



Measurement Products - Measurement Made Easy

# Guided Wave Radar Level Transmitters K-TEK Products

# Index



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3 Introduction

4 Principle of operation

6 Industries and applications

7 Specifications

8 Contact Us

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# Introduction

## A new level of safety for hazardous industry environments



**ABB's MT series Guided Wave Radar Level Transmitters are the only level transmitters in the world to be IEC 61508 certified for operation in SIL2 and SIL3 environments.**

The guided wave radar's self-monitoring capability continually checks for any faults that could cause device failures or false indications. The device features a graphic display incorporated into an all digital electronics module. Using this new format ABB has been able to add waveform screens to the modular electronics along with easy to follow multiple choice setup menus. These menus can be changed to many different languages for easy commissioning throughout the world. Pulses of microwave energy are directed to the product surface using a rigid rod or flexible cable type probe. This assembly has no moving parts and no loss of energy due to beam divergence.

### Customer benefits

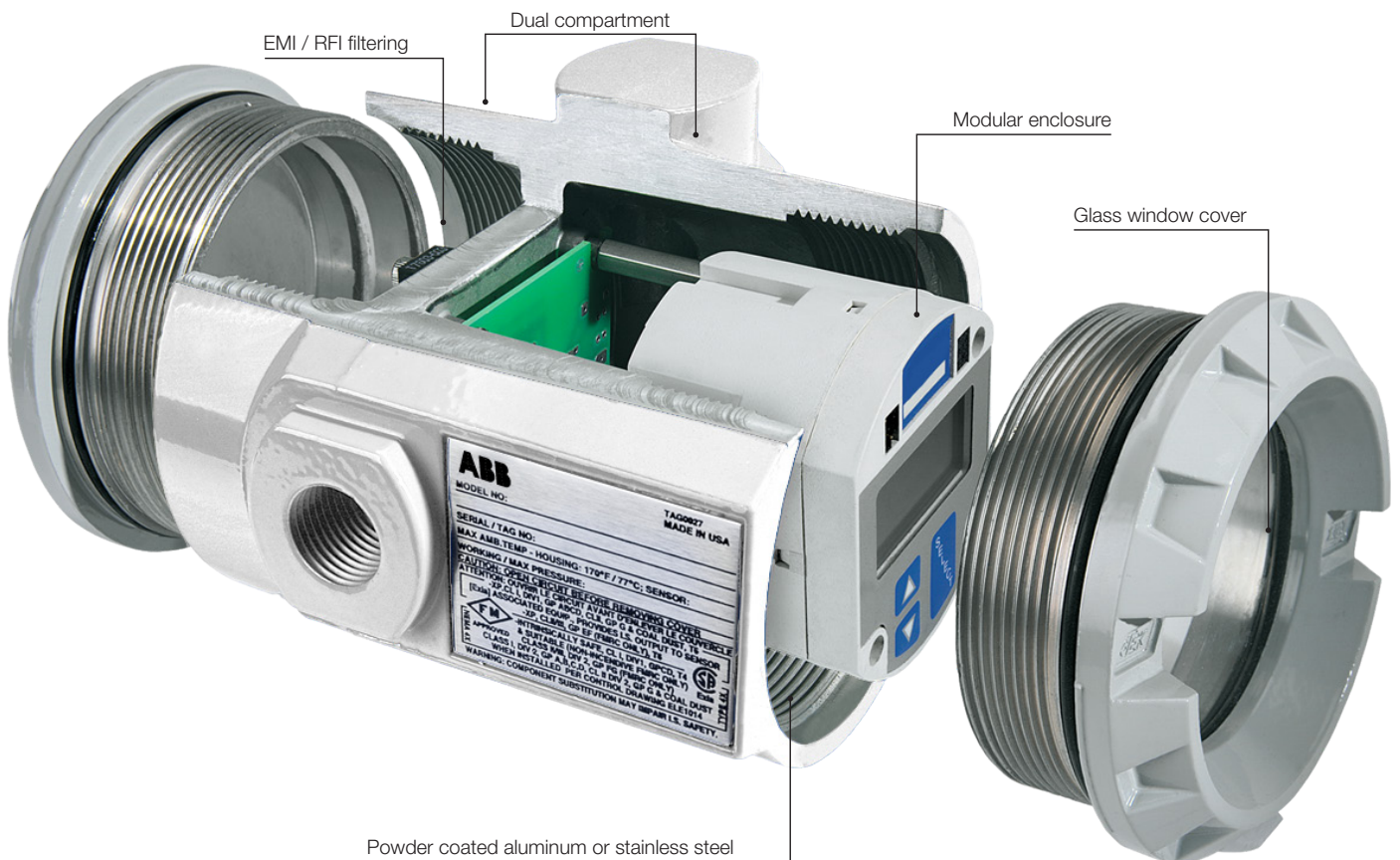
- Microwaves are unaffected by temperature, pressure, specific gravity and vapors
- Easy to install
- No moving parts
- Ignores light continuous coatings
- Good for vacuum service
- No beam angle to be concerned about like through-air radar or ultrasonic transmitters
- More direct energy return – more consistent signal
- No complicated setup, no computer or programmer required
- Built-in waveform screen (Scope Trace)



# Principle of operation

## Stable readings in the most challenging environments

ABB's ability to provide engineered solutions for tough applications allows an engineer to specify the best coupler and probe design and material for the application. ABB can supply specialized couplers, rods, cables and probe-end connections. These components can be supplied in stainless steel, Hastelloy C276, Hastelloy B, Titanium, Tantalum, Monel 400 or Inconel 625.

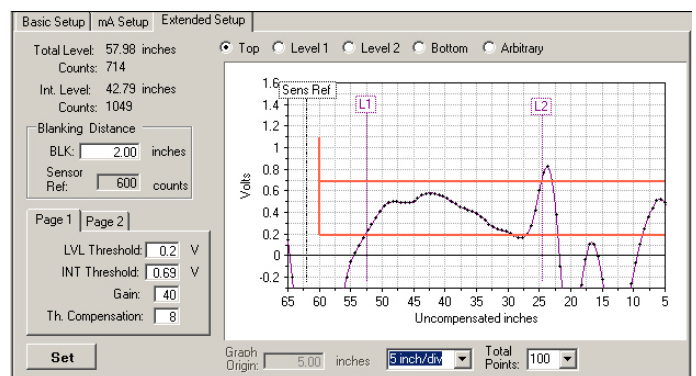




### Time of flight

Guided wave radar uses the time domain reflectometry measurement principle.

- Microwave pulses are created and propagated down the probe or cable of the device.
- When the microwave pulse makes contact with a change in dielectric a reflection is created.
- ABB's radar sends and receives 64,000 pulses per second and provides two output readings in that time. The higher the dielectric of the material, the greater amount of energy reflected back to the transmitter.
- Using the time of flight principle, we measure the distance to the surface and back and then divide by two.

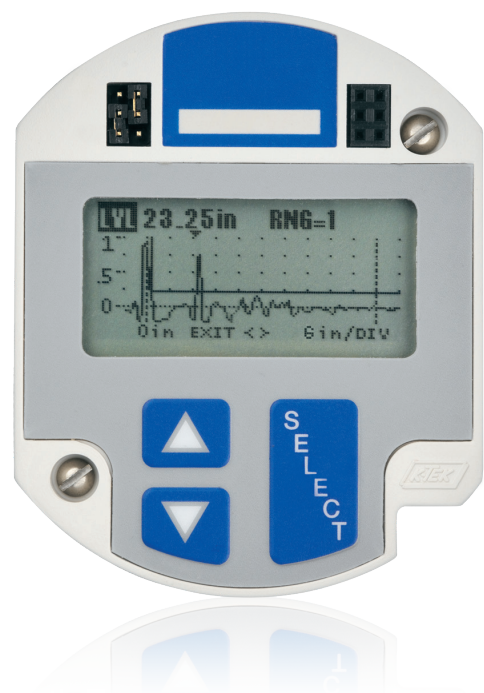


### Graphic Display

The MT5000 series guided wave radar transmitters feature a graphic display incorporated into an all digital electronics module. Using this new format ABB has been able to add waveform screens to the modular electronics along with easy to follow multiple choice setup menus. These menus can be changed to many different languages for easy commissioning throughout the world. Pulses of microwave energy are directed to the product surface using a rigid rod or flexible cable type probe. This assembly has no moving parts and no loss of energy due to beam divergence. The waveform display allows engineers and technicians to view measurements in real-time and has onboard diagnostics.

### Electronics

- HART Protocol
- Foundation Fieldbus
- Modbus





# Industries and applications

## The leader in level detection

### Typical industries:

- Oil and gas production
- Refining
- Pharmaceutical and biotech
- Power generation
- Pulp and paper
- Iron and steel
- Chemicals
- Food and beverage
- Marine




### Typical applications:

- Storage vessels
- Horizontal cylinders
- Open atmosphere sumps
- Cooling tower basin, flume and flumes
- Precipitator / fly ash
- Feedwater heaters
- Oil and gas separators
- Mud tanks
- Crude or hydrocarbon condensate tanks
- Process water tanks
- Crude oil storage tanks
- Chemical storage vessels
- Blending tanks
- Hydrocarbon storage vessels
- Fuel oil storage
- Sump or lift station
- Caustic tank
- Reactor vessels
- Ammonia storage
- Service water storage
- Demineralization tanks
- Makeup water storage
- Condensate storage
- Condenser sump or hotwell
- Deaerator
- Steam boiler drums
- Boiler blowdown tanks
- Flash tanks



# Specifications

## Radar level detection for liquids and solids

	MT5000	MT5100	MT5200
			
Process measurement	Liquid level	Liquid level, liquid / liquid interface level	Bulk solid level / Low dielectric applications
Features	<ul style="list-style-type: none"> <li>Reliable level measurement over varied process conditions</li> <li>Standardization reduces inventory and training requirements</li> <li>Modular electronics</li> </ul>	<ul style="list-style-type: none"> <li>Provides both lower and upper level fluid indications</li> <li>Flooded or non-flooded chambers</li> <li>Transmission of interface and upper fluid signals with the use of the optional RI100 repeat indicator</li> <li>Detection of the presence of a rag layer (patent pending)</li> <li>Weak interface signal detection</li> </ul>	<ul style="list-style-type: none"> <li>Unaffected by dust</li> <li>No moving parts</li> <li>Unaffected by feed flow</li> </ul>
Graphic display	Field selectable units in feet, inches, millimeters, centimeters, meters, or percentage and return signal waveform screens		
Housing	Dual compartment power, coated aluminum (standard) or stainless steel		
Power	13.5 - 36 VDC standard; 9-32 VDC foundation fieldbus; 10-18 VDC Modbus		
Output	Single 4-20 mA, HART, foundation fieldbus, MODBUS (RTU or ASCII)		
Resolution	+/- 0.0625 inches / 1.6 millimeters		
Process connection	3/4 inch NPT standard		
Menu languages	English, French, Russian, Italian, Spanish, Portuguese, Chinese (Mandarin)		
Accuracy	± 0.2 in / 5 mm	± 0.2 in / 5 mm upper level ± 1.0 in / 25 mm interface level	± 0.2 in / 5 mm direct measurement ± 1.0 in / 25 mm ULD mode
Approvals	Factory mutual (FM), Canadian standards association (CSA), GOST (Russian), ATEX, IEC, SIL2 and SIL3, INMETRO and NEPSI		
Measuring range	2 to 200 ft / 0.6 to 60.9 m	2 to 65 ft / 0.6 to 19.8 m	2 to 50 ft / 0.6 to 15.2 m
Sensor materials	316SS, Monel, Hastelloy C276 and B3, Titanium		
Process pressure	Up to 5000 PSI / 344 bar		
Process temperature	Up to 800°F / 427°C		
Process dielectric constant	1.4 - 100 +	Upper fluid 1.6 - 5 Lower fluid 15 - 100+	Directly 3 < ULD Mode 1.3 - 3
Process viscosity maximum	1500 cp		
Miscellaneous specifications	2000 PSI @ 635°F 138 bar @ 335°C, steam service	Secondary 4-20 mA output via RI100 repeat indicator	Bulk density 50 lb / ft <sup>3</sup> cable loading 10,000 lbs

# Contact us

## **ABB Inc.**

18321 Swamp Road  
Prairieville, LA 70769 USA  
Phone: +1 225 673 6100  
Service: +1 225 677 5836  
Fax: +1 225 673 2525  
E-mail: quotes.ktek@us.abb.com  
Service e-mail: ktek-service@us.abb.com

## **ABB Inc.**

585, Boulevard Charest E., Suite 300  
Quebec, QC Canada G1K 9H4  
Phone: +1 418 877 2944  
Service: +1 800 858 3847  
Fax: +1 418 877 2834  
E-mail: qc\_rfq@ca.abb.com  
Service e-mail: laserscanner.support@ca.abb.com

## **ABB Engineering (Shanghai) Ltd.**

No. 5, Lane 369, Chuangye Road  
Kangqiao Town, Pudong District  
Shanghai, 201319, P.R. China  
Phone: +86 10 64231407  
Service: +86 21 61056421  
Fax: +86 10 64371913  
E-mail: shan.li@cn.abb.com  
Service e-mail: rola.li@cn.abb.com

## **ABB LTD**

Salterbeck Trading Estate  
Workington, Cumbria, England CA14 5DS  
Phone: +44 7885333752  
Service: +44 145 3826661  
E-mail: workington.sales@gb.abb.com  
Service e-mail: joe.fudge@gb.abb.com

[www.abb.com/level](http://www.abb.com/level)

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