

Bulletin No. 3300

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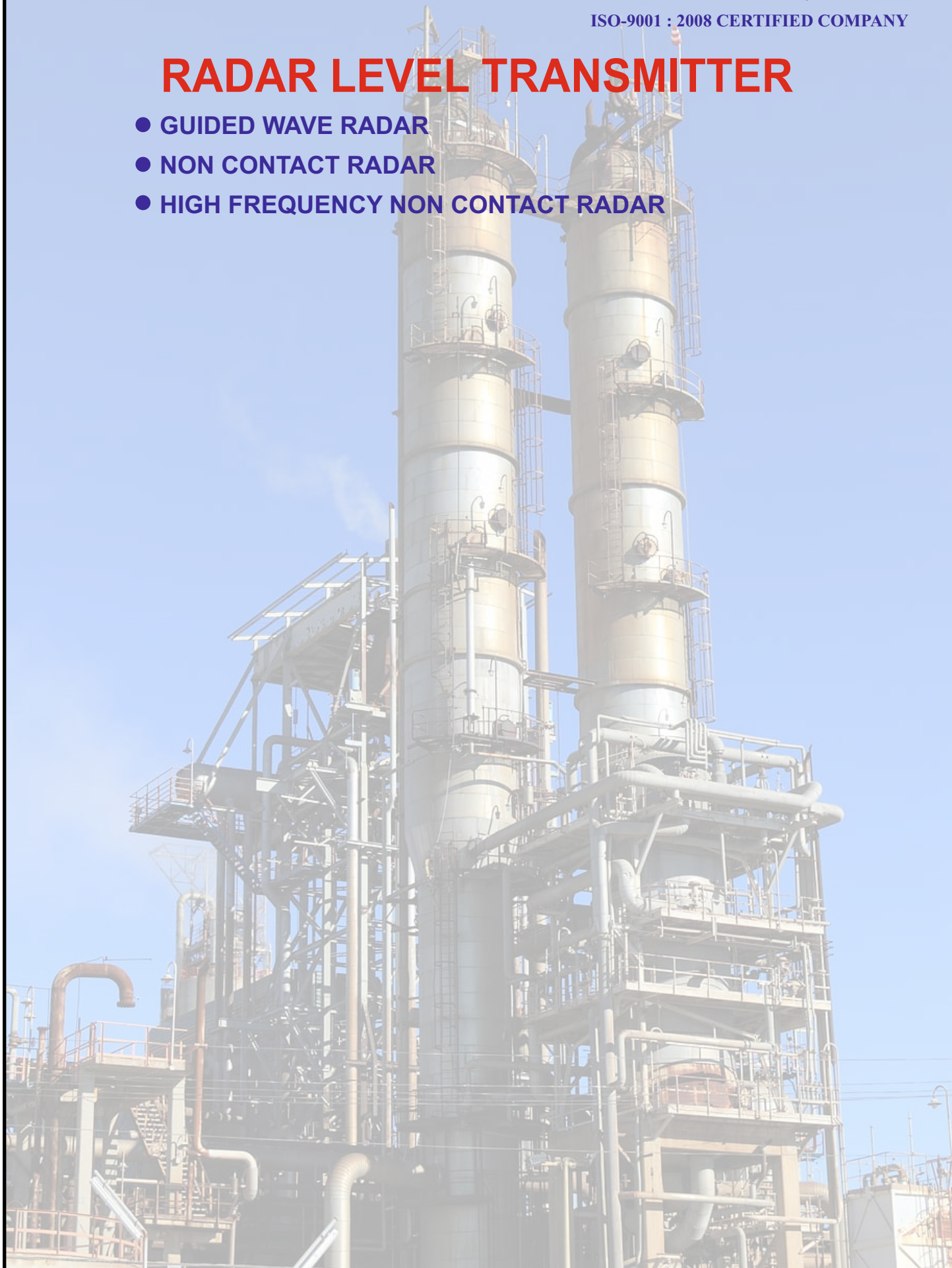


*... the level & gas people*

ISO-9001 : 2008 CERTIFIED COMPANY

## **RADAR LEVEL TRANSMITTER**

- GUIDED WAVE RADAR
- NON CONTACT RADAR
- HIGH FREQUENCY NON CONTACT RADAR



# BRIEF INTRODUCTION OF GUIDED WAVE RADAR LEVEL TRANSMITTER

## Product Description

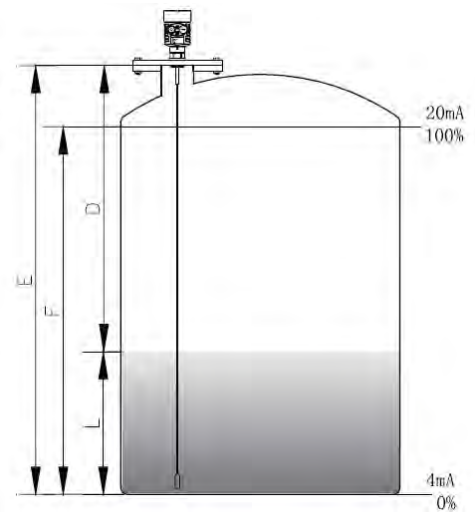
### Working principle

Guided wave radar transmitter works on the principle of time and travel (TDR). Radar wave travels at the velocity of light. The flying time is converted into level signal via the electronic components. The probe emits high frequency wave pulse which travels along a cable probe or a rod probe. When the wave pulse reaches the medium surface, it will be reflected and received by the receiver, and then the distance signal will be converted into level signals.

### Input

The reflected wave pulse travels back along the cable and arrives at the electronic unit. The microprocessor will process the signals and recognize the returned waves from medium surface. The identification of correct return wave signals can be done by the intelligent software. The distance  $D$  from the medium surface is proportional to the travel time:  $D=C \times T/2$  ( $C$  is velocity of light)

Due to the empty tank distance  $D$  is known, and then the level  $L$  is:  $L=E-D$



### Output

By setting of empty tank height  $E$  as zero point, the height of full tank  $F$  as full range point, and other applicable parameter, the instrument will adapt into the working environment automatically and correspond to output 4-20mA.

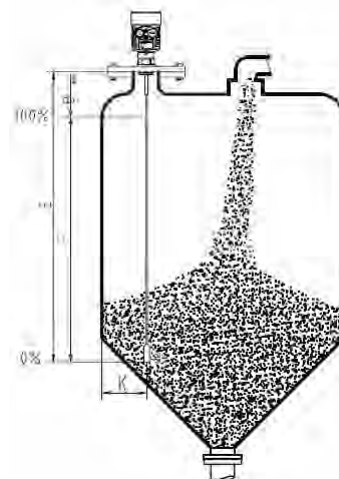
Measuring range  $F$ ----measuring range

$E$ ----distance of empty tank

$B$ ----dead zone on the top

$K$ ----min. distance between probe and tank wall

Dead zone at top refers to the min. distance between the highest medium position and the measuring reference position (point).



Dead zone at bottom refers to the distance which cannot be measured accurately nearby the bottom of the cable.

The distance between the dead zone at the top and the dead zone at the bottom is the effective measuring distance.

**Note:**

Level measurement in a tank can be effectively performed only when the medium level within the top dead zone and the bottom dead zone.

### Introduction of Transmitter



**Type :** Rope

**Application:** liquid and solid powder.

**Measuring range:** 30m

**Enclosure :** Die Cast Aluminum

**Process connection:** thread, flange

**Process temperature:** -40°C~+250°C

**Process pressure:** -1~20Kg cm<sup>2</sup>

**Accuracy:** ±3mm

**Repeatability:** ±2mm

**Frequency range:** 100MHZ~1.8GHz

**Signal output:** 4-20mA/ HART (2-wire)

**Enclosure Protection :** IP66



501E-32-A



**Type :** Rod Probe

**Application:** liquid

**Measuring range:** 6m

**Enclosure :** Die Cast Aluminum

**Process connection:** thread, flange

**Process temperature:** -40°C~+250°C

**Process pressure:** -1~20Kg cm<sup>2</sup>

**Accuracy:** ±3mm

**Repeatability:** ±2mm

**Frequency range:** 100MHZ~1.8GHz

**Signal output:** 4-20mA/ HART (2-wire)

**Enclosure Protection :** IP66



501E-32-B



**Type:** Twin Cable

**Application:** solid powder.

**Measuring range:** 30m

**Enclosure :** Die Cast Aluminum

**Process connection:** thread, flange

**Process temperature:** -40°C~+250°C

**Process pressure:** -1~20Kg cm<sup>2</sup>

**Accuracy:** ±3mm

**Repeatability:** ±2mm

**Frequency range:** 100MHZ~1.8GHz

**Signal output:** 4-20mA/ HART (2-wire)

**Enclosure Protection :** IP66



501E-32-C



**Type:** Rod

**Application:** liquid

**Measuring range:** 6m

**Enclosure :** Die Cast Aluminum

**Process connection:** thread, flange

**Process temperature:** -40°C~+400°C

**Process pressure:** -1~40Kg cm<sup>2</sup>

**Accuracy:** ±3mm

**Repeatability:** ±2mm

**Frequency range:** 100MHZ~1.8GHz

**Signal output:** 4-20mA/ HART (2-wire)

**Enclosure Protection :** IP66



501E-32-D



**Type:** Rope/Rod

**Application:** corrosive liquids

**Measuring range:** 6m (for rod probe)/ 20m (for cable probe)

**Enclosure :** Die Cast Aluminum

**Process connection:** flange

**Process temperature:** -40°C~+120°C

**Process pressure:** -1~20Kg cm<sup>2</sup>

**Accuracy:** ±3mm

**Repeatability:** ±2mm

**Frequency range:** 100MHZ~1.8GHz

**Signal output:** 4-20mA/ HART (2-wire)

**Enclosure Protection :** IP66



501E-32-E

**Type:** Co-axial Rod

**Application:** liquids with lower dielectric constant or liquids with wave surface

**Measuring range:** 6m

**Enclosure :** Die Cast Aluminum

**Process connection:** thread, flange

**Process temperature:** -40°C~+250°C

**Process pressure:** -1~20Kg cm<sup>2</sup>

**Accuracy:** ±3mm

**Repeatability:** ±2mm

**Frequency range:** 100MHZ~1.8GHz

**Signal output:** 4-20mA/ HART (2-wire)

**Enclosure Protection Grade :** IP66



**501E-32-F**

### General Specifications

- **Working frequency** : 100MHz~1.8GHz
- **Application** : Liquid, Solid Powder, Corrosive Liquid, Liquid with low die electric
- **Power Supply** : 24V DC (Power Range 12V~45V)
- **Output Signal** : 4~20mA Output Superimposed with HART<sup>®</sup> Protocol/ Field bus
- **System** : 2 Wire
- **Load Resistance** : 600 ohm HART<sup>®</sup>/ 575 ohm FF
- **Fail safe/ Loop check** : Provided 3.8mA or 21.6mA
- **Relative Humidity** : 0~100%
- **Damping** : Adjustable between 0~32 sec
- **Response Time** : >0.2 sec.
- **Warm up Time** : 3 sec.
- **Sample** : echo sampling 55 times /s
- **Display** : 4.5 Digit LCD
- **Repeatability** : ± 2mm up to 6 Mt.  
± 6mm beyond 6 Mt.
- **Sensing Material** : PP / PTFE, SS316
- **Insulation** : PTFE or Ceramic
- **Electrical Connection** : 1/2" , 3/4" NPT (F)
- **Enclosure** : Die cast Aluminum or Stainless Steel



## Relationship Between Different Mediums And The Measuring Range.

Medium group	DK( $\epsilon$ )	Solid particles	Liquid	Measuring range
1	1.4~1.6		cold concentrate, e.g. N <sub>2</sub> CO <sub>2</sub>	3m (only for coaxial probe)
2	1.6~1.9	White lime Specials Cement Sugar	Liquefied gas, e.g. Propane Solvent Freon12/Freon Palm oil	20m
3	1.9~2.5	Normal cement, Plaster	Mineral oil, fuel	20m
4	2.5~4	Grain, seeds Stone Sand	Benzene, styrene, Toluene Furan Naphthalene	25m
5	4~7	Moist stone, mineral Salt	Chlorobenzene, Chloroform Cellulose spray Isocyan hydrochloric Acid. Aniline	30m
6	>7	Metal powder Carbon black Coal	Liquid with water Alcohol Liquid ammonia	30m

## Model Selection Reference Table For Guided Wave Radar Level Transmitter

Model	Application	Antenna diameter	Dielectric constant	Solid particles	Solid powder	Liquid	Accuracy	Beam angle
501E-32-A	Liquid	4mm	2.5~3.0	N.A	N.A	20m	3mm	N.A
	Solid	6mm	2.5~3.0	N.A	20m	N.A	3mm	N.A
501E-32-B	Liquid	10mm	2.5~3.0	N.A	N.A	6m	3mm	N.A
501E-32-C	Solid/Liquid	Both 6mm	2.5~3.0	N.A	20mm	25m	3mm	N.A
501E-32-D	Liquid	10mm	2.5~3.0	N.A	N.A	6m	3mm	N.A
501E-32-E	Liquid	7mm (Probe Cable)	2.5~3.0	N.A	N.A	20m	3mm	N.A
	Liquid	14mm (Probe Rod)	2.5~3.0	N.A	N.A	6m	3mm	N.A
501E-32-F	Liquid	25mm	2.5~3.0	N.A	N.A	6m	3mm	N.A

# Ordering Information

I	II	III	IV	V	VI	VII	VIII	IX	X	XI
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### Model Selection

501E-32-A / B / C / D / E / F.....

### Electrical Classification

Weather proof..... W  
 Explosion proof..... E  
 Intrinsically Safe..... I

### Measuring Range

6 Mtr. ....  
 10 Mtr.....  
 20 Mtr.....  
 30 Mtr.....

### Output

4-20mA linear Output..... H  
 Fieldbus Output..... F

### Process Connection

501E-32-A & 501E-32-B	501E-32-C & 501E-32-D	501E-32-E	501E-32-F
A1 - 1½"NPT	B1 - 3" Flange	C1 - 1½"NPT	D1 - 2" Flange
A2 - 2" Flange	B2 - 4" Flange	C2 - 2" Flange	D2 - 3" Flange
A3 - 3" Flange	B3 - 6" Flange	C3 - 3" Flange	D3 - 4" Flange
A4 - 4" Flange	B4 - 8" Flange	C4 - 4" Flange	D4 - 6" Flange
A5 - 6" Flange		C5 - 6" Flange	D5 - 8" Flange
A6 - 8" Flange			
Others.....J			

### Head Flange Material

CS..... 1  
 PP..... 2  
 SS304..... 3  
 SS316..... 4

### Temperature

Common seal/ (-40~+120)°C..... P  
 Seal for high temperature/ (40~+250)°C with cooling fins..... G

### Pressure (kg/cm²).....

### Mounting

Top Internal.....  
 External Cage ..... T S

### External Chamber (Optional)

CS..... A  
 SS304..... B  
 SS316..... C  
 N/A..... D

### Chamber Process Connection

SW..... 1  
 Flange..... 2  
 N/A..... 3

## ● Data sheet for model selection

### **Tank/container information**

Tank type:

Storage tank  Reaction tank  Separation tank  Marine tank

Tank structure:

Tank material:  Tank pressure:

Tank size:

Height of tank: m

Diameter of tank: m

Shape of tank top:

Arch  Flat top  Open  Conic

Shape of tank bottom:

Tapered  Flat  Inclined  Arch

### Installation:

Top mounted  Side mounted  Bypass pipe mounted  Wave guide pipe mounted

Extension pipe at tank top (important information):

Pipe height: mm,

Pipe diameter: mm

Measuring medium

Medium name:  Liquid  solid  mix medium

Medium temperature: °C

Dielectric constant:

Adhesion:  Yes  No

Stirring:  Yes  No

### Process connection

Thread: ( G1½"  1½" NPT  G2" A  G1" A  1" NPT)  Flange (ANSI= )

Power supply:

24V DC 2-wire  220V AC

Output:  4-20mA  HART  Fieldbus

Display:  With display and programmer  Without display and programmer

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