

Guided Wave Radar(TDR) Level Transmitter For Nuclear Service

ALT6100N

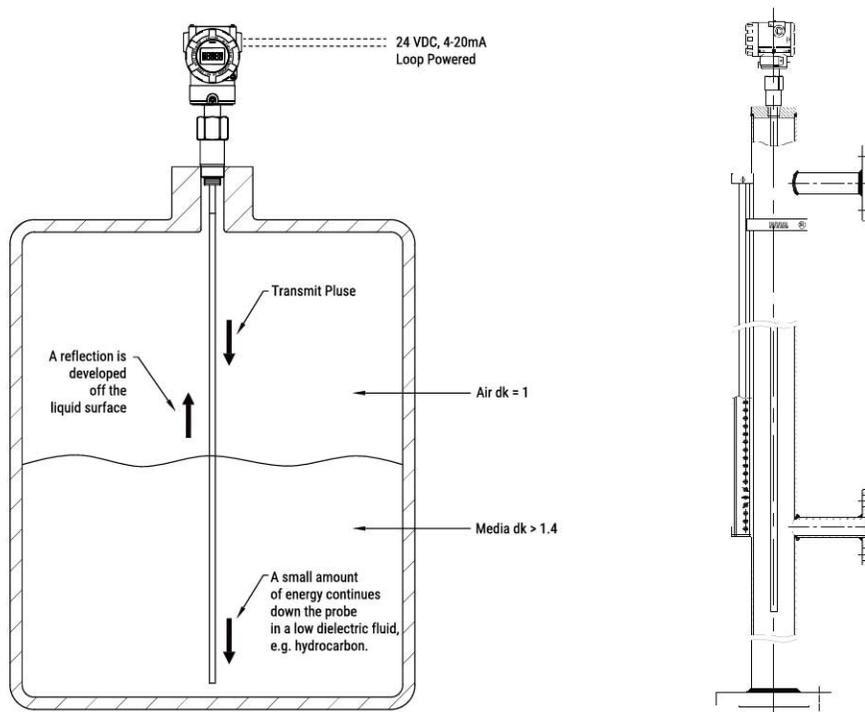
- Various Liquid Available.
- Convenience Maintenance.
- Comply with Nuclear Regulation.



Overview

The ALT6100N is a **Time Domain Reflectometer (TDR)** configured for level sensing. It measures the round-trip time for a pulse to propagate along a transmission line (or probe) to the surface of a liquid and reflect back. The propagation time is independent of air temperature, pressure and humidity, and the precise location of the pulse reflection depends only on the location of the liquid's surface, independent of the liquid's dielectric constant.

Basic Configuration



Features

- Measures accurately on materials with dielectric (dK) as low as 1.4
- ALT6100 N has high precision accuracy as +/- 0.25% of span
- Measures level on challenging applications including foam
- Trouble-free operation since the transmitter is virtually unaffected by dust, vapor, interfering obstacles, and turbulence. It is even suitable for small or oddly shaped tanks

Applications

- Level measurement
- Oil, gas
- Water
- Turbine
- Spent fuel pools (SFP)

Probe Types

Doc.No. : C6100N-E01A

Division	Coaxial	High TEMP. & Pressure	Wire Probe	Spent fuel pools (SFP)	Rigide Rod Probe
Shape					
Measuring Range	0.1 ~ 4meters	0.2 ~ 4meters	0.4 ~ 20meters	0.4 ~ 8 meters (Remote 100+8 meters)	0.4 ~ 4 meters
Probe Detail Type (Size)	Φ 25.4mm	Φ 25.4mm	Φ 6mm	Φ 6mm	Φ 9mm
Process Temperature	-40 ~ 100 °C	-40 ~ 300 °C	-40 ~ 100 °C	-40 ~ 100 °C	-40 ~ 100 °C
Process Pressure	-1 ~ 70 bar	-1 ~ 250 bar	-1 ~ 70 bar		
Accuracy	±10 mm or 0.25% of span, whichever is greatest.			±0.25% of span	±10 mm or 0.25% of span, whichever is greatest.
Power	16 ~ 45 VDC				
Signal Output	4 ~ 20mA (2 wire loop powered), HART Digital Communications				
Dk Value Availability	min 1.4 (1.4 ≤)	min 1.4 (1.4 ≤)			
Dk Value	Low/ Medium/ High	Medium/ High	Medium/ High	High	Medium/ High
Obstacles	Better	Better	Normal	Normal	Normal
Probe Flexibility	X	X	O	O	X
Cramped Space	Normal	Normal	Best	Best	Better
Velocity of Flow	Better	Better	Normal	X	Better
Remote Install	O	O	O	O	O
	max. 8 meters	max. 8 meters	△	max. 100 meters	max. 8 meters
Temperature Resistance	Low/ Medium	Medium/ High	Low/ Medium	Low/ Medium	Low/ Medium

* Need to discuss about general specifications in advance with the manufacturer

Probe Types

SFP Application	Flexible Probe - Angle Type Probe body
Installation	<p>Transmitter (Mild Environmental)</p> <p>Remote Cable (Max. 100M)</p> <p>SFP (Harsh Environmental)</p> <p>8M</p>
Application	SFP (Spent Fuel Pool)
Measuring Range	8 meters
Remote Install	100 meters between Transmitter Head as electrical part and Probe Module as mechanical parts.
Process Pressure	-1 ~ 70 bar
Accuracy	± 0.25% of span
Power	16 ~ 45 VDC
Signal Output	4 ~ 20mA (2 wire loop powered) @ 24 Vdc HART Digital Communications (HART 7)
Feature	Wire Probe max. 8meters. Remote Signal Cable max. 100meters.
Application	[Spent Fuel Pool Area] max. Pressure 11 Psig max. Temperature 140 °F Integrated Dose ≤ 2 X 10⁶ Gy Transmitter Head in Mild Zone, Probe Module in Harsh Zone.

IEEE Std. 323 : 2003 ed [KEPIC END 1100]	“Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Station”
IEEE Std. 344 : 1987/2004 ed [KEPIC END 2000]	“Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations”
US NRC Reg. Guide 1.180 (Rev. 1)	“Guidelines for Evaluating Electromagnetic Radio Frequency Interference in Safety-Related Instrumentation and Control System”
IEC 61000-4-2 : 2001	“Electromagnetic compatibility (EMC) - Part 4-2 : Testing and measurement techniques - Electrostatic discharge immunity test”
IEEE 1012 : 2004	“IEEE Standard for Software Verification and Validation”

EMC(Electro Magnetic Compatibility)	
CE101, Conducted Emissions, Power Lead	30 Hz to 10 kHz
CE102, Conducted Emissions, Power Leads	10 kHz to 2 MHz
CS101, Conducted Susceptibility, Power Leads	30 Hz to 150 kHz
CS114, Conducted Susceptibility, BCI	10 kHz to 30 MHz
CS115, Conducted Susceptibility, BCI	Impulse Excitation
CS116, Conducted Susceptibility, Damped Sinusoidal Transients	10 kHz to 100 MHz
RE101, Radiated Emissions, Magnetic Field	30 Hz to 100 kHz
RE102, Radiated Emissions, Electric Field	2 MHz to 1 GHz
RS101, Radiated Emissions, Magnetic Field	30 Hz to 100 kHz
RS103, Radiated Emissions, Electric Field	30 MHz to 10 GHz
Electrostatic Discharge (ESD)	

Environmental

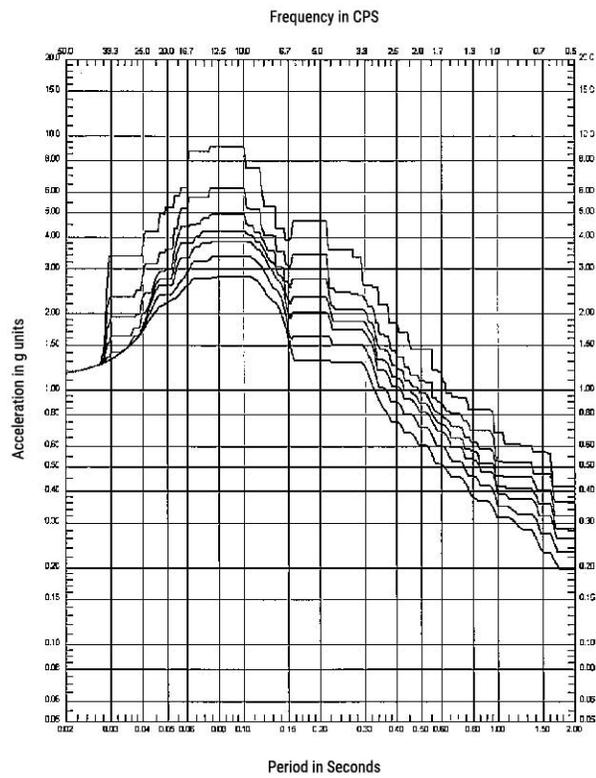
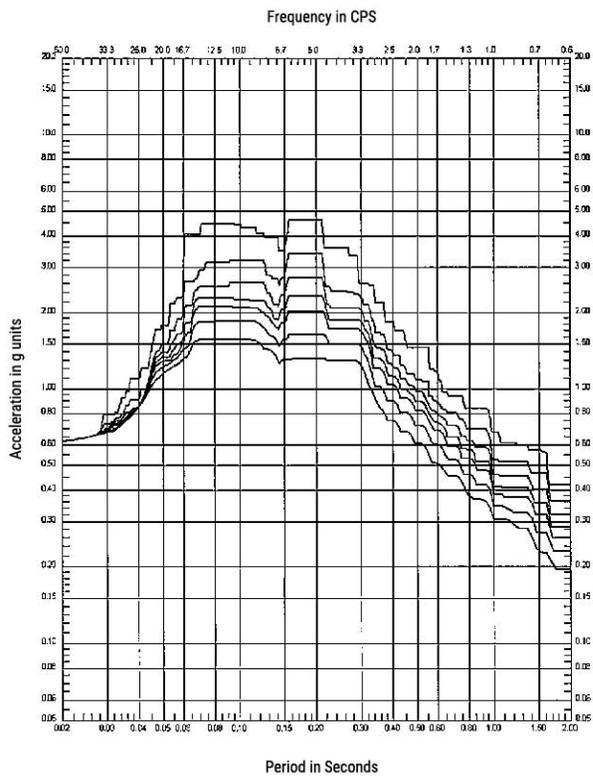
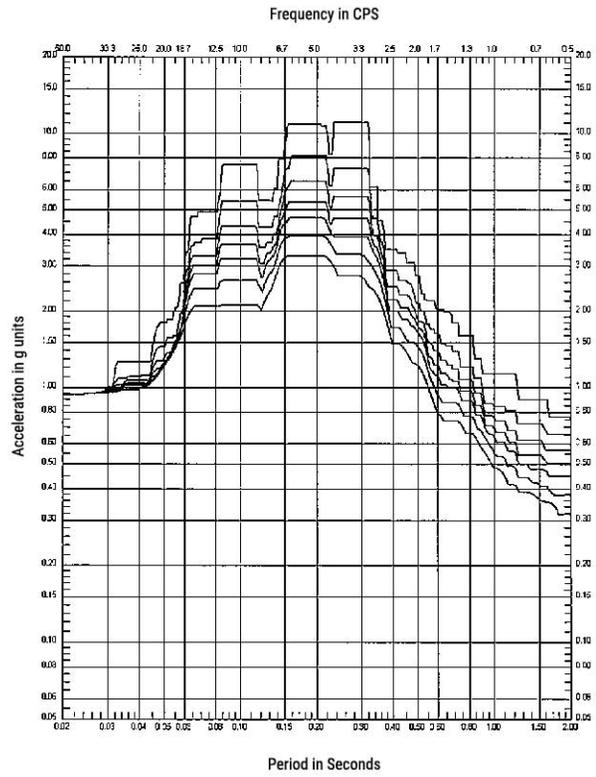
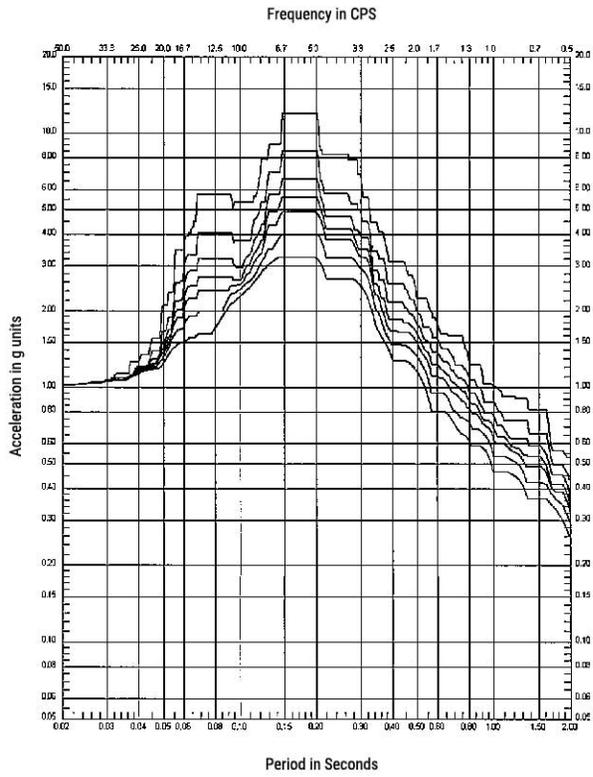
1 Spent Fuel Pool Area Harsh Environment

Condition	Requirements for Environmental Qualification		
	Normal	Accident	Beyond DBA
Duration	40 years	1 year	7 days
Max. Pressure, Psig (El. 155'-0"/El. 129'-7")	0/11	0/11	0/11
Max. Temperature(°F) (El. 155'-0")	50 to 104 °F	140 °F	212 °F
Max. Temperature(°F) (El. 130'-7")	140 °F	140 °F	212 °F
Relative Humidity (%)	7 to 90	7 to 90	7 to 100
Integrated Dose, Gy*	≤ 2 X 10 ⁶	≤ 2 X 10 ⁶	≤ 2 X 10 ⁶

2 Outside Containment Mild Environment

Condition	Requirements for Environmental Qualification	
	Normal	Accident
Duration	40 years	1 year
Max. Pressure, Psig	0.0	0.0
Max. Temperature(°F) (El. 155'-0")	50 to 122 °F	50 to 122 °F
Relative Humidity (%)	7 to 90	7 to 90
Integrated Dose, Gy*	≤ 100	≤ 100

Response Spectra Curves



Ordering Information

Model	Description	
ALT6100N	Guided Wave Radar Level Transmitter for Nuclear Service	
Code		
-		
Code	Probe Type	
1F	Flexible Probe Angle Type Probe body (for Spent Fuel Pool)	0.4 ~ 8m
1W	Single Wire Probe	0.4 ~ 20m
1R	Single Rigid Rod Probe	0.4 ~ 4m
2W	Twin Wire Probe	0.4 ~ 4m
2R	Twin Rigid Rod Probe	0.4 ~ 4m
CX	Coaxial Probe (single module)	0.1 ~ 4m
C2	Coaxial (2 module assembly)	0.1 ~ 4m
C3	Coaxial (3 module assembly)	0.1 ~ 4m
C4	Coaxial (4 module assembly)	0.1 ~ 4m
Code	Process Connection Flange Material	
N	Non (Process connection = Threaded connection)	
S	304 SST	
T	316 SST	
Q	Special	
Code	Process Connection	
A21	2" ANSI, #150	Flange Type
A23	2" ANSI, #300	
A26	2" ANSI, #600	
A29	2" ANSI, #900	
A31	3" ANSI, #150	
A33	3" ANSI, #300	
A36	3" ANSI, #600	
A39	3" ANSI, #900	
A41	4" ANSI, #150	
A43	4" ANSI, #300	
A46	4" ANSI, #600	
A49	4" ANSI, #900	

Code	Process Connection Continued		
A51	5" ANSI, #150	Flange Type	
A53	5" ANSI, #300		
A56	5" ANSI, #600		
A59	5" ANSI, #900		
J51	JIS 50A, 10K		
J52	JIS 50A, 20K		
J81	JIS 80A, 10K		
J82	JIS 80A, 20K		
J10	JIS 100A, 10K		
J11	JIS 100A, 20K		
D21	DIN 50 PN10 / PN16		
D22	DIN 50 PN25 / PN40		
D31	DIN 80 PN10 / PN16		
D32	DIN 80 PN25 / PN40		
D41	DIN 100 PN10 / PN16		
D42	DIN 100 PN25 / PN40		
TN1	1 1/2" NPT		Thread
TN2	1" NPT		
TG1	G 1 1/2"		
TG2	G 1"		
S	Special*		
Code	Process Temperature & Pressure		
S	Standard (-40 ~ 100°C)		
HP	High Temperature & High Pressure (-40 ~ 300°C)		
Code	Material of Construction : Process Connection / Probe		
S	304 SST		
T	316 SST		
Code	O-ring Material		
V	Viton (-25 ~ 200°C)		
E	EPDM* (-40 ~ 150°C)		
K	Kalrez* (-25 ~ 250°C)		
B	Buna-N (-25 ~ 100°C)		

Ordering Information

Code	Hazardous Location Certifications
-K0	Maker Standard (Waterproof : NEMA 4x)
Code	Electrical Connection
1	1/2" - 14 NPT Female
2	3/4" - 14 NPT Female Adapter
X	Special
Code	Option
M1	LCD Indicator
LPI	Lightening Protector
BA	Stainless Steel Bracket (Angle Type with SST Bolts)
BF	Stainless Steel Bracket (Flat Type with SST Bolts)
ST	Stainless Steel Housing

Nuclear Data	Safety Class	Seismic Category	Quality Class	Environmental Zone	Electric
	S*(Safety)	1	Q*	O	1E
	NS (Non-safety)	2	A		NE (Non-1E)
3		S			

Note : Nuclear data are not applied to the Spent Fuel Pool level Transmitter

Code	Probe Length
-□□□...□(with unit)	Probe Length (meter/ ft/ mm/ inch...)
Code	Remote Housing Cable
-N	NON
-R□□□...□(with unit)	Remote Housing Cable (meter/ ft/ mm/ inch...)*

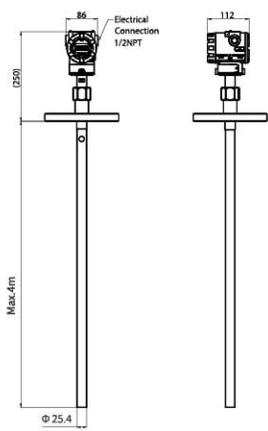
Note : “*” consult manufacturer before order

Example

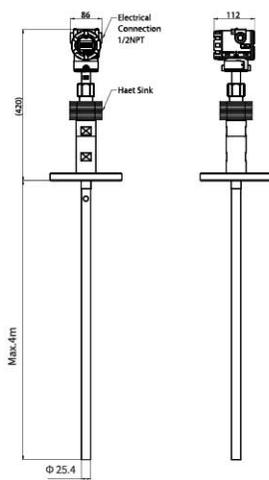
ALT6100N-C2SA31SSVK02-M1LPIBANS2AONE-2.5m-R4m
 Coaxial Probe(2 module assembly), 304 SST Flange, 3"ANSI #150 Flange,
 Standard Temp/ Pressure, Material of Construction 304 SST, Viton O-ring,
 Maker Standard, 3/4" - 14 NPT Female Adapter, Lightening Protector,
 Angle Bracket, Non-safety, Seismic Category 2, Quality Class A,
 Environmental Zone O, Electric Non-1E,
 Probe Length 2.5 meter, Remote Housing Cable 4 meter

Dimensions of Transmitter (mm)

1 PROBE TYPE



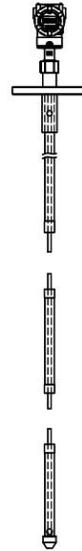
Coaxial Probe
(General Type)



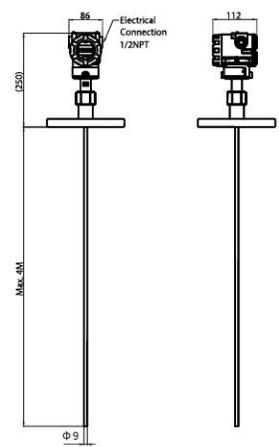
Coaxial Probe
(High Pressure, High Temp.)



Coaxial
(2 module assembly)

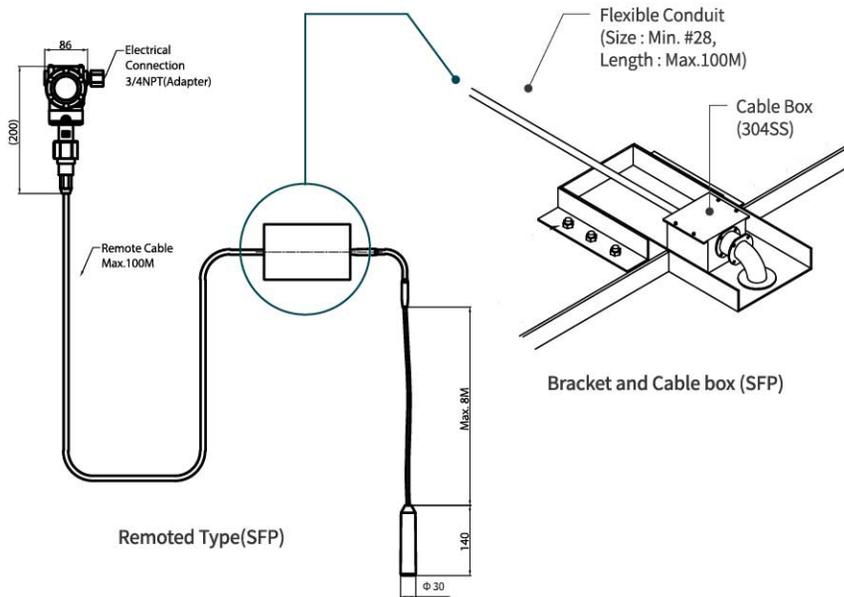


Coaxial
(3 module assembly)



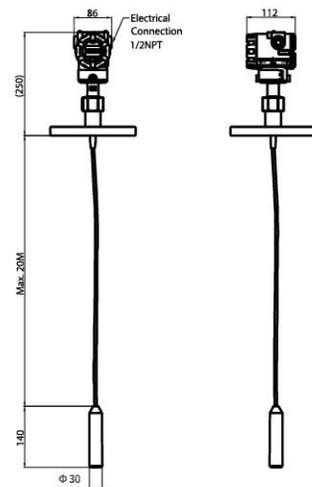
Single Rod Probe

2 FLEXIBLE PROBE TYPE



Remoted Type(SFP)

SFP Type level Transmitter Model : ALT6100N-1FTSSTVK0X-LPIBAST-8m-R100m



Integral Type

* Consultant to Manufacturer for more Information & Application.

AUTROL®

**Guided Wave Radar
Level Transmitter**

For Nuclear Service

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