transmitter Diagram

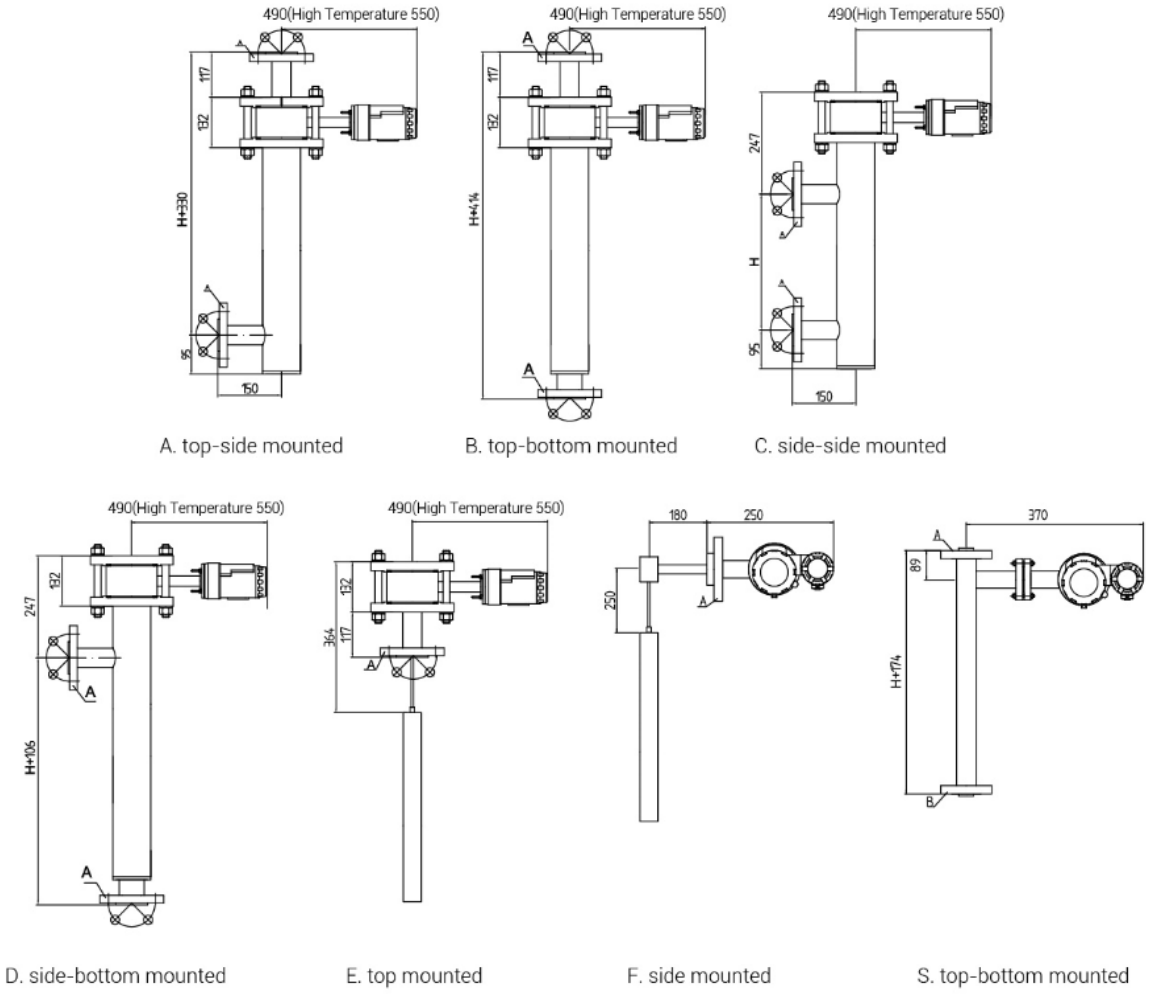
Technical Parameters

Power supply: 12~30V DC; with reverse-polarity protection. (When HART communication is used, the voltage of controller should be larger or equal to 17.75V DC)
Output: 4 ~ 20mA DC+HART (Positive effect - increased output due to increased level, interface or density; or negative effect - decreased output due to increased level, interface or density)
Range: 300mm - 2500mm (to order; customized design if out of range)
Nominal pressure: ≤42.0MPa(Class2500)
Nominal diameter: DN40 or to order
Ambient temperature: -40 ºC to +80 ºC (When ≤ -20 ℃, LCD no display, remote transmission can be used normally.)
Medium temperature: − 196℃≤T≤+450℃
Accuracy: 0.5
Influence by power supply: When the voltage of the power supply varies between min. and max. ,the output change is within < ±0.2% of the output range.
LCD display: Output current signal, process variable, process temperature, percentage range, rotation angle of torque tube.
Density:0.2≤ρ≤1.9g/cm3
Medium density difference: ≥0.04g/cm³
Torque tube material: Standard configuration Inconel 600, or Monel, HasetlloyC-276
Chamber material: CS, 304, 316 or as customer required.
Displacer material: 304,316 or as customer required.
Flange standard: HG/T20592-2009、HG/T20615-2009 or on request
Power inlet: Two NPT1/2 (female) or on request
DLC3010 Explosion-proof type: Ex ia II C T5; Ex d II C T5

DLC3020 Explosion-proof Type: Ex ia II C T5/T6 Ga; Ex d II C T5/T6 Gb
DLC3100 Explosion-proof version: Ex ia II C T5/T6 Ga; Ex d II C T5/T6 Gb
DLC3010/3020 Functional safety level: SIL 1
DLC3100 functional safety level: No SIL certification/SIL 2 (optional)
IP Rating: IP66
Alarm configuration: For the self-diagnosis to the inaccuracy failure of the process variables (for example, the electronic module failure). Configure the process variables for high and low alarms.

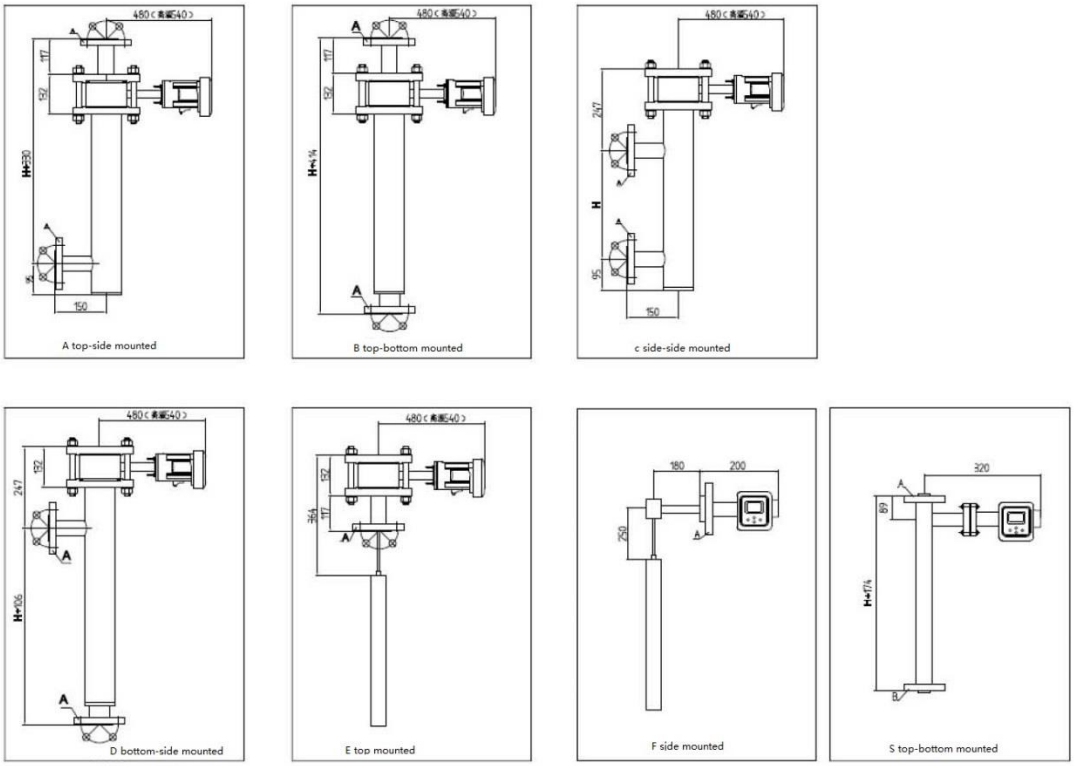
Outline Drawing and Parameters

H in following chart is the measuring range; Nominal pressure ≤PN63. Dimension in the bracket is suitable for product with insulation cover.



Configuring the DLC3010/3020f Level Controller

Displacer Level Transmitter

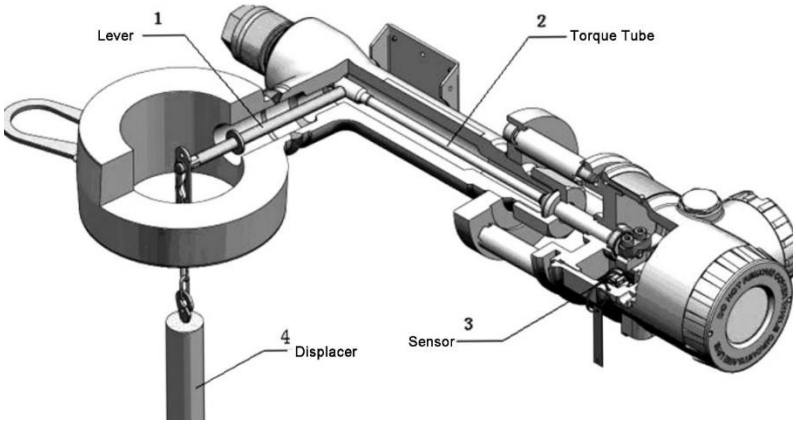


Configuring the DLC3100Level Controller

Displacer Level Transmitter

ZTD Displacer Level Transmitter with 244LD Level Controller

DDTOP is the largest authorized OEM manufacturer of Schneider Foxboro 244LD displacer level transmitter. The level controller part is originally manufactured by Foxboro. After years of manufacturing and maintenance of 144LD, 244LD, 244LD Level Star series level controllers, we have accumulated a wealth of experience, our company has mastered more technical characteristics of this series level controllers, and have richer on-site processing experience, to ensure users to use this series of products for a long time and safely.



244LD Level Controller Exploded View

Operating principle

The buoyancy of displacer (4) is transmitted to the sensor 3 via lever 1 and the torque tube (2). In measuring range, the voltage is proportional to the buoyancy, and as the input signal is transmitted to the electronic amplifier. Through the electronic amplifier, voltage is converted to 4-20 mA two-wires output signal.

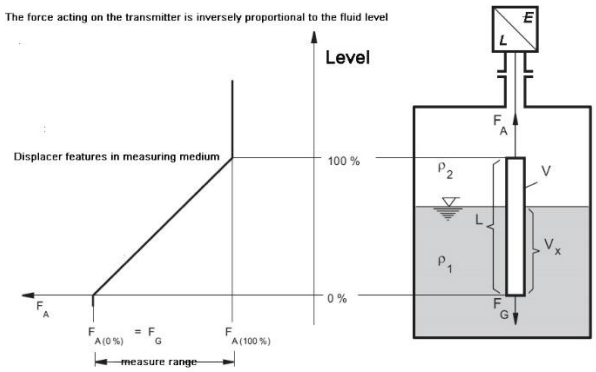
When measuring the density and interface level, the displacer should be completely immersed in liquid. The change of the liquid level must be within the range.

The calculation of buoyancy:

$F_A = V_X \cdot \rho_1 \cdot G + (V - V_X) \cdot \rho_2 \cdot G$

In the formula:

F_A: Buoyancy
V: The volume of the displacer
V_X: In the liquid density of ρ_1, the medium volume displacer swaps out
ρ_1: The average of the heavy medium density
ρ_2: The average of the lighter medium density
G: The local acceleration of gravity
F_G: Buoy its own gravity



Technical Parameters

Power supply: 12 ~ 42 VDC

Output signal: 4 ~ 20mA/20 ~ 4mA+HART

Range: 300 ~ 3000mm (can also over range)

Nominal pressure: ≤42.0MPa

Nominal diameter: DN40 or on request

Ambient temperature: －40℃ ~ +80℃(When ≤ -20 ℃, LCD no display, remote transmission can be used normally)

Medium temperature: －196℃≤T≤450℃

Accuracy:0.5

Load Resistance：(Power supply-12V)/0.02A

LCD display: Five digits can be configured as%, mA or other physical units

Density: 0.2≤ρ≤1.9g/cm3

Medium interface density difference：≥0.04g/cm3

Torque tube material：Standard Inconel 600, optional Monel, HasetlloyC-276

Measuring chamber material: CS, 304, 316L or as customer request

Displacer material：304, 316L or as customer required

Flange standard：HG/T20592-2009, HG/T20615-2009 or as customer request

Power inlet: Two NPT 1/2 (female) or on request

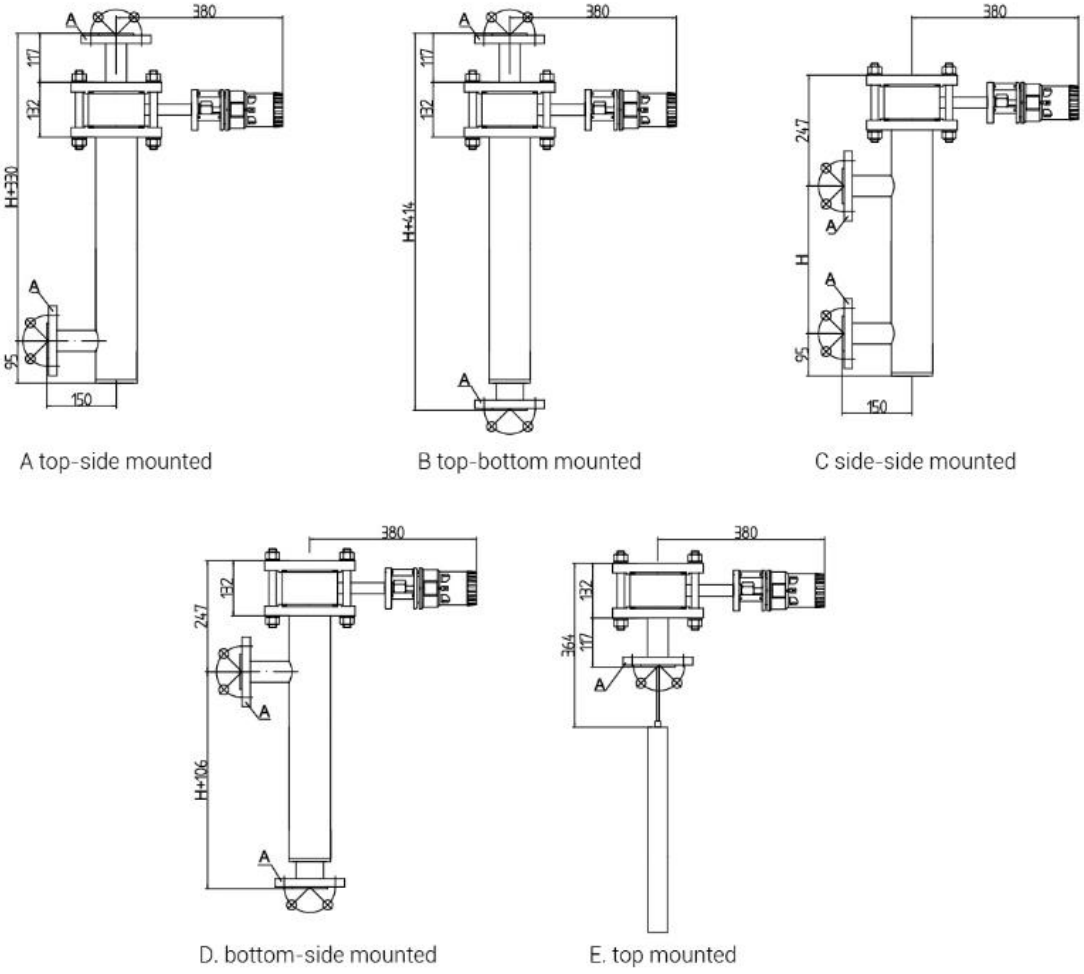
Explosion-proof: Ex ia Ⅱ CT4/6； Ex d Ⅱ CT4/T6；

Functional safety: SIL Ⅱ

IP Rating: IP66

Outline Drawing and Parameters

H in following chart is measuring range; Nominal pressure ≤PN63.



A top-side mounted

B top-bottom mounted

C side-side mounted

D. bottom-side mounted

E. top mounted

Model Selection Table

Model	Code	Contents
ZTD-		Smart Displacer Level (Interface) Transmitter
	1	Level measurement
	2	Interface measurement
	3	Density measurement
	A	Top-side mounted
	B	Top-bottom mounted
	C	Side-side mounted
	D	Bottom-side mounted
	E	Top mounted
	2	PN10(1.0MPa)
	3	PN16(1.6MPa)
	4	PN20(CLASS150)
	5	PN25(2.5MPa)

										6				PN40(4.0MPa)	
										7				PN50(CLASS300)	
										8				PN63(6.3MPa)	
										9				PN100(10.0MPa)	
										10				PN110(CLASS600)	
										11				PN150(CL900)	
										12				PN160(16.0MPa)	
										13				PN250(25.0MPa)	
										14				PN260(CL1500)	
										15				PN420(42.0MPa)	
										16				PN420(CL2500)	
											/				
												d			Explosion-proof
												i			Intrinsically safe
													1		20
													2		304
													3		316
													4		316L
													X		According to user requirements
														D	Temperature class：-30℃≤T < +100℃
														G	Temperature class：-196℃≤T≤+450℃
															/
															Range: Fill in according to the actual situation, the default unit is mm
															-
															F Chamber with heating, flange connection DN15, PN2.5 RF
															Z Chamber with heating, thread joint
															Y Right mounted transmitter (Default)
															W Left mounted transmitter
															-
															1 DLT9010(Hart)
															2 DLC3010/3100(Hart)
															3 DLC3020f(FF)
															4 244LD(Hart)
															5 DLC3100(Hart SIL2)
ZTD-				/				/		-			-		

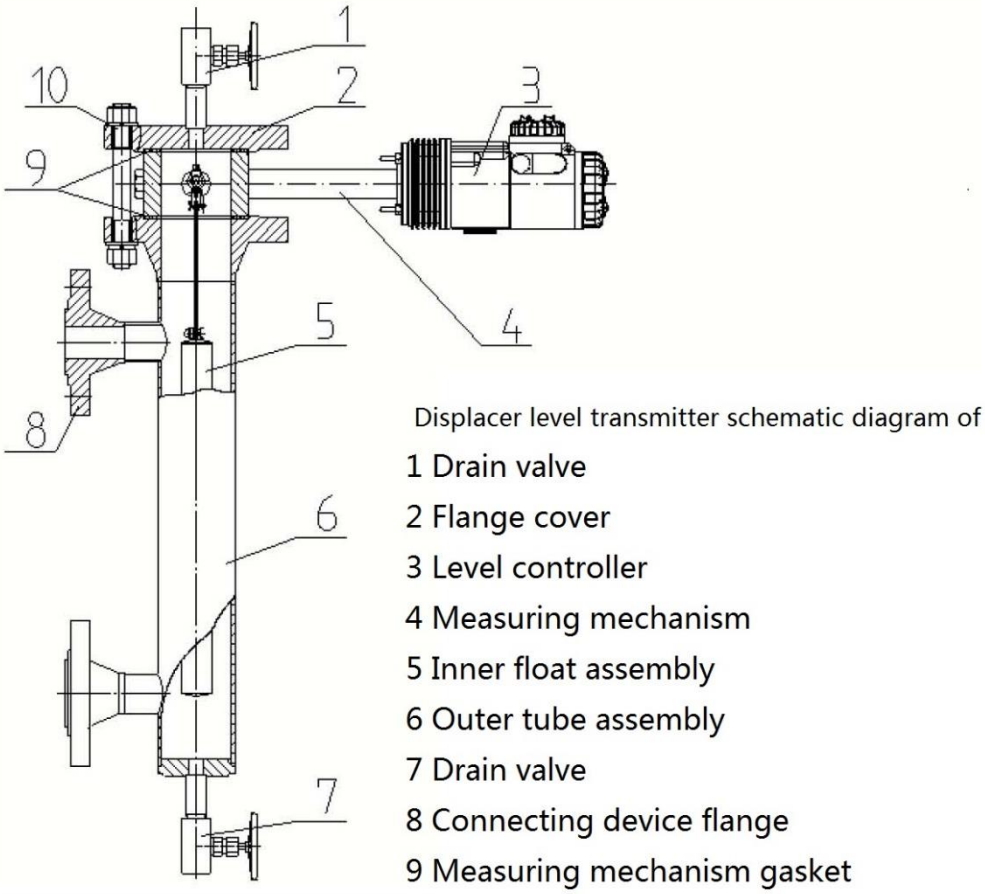
Example

ZTD-2C7/i1D/800FY-1: Measuring interface, side-side mounted, nominal pressure is PN63 or PN5.0MPa

intrinsically safe, HART, chamber material is carbon steel, medium temperature-30℃≤T < +100℃, measuring range is 800mm, chamber with heating, flange connection with heating tracing, right mounted transmitter ,controller is DLT9010.

Mounting orientation of the level controller

Mount the controller on the chamber. When the controller is mounted on the right of the displacer chamber, the transmitter is called right-mounted, so when the level increases, torque tube turns in clockwise. When the controller is mounted on the left of the displacer chamber, the transmitter is called left-mounted, so when the level increases, torque tube turns in counter-clockwise.



Displacer level transmitter schematic diagram of components

1 Drain valve
2 Flange cover
3 Level controller
4 Measuring mechanism
5 Inner float assembly
6 Outer tube assembly
7 Drain valve
8 Connecting device flange
9 Measuring mechanism gasket
10 Measuring fasteners

Material and Temperature

Material	Process Temperature	
	Min	Max
Cast iron	-29℃	232℃
Steel	-29℃	427℃
Stainless steel	-196℃	427℃
Monel	-196℃	371℃
Inconel	-196℃	600℃
Hastelloy c	-196℃	400℃
Flake graphite/stainless graphite	-196℃	427℃
Monel/ptfe	-73℃	204℃

Safety barrier recommendation table

Shanghai I.S.Instruments & system Co.,Ltd	LS4041-Ex
Germany P+F Company	KFD2-STC3-Ex1
Shanghai Automation Instrument Institute	GS8041-Ex; GS8045-Ex
Dandong Top Electronics Instrument Co., Ltd	TP5041-Ex; TP5045-Ex
Longfei Group Corporation in China	LF1045
England	MTL3046B; MTL5042; MTL706+

Ordering Information

- Choose the model according to model selection table
- Process pressure and temperature
- Special wetted material name
- Tag No.
- Medium name & density
- Flange standard
- Accuracy requirement