ISO 9001/14001

Model
SDT-420

Torque Tube, Displacement Type Level Transmitter

SEOJIN INSTECH CO.,LTD
www.seojin.biz

SDT-420

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/cm2 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 (SIEMENS PDM S/W) 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 kgf/㎠.
- Output signal : 2-Wire type 4~20mA, HART, LCD.
- Range of specific gravity : 0.5~1.5.
- Allowable error : ±0.5% of the Full Scale
- 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 IEEE344-2004

Application

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

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

The operating temperature of SDT-420 is from -40 deg℃ to +450 deg℃ 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.

ISO 9001:2000/ISO 14000/2004

SEOJIN INSTECH has been assessed and approved by CREBIZ QM with respect to ISO 9001 : 2000 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.

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
KEPIC Certificate of Registration
MN-125

Quality Assurance

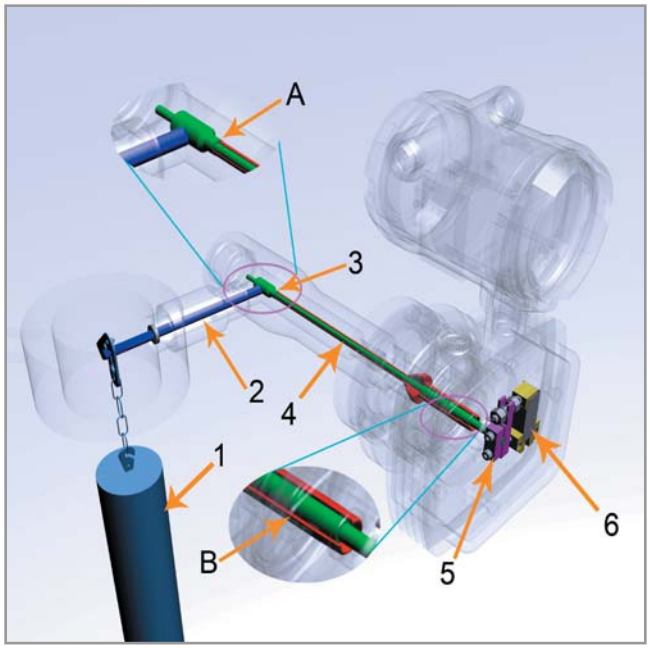
With over 30 year worldwide experience in the thermal power plant, nuclear power plant and petro-chemical industries.
SEOJIN INSTECH is able to accommodate testing, surveying and documentation requirements specified at the time of order. Inspection by customers or nominated inspection agencies can be arranged.

SDT-420

Operation Principle

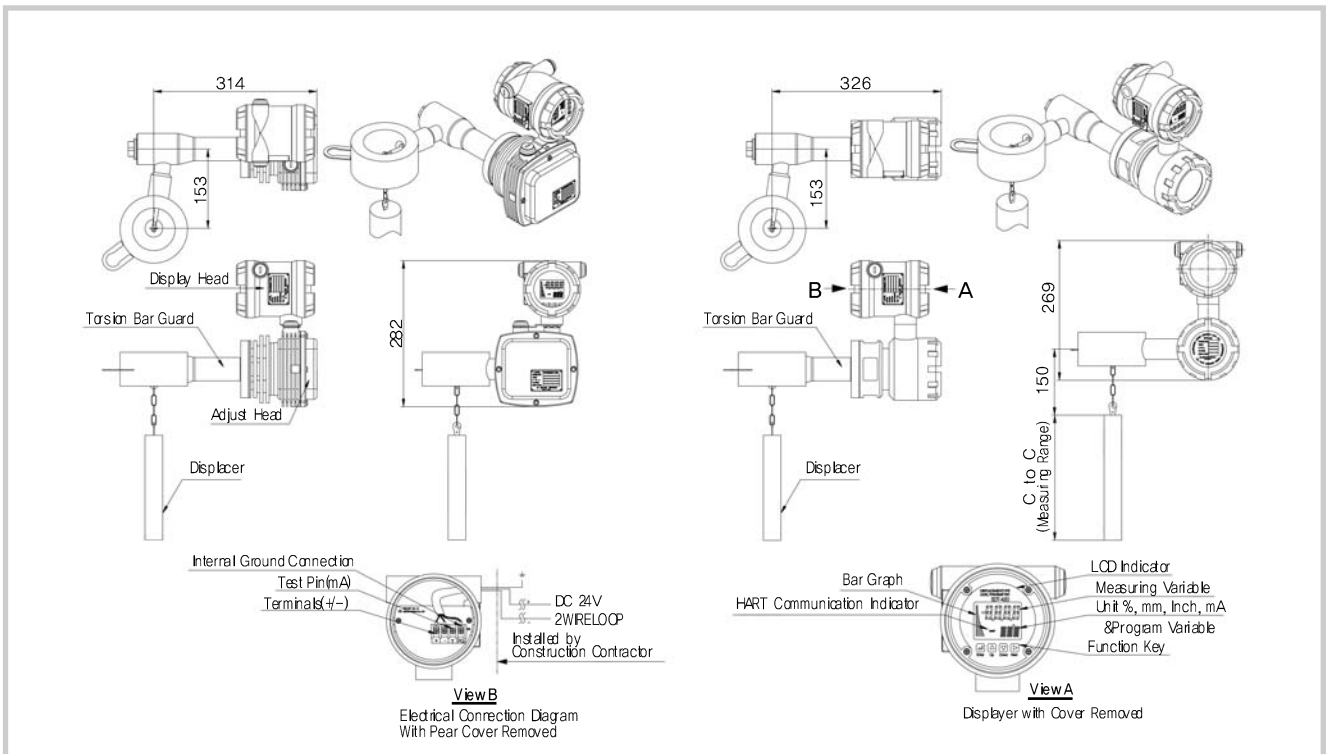
The shape of entire torsion bar is L-figure.
As the right side figure shows, torque tube(4) and rod(3) are connected to A portion, and this A portion can be twisted according to the displacer's buoyancy. On the other hand, B portion holds the twist movement of the A portion because torque tube(4) is 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.



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.

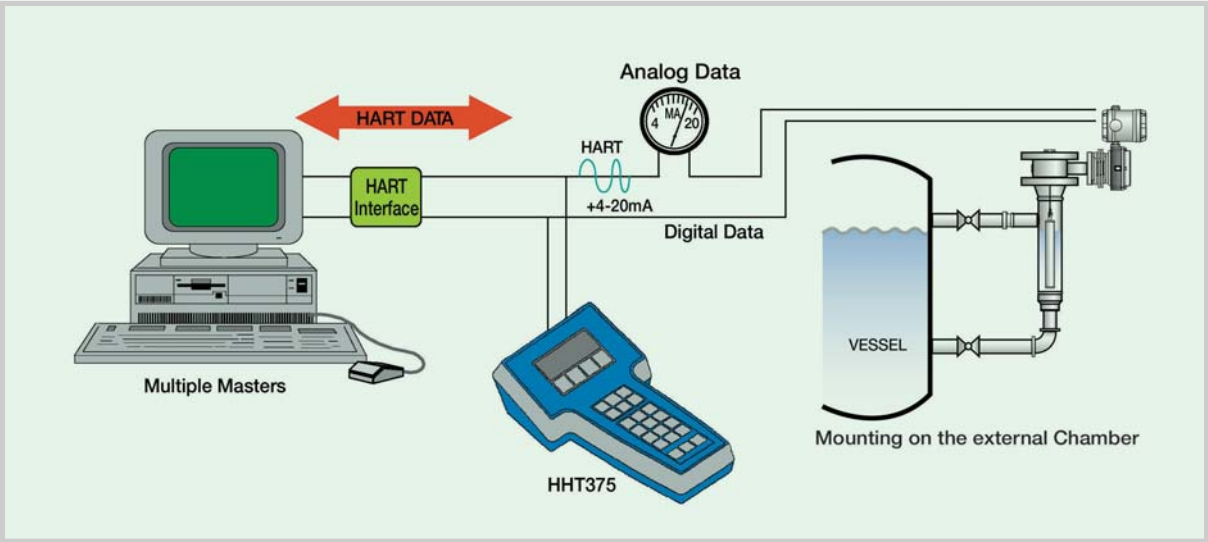
Dimension



Specification

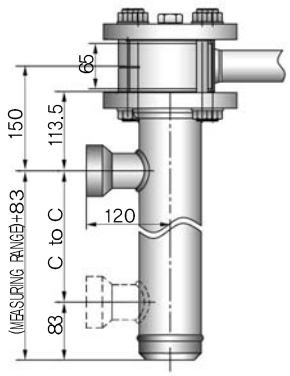
System Design	
Measurement Principle	Buoyancy-continuous displacement utilizing a precision torsion bar
Measurement Medium	Liquid(Max. Viscosity : 1500 cP)
Input	
Measured Variable	Level, Determined by load cell affected by buoyancy force changes
	on continuous displacer
Measuring Range	Up to 5,000mm based on displacer length(Consult factory for longer
ranges)	
Output	
Type	4 to 20mA with HART Version 6.X
	3.75 to 22mA useable
LCD Window Display	Bar graph, Millimeter, Inch, %, mA
Resolution	Analog :0.01mA,
Loop Resistance	240Ω @24V DC
Diagnostic Alarm	3.8, 22mA or HOLD selectable
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	
Measured at Instrument Terminals	15-30V DC HART
	This device is operated under only functional isolation
Current	Minimum 3.8mA, Maximum 22.5mA
	This device provides only functional isolation
Housing	
Material	Aluminum alloy ADC12(KS;ALDC12, ASTM;383)
Cable Entry	1/2" PF(std.)
Ingress Protection	IP65 (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 80℃
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
Repeatability	± 0.05% of full span
Hysteresis	± 0.05% of full span
Warm-up Time	< 3 seconds
Certificate	ATEX, KOSHA

Installed Configuration

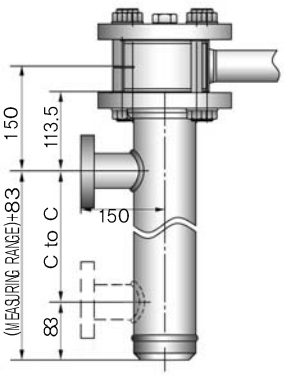


Overall Dimensions of Chamber

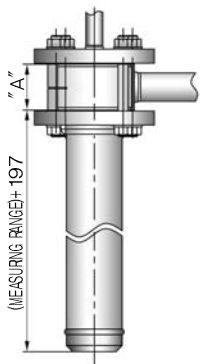
SIDE-BOTTOM / SIDE-SIDE (S.W)



SIDE-BOTTOM / SIDE-SIDE (FLANGE)



TOP-BOTTOM (FLANGE)

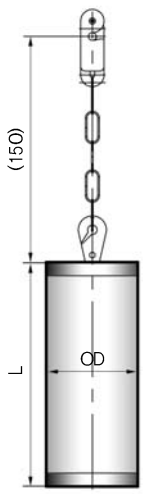


The length from top flange's raised face to chamber flange face length "A" is 74mm

The drawing above shows the standard dimensions, but they can be changed according to user's demand.

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 Informations

■ Torque Tube, Displacement Type Level Transmitter Chamber

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

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

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

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

PROCESS CONNECTION SIZE
1 = 2"(Std.)
2 = 1-1/2"
3 = 1"
OP = 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#
OP = etc.

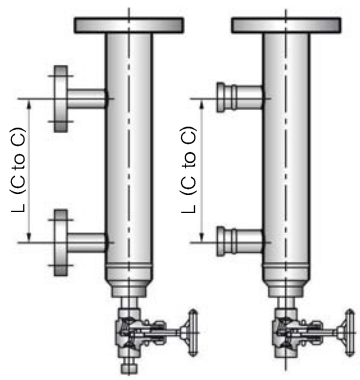
LENGTH (C to C)
A = 300 ~ 350mm
B = 351 ~ 500mm
C = 501 ~ 750mm
D = 751 ~ 1,200mm
E = 1,201 ~ 2,000mm
F = 2,001 ~ 3,000mm
G = 3,001 ~ 4,000mm
H = 4,001 ~ 5,000mm

DRAIN PARTS (Side-Side Type Only)
1 = PT 1/2" With Plug(Std.)
2 = PT 1/2" With Globe Valve
OP = etc.

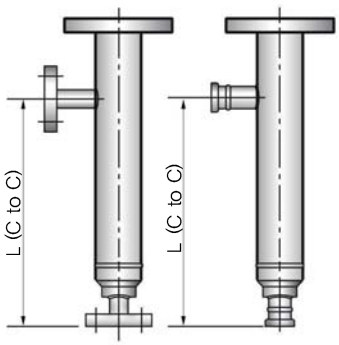
PAINTING
A = MFR Std.(SEOJIN Spec.)
OP = etc.(Customer Requirements)

TEST FOR WELDING
1 = Hydro Test Only
2 = PT Test + Hydro Test
OP = etc.(Customer Requirements)

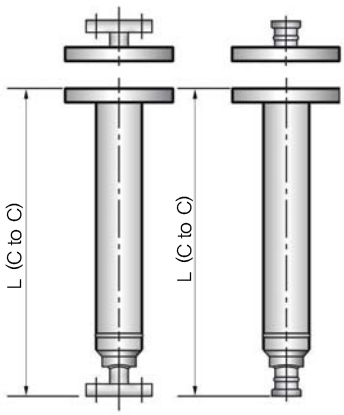
TYPE "A" (SIDE-SIDE)



TYPE "B" (SIDE-BOTTOM)



TYPE "C" (TOP-BOTTOM)



Ordering Informations

■ Torque Tube, 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"(Without Cable Gland)
2 = PT 1/2"(With Cable Gland)
3 = NPT 1/2"(With Cable Gland)
OP = etc.

MOUNTING DIRECTION
A = Righthand Mounted(Std.)
B = Lefthand Mounted

ELECTRICAL CLASSIFICATION(ENCLOSURE)
1 = Weather Proof (IP65)
2 = Explosion Proof (Ex d IIC T6/IP65 : KOSHA)
3 = Intrinsic Safety (Ex ia IIC T4/IP65 : KTL)

TORQUE TUBE MATERIAL
A = 316 SS(Std.)
B = INCONEL 600
OP = etc.

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 = 316L(Std.)
B = PTFE
C = etc.

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

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

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SEOJIN INSTECH CO., LTD.
#91-18 Gunja-dong, Gwangjin-gu, Seoul, Korea
Tel: 82-2-2204-8500 Fax: 82-2-466-6445
http://www.seojin.biz