ISO 9001/14001

ATEX

Displacement Type Level Transmitter (Torque Tube Type)

Model : SDT-420

SeoJin Instech Co., Ltd.

www.seojin.biz

SDT-420

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Introduction

The SEOJIN INSTECH model SDT-420 Displacement Level Transmitter is one of the most advanced level instruments based on displacer device.
The buoyancy principle has been well known for many decades as its high reliability and stability.
The SDT-420 operates under extremely harsh environment of 200kgf/cm^2 of pressure and 450 deg, C.
Also interface measurement between two different liquids is possible.
The buoyancy principle of Archimedes is applied into its operation. The SDT-420 can be configured parameter values and monitored the measured values by using PC (PDM/AMS) or HART Communicator in Control Center where located far distance from site.
It is also possible to be adjustment, operation, and control easily by using conventional remote keypad on site.

Features

- Possible to communicate with HART or SIEMENS PDM.
- Measurement range : 300~5,000mm.
- Process temperature : Wetted parts -40 ~ 450℃.
- Process pressure : 200㎏f/㎠.
- Output signal : 2-Wire type 4~20mA, HART, LCD.
- Range of specific gravity : 0.5~1.5.
- Accuracy : ±0.5% of the Full Scale (Option : ±0.25% F.S)
- Possible to actuate general functions by means of using remote keypad on site.
- Installation the continuity of process and self-diagnosis function.
- Displaying with the units of %, mm, inch, mA, ℃, and other physical units on site.
- Possible to compensate on site by inputting the conventional values of density, temperature, and of measurement distant of process, without acquiring the real value in site.
- Designed to ASME B31.1
- Weather proof
- Explosion-proof & Frame-proof
- Weld procedures approved to KEPIC MQ and ASME IX
- Material certification to ASTM, ASME, JIS, KS Standards
- Qualified to IEEE 323-2003, and IEEE 344-2004

Application

The SDT-420 can be applied in most of level measurement application including following fields :

- HP, LP, IP Feed-water Heater
- Condensate Drums
- Industrial Boilers
- Receiver Tanks
- Hot Well
- Separators
- Storage Vessels
- Heavy Acids (SG=0.5~1.5) Tank

The operating temperature of SDT-420 is from -40℃ to +450℃ under the process pressure from full vacuum to 200 bar.
This instrument measures liquid application.
The Specific Gravity(S.G) range of applicable liquid process is from 0.5 to 1.5, and interface as low as S.G difference of 0.1 is also available. The measuring range of the SDT-420 is varied only on the element, although the 5,000mm is the maximum displacer length.

Approvals

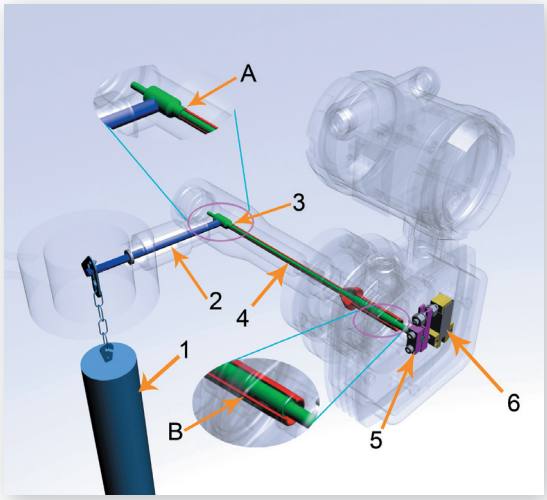
KOSHA (The Korea Occupational Safety and Health Agency)- Approval Explosion proof Ex d IIC T6
(-20℃ ≦ AMB ≦ 60℃)
General Area, Weather proof type IP65
TÜV- Approval
CE Certificate
EN-61010-1-2001
KTL (Korea Testing Laboratory)- Tested to verify the requirements of Nuclear Power Plant Quality Standards.
IEC Pub.60068 Basic Environmental Testing Procedures
Explosion proof (Ex d IIC T6, IP65)
KEPIC Certificate of Registration
MN-125 & EN-255
ATEX (ATmosphere EXplosibles)
Approval INERIS11ATEX0001X
Explossion proof : Ex d IIC T6
(-20℃ < AMB < 60℃)
KC Mark (Korea Certification)

ISO 9001:2008/ISO 14001/2004

Seojin Instech has been assessed and approved by CREBIZ QM with respect to ISO 9001 : 2008 in the designing, development, assembly and re-calibration of the precision instruments and systems for the measurement and indication of electrical signals and, level, flow and water/steam systems.

Quality Assurance

With over 35 year worldwide experience in the thermal power plant, nuclear power plant and petro-chemical industries.
Seojin Instech is able to accommodate testing, surveying and documentation requirements specified at the time of order. Inspection by customers or nominated inspection agencies can be arranged.



Since the resolution of the measurement is in proportion to both the volume of buoyancy and the sectional area of displacer(1), the out side diameter of displacer(1) is specified according to the measurement length.

Operation Principle

The shape of entire torsion bar is left-figure. As the right side figure shows, torque tube(4) and rod(3) are connected to A portion, and this A portion can be twisted according to the displacer's buoyancy.

On the other hand, B portion holds the twist movement of the A portion because torque tube(4) is fixed to main body.

When a displacer(1) is suspended on the operating rod(2), a twist stress is applied to the torque tube(4) by the weight(gravity force) of the displacer, and converted into a torque force.

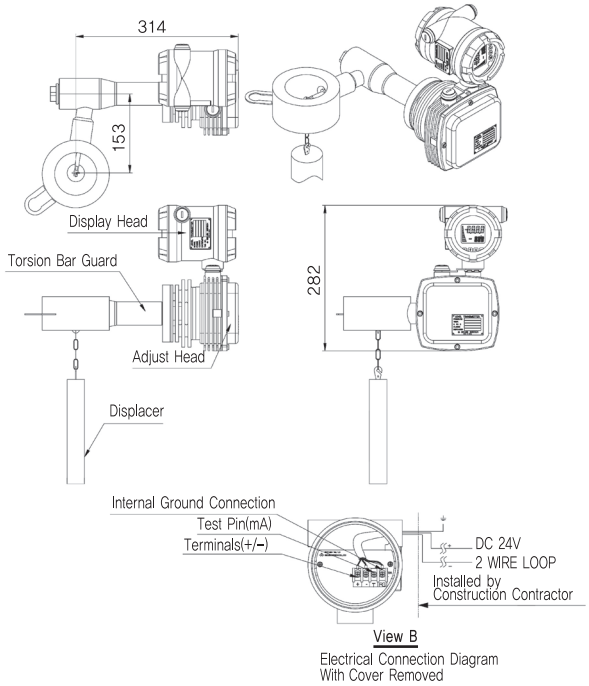
At the same time, this torque force affects load cell through a bar fixture(5).

As water level goes up, the weight of displacer(1) is decreased due to increasing of buoyant force. In this case, the torque stress of torque tube(4) is decreased, and amount of the reduced torque force is transferred into the load cell(6) connected to bar fixture(5) by the movement of relaxation stress or compression stress through the rod(3), and an electricity signal corresponded to the torque force is generated.

This voltages from the load cell(6) is converted into 4~20mA of current signal of 2 wires through an amplifier device within the main PCB.

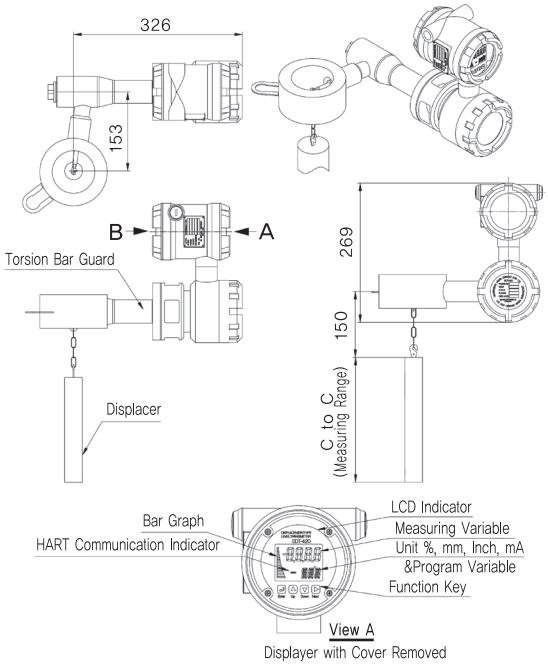
Dimensions

Weather Proof /Intrinsic Safety



Electrical Connection Diagram
With Cover Removed

Explosion Proof

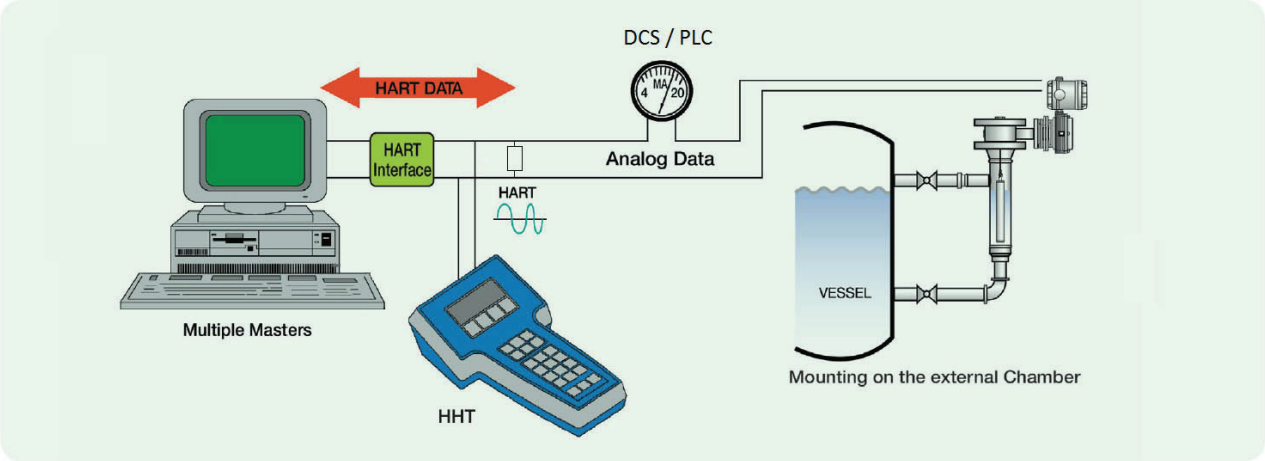


Displayer with Cover Removed

Specification

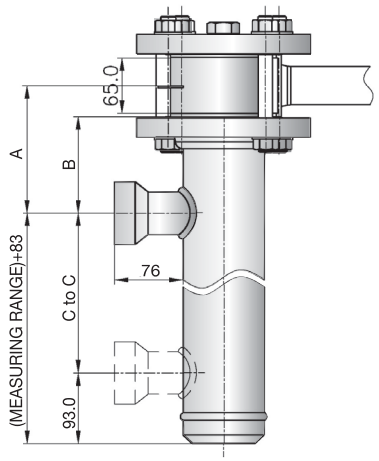
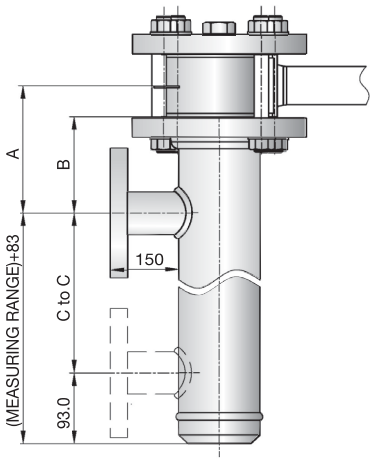
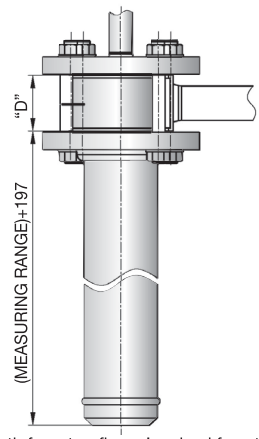
System Design	
Measurement Principle	Buoyancy-continuous displacement utilizing a precision torsion bar
Measurement Medium	Liquid (Max. Viscosity : 1500 cP)
Input	
Measured Variable	Level, Determined by load cell affected by buoyancy force changes on continuous displacer
Measuring Range	Up to 5,000mm based on displacer length (Consult factory for longer ranges)
Output	
Type	4 to 20mA with HART
LCD Window Display	Bar graph, mm, Inch, %, mA
Resolution	Analog : 0.01mA,
Loop Resistance (HART)	250 ~ 550Ω (24Vdc)
Diagnostic Alarm	3.8, 22mA or HOLD selectable (12mA)
Damping	Adjustable 1- 30 seconds
Sampling Rate	Transmitter 10 times per second
User Interface	
Keypad	4-button menu-driven data entry and system security
Indication	Bar graph, HART Communication, 2 line x 4-charactor LCD display
Power	
Power Supply	General Operating: 12 ~ 30V(No Load) Hart Communication: 17.5 ~ 30V
Current	MIN: 3.9mA / MAX : 21mA
Housing	
Material	Aluminum alloy ADC12 (KS;ALDC8, ASTM;383), 316LSS
Cable Entry	1/2″ PF (std.)
Ingress Protection	IP67 (NEMA 4)
Chamber	
Materials	Carbon steel 304/316/316L Stainless steel
Wetted Parts	316/316L and Inconel (Torque Tube)
Process Connections	Tank Top: 3″, 4″ ANSI Flange Chambered: 1″, 1-1/2″, 2″ S/W, Flange
Process Conditions	
Process Temperature Range	- 20 to 450℃
Process Pressure Range	200kgf/㎠@ 25℃
Environment	
Electronics Operating Temp.	-20 to 60℃
Humidity	0-99%, Non-condensing
Electromagnetic Compatibility	CE Requirement EN61000-6-2-2005, EN61000-6-4-2007
Natural Frequency	42.7 (X axis), 109.6 (Y axis), 127.4 (Z axis)
Level Performance	
Linearity	± 0.5% of full span
Accuracy	± 0.5% of full span (Option : ± 0.25% F.S)
Repeatability	± 0.05% of full span
Hysteresis	± 0.05% of full span
Warm-up Time	< 3 seconds
Certificate	ATEX, KC, CE, KOSHA, KTL, KEPIC

Installed Configuration



Overall Dimensions of Chamber

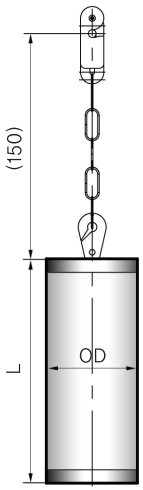
Rating	A	B
150/300	150	113.5
Above 400	200	163.5

SIDE-BOTTOM / SIDE-SIDE (SW)	SIDE-BOTTOM / SIDE-SIDE (FLANGE)	TOP-BOTTOM (FLANGE)
		

The length form top flange's raised face to chamber flange face length "D" is 74mm

Dimensions of Displacer

■ Patented displacer hook assembly.



L	OD
300–350	Ø60.3
351–500	Ø48.3
501–750	Ø42.2
751–1200	Ø33.4
1201–2000	Ø26.7
2001–3000	Ø21.3
3001–4000	Ø19.0
4001–5000	Ø15.9

(Unit : mm)

Ordering Information

Displacement Type Level Transmitter Chamber

SDT-420 CH	A	1	A	1	A	1	A	3	A	1

TYPE OF CHAMBER
A = Side-Side
B = Side-Bottom
C = Top-Bottom
D = etc.

CHAMBER MATERIAL
1 = Carbon Steel (Std.)
2 = 304 SS
3 = 316 LSS
4 = etc.

PROCESS CONNECTION TYPE
A = Socket Welding Type
B = Flange Type
C = etc.

PROCESS CONNECTION SIZE
1 = 2″ (Std.)
2 = 1-1/2″
3 = 1″
4 = etc.

TOP MOUNTING SIZE
A = 3″ ANSI RF (Std.)
B = 3″ ANSI RJF
C = 4″ ANSI RF
D = 4″ ANSI RJF

PRESSURE RATING
1 = 150#
2 = 300#
3 = 600#
4 = 900#
5 = etc.

LENGTH (C to C)
A = 300 ~ 350mm
B = 351 ~ 500mm
C = 501 ~ 750mm
D = 751 ~ 1,200mm
E = 1,201 ~ 2,000mm
F = 2,001 ~ 3,000mm
G = 3,001 ~ 4,000mm
H = 4,001 ~ 5,000mm

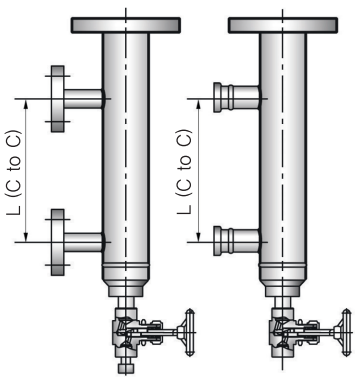
DRAIN PARTS (Side-Side Type Only)
1 = Cap PT 1/2″
2 = Globe valve PT 1/2″ with Plug
3 = Cap NPT 1/2″ (Std.)
4 = Globe valve NPT 1/2" with Plug
5 = etc.
6 = Cap NPT 3/4″
7 = Globe valve NPT3/4″ with Plug

PAINTING
A = MFR Std. (Seojin Spec.)
B = etc.

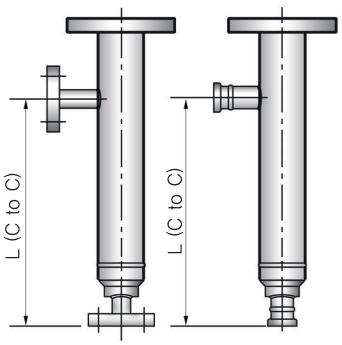
TEST FOR WELDING
1 = Hydro Test Only
2 = PT Test + Hydro Test
3 = etc.

■ When placing an order, selected ordering number should be indicated on the purchase order sheet.

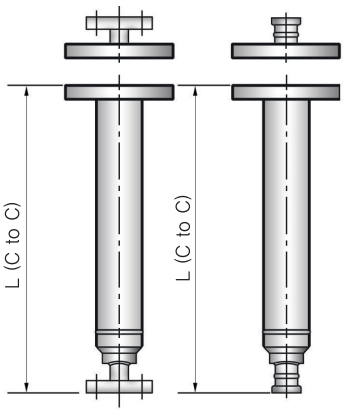
TYPE "A" (SIDE-SIDE)



TYPE "B" (SIDE-BOTTOM)



TYPE "C" (TOP-BOTTOM)



Ordering Information

Displacement Type Level Transmitter

SDT-420	31	A	1	A	1	A	1	A	1	A

TAGGING METHOD
A = 304SS Tag Fixed On Amplifier
B = 304SS Tag Fixed With Wire

CONDUIT CONNECTION
1 = PF 1/2″ (Std.)
2 = PT 1/2″
3 = NPT 1/2″
4 = NPT 3/4″
5 = PF 3/4″
6 = etc.

MOUNTING DIRECTION
A = Right hand Mounted (Std.)
B = Left hand Mounted

ELECTRICAL CLASSIFICATION(ENCLOSURE)
1 = Weather Proof (IP65)
2 = Explosion Proof (Ex d IIC T6/IP67)
3 = Intrinsic Safety (Ex ia IIC T5,T6 /IP65)

TORQUE TUBE MATERIAL
A = 316 LSS(Std.)
B = Inconel 600

MEASURING PARTS LENGTH(C TO C)[1)]
1 = 300 ~ 350mm
2 = 351 ~ 500mm
3 = 501 ~ 750mm
4 = 751 ~ 1,200mm
5 = 1,201 ~ 2,000mm
6 = 2,001 ~ 3,000mm
7 = 3,001 ~ 4,000mm
8 = 4,001 ~ 5,000mm

DISPLACER MATERIAL
A = 316LSS (Std.)
B = PTFE
C = Hastelloy-C
D = 316SS+PTFE powder coating
E = etc.

TORSION BAR GUARD MATERIAL
1 = Carbon Steel (Std.)
2 = 316LSS
3 = etc.

TORSION BAR GUARD CONTACT FACE
A = RF Raised Face Flange (available with 31, 33, 36, 41, 43, 46, 49)
B = RJF Ring Joint Flange (available with 33, 36, 39, 43, 46, 49)
C = etc.

TORSION BAR GUARD MOUNTING SIZE(Flange Size & Rating)
31 = 3″ 150# ANSI (Std.)
33 = 3″ 300# ANSI
36 = 3″ 600# ANSI
39 = 3″ 900# ANSI
41 = 4″ 150# ANSI
43 = 4″ 300# ANSI
46 = 4″ 600# ANSI
49 = 4″ 900# ANSI
50 = etc.

NOTE : 1) Displacer length is measuring parts length + 30mm

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