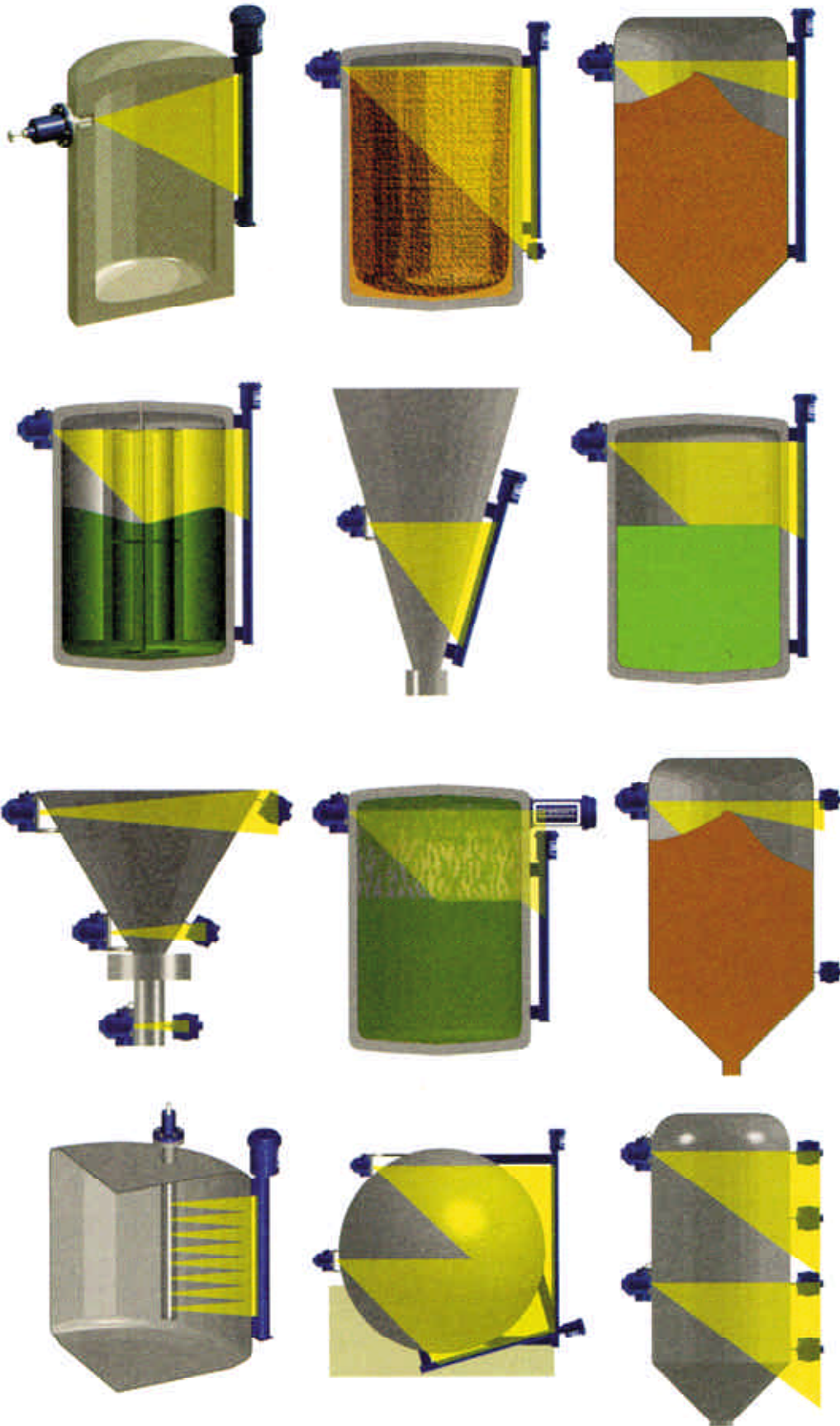


## Nuclear Continuous Level & Point Measurements



# Level

**ABLE** Instruments & Controls Ltd.  
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Email: [sales@able.co.uk](mailto:sales@able.co.uk)  
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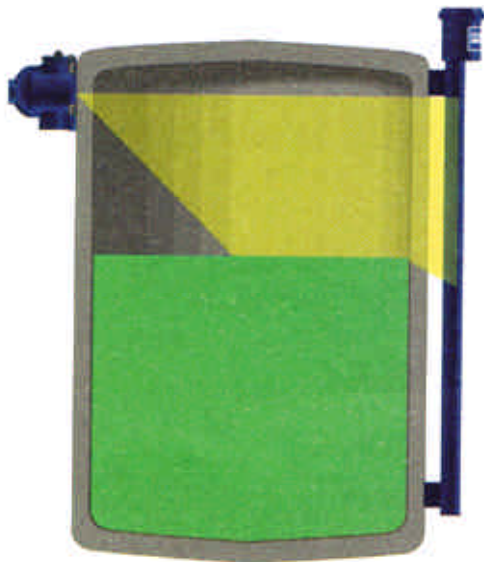
# ABLE

# Nuclear Continuous Level and Point Level Measurement

## Nuclear Continuous Level & Point Level Detection Measurements

### Low Maintenance & High Reliability

- **Non-invasive to Vessel**  
No exposure to the corrosive, abrasive, high pressure or high temperature process conditions.
- **No Moving Parts**  
Detectors employ no moving parts to wear, bind, corrode or fail on process.
- **Proven Technology**  
Nuclear measurements have proven reliable over time in thousands of applications.



### Low Total Installation Cost

- **Gauge Installed Without Process Shutdown**  
No alterations are required to the vessel interior for gauge installations in a standard application.
- **No Intrusions Into Vessel Required**  
With no intrusions necessary in a standard installation, no changes to coded vessels are required.
- **High First-time Success Rate**  
With nuclear level systems, there is a high success rate on the first installation. Time and money are not wasted trying multiple level technologies.

### Continuous Level Measurement

Nuclear continuous level measurement works by directing a narrow fan of radiation through the vessel to a detector. As the process level rises, it shields the detector from the radiation. The more radiation the detector 'sees', the lower the process level (discernable to 1% of span). The less radiation detected, the higher the process level.

### Solves Difficult & Extreme Applications

- **High Temperature**  
Process temperature has no effect on measurement.
- **High Pressure or Vacuum**  
Measures in all process pressures.
- **Corrosive**  
Non-contact technology allows use in the most aggressive services.
- **Volatile & Biohazard**  
Non-invasive nature eliminates process connections and leak paths.
- **Agitators, Baffles, Coils & Other Obstacles**  
Non-contact technology allows use in the most aggressive services.

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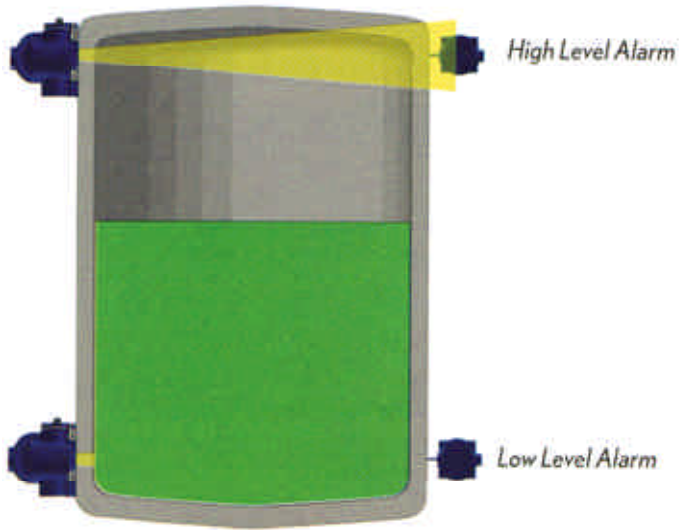
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# Nuclear Continuous Level and Point Level Measurement

## Benefits of Nuclear Level Measurements

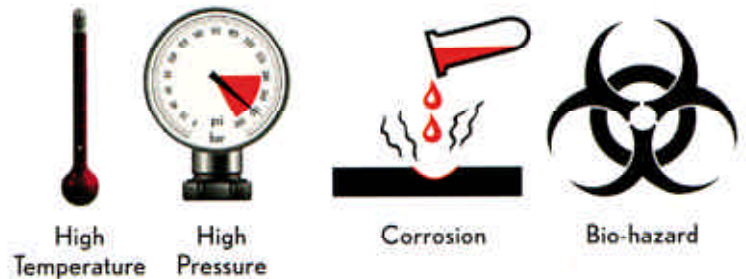


## Universal Solution

- **Applicable Across Virtually All Industries, Materials and Processes**  
Nuclear gauges use radiation as a means to make measurements, but this radiation does not affect the process material that are being measured.
- **No Effect On Process Materials**  
Will not change product being measured, even foods and pharmaceuticals.
- **High Accuracy & Repeatability**  
When properly installed, accurate to  $\pm 1\%$  or better.

## Point Level Detection

Point level detection uses a focused beam of radiation directed at a small detector, that senses the presence or absence of the beam. When the beam is blocked by process, the detector sees little radiation from the source. Ohmart point level detectors can be set as either high or low alarms.



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# Nuclear Continuous Level and Point Level Measurement

## Advantages



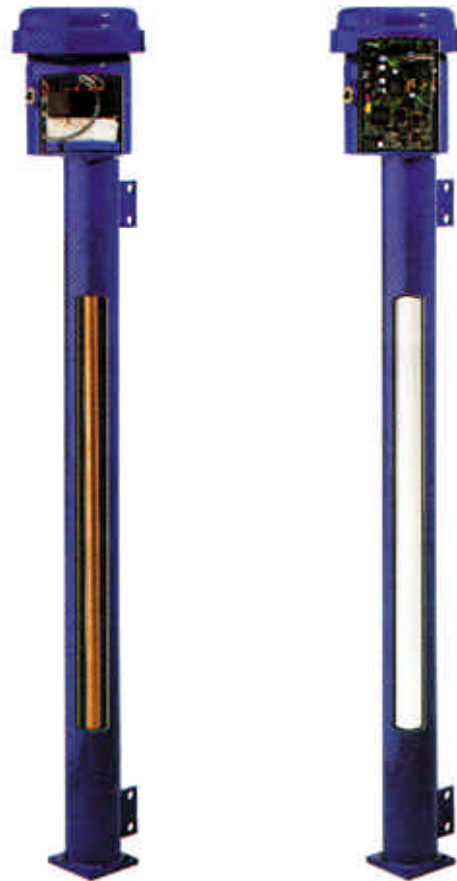
*Level gauges similar to the one shown above, have been in service since the 1970's in a paper mill located in Midwestern United States.*

## Depth of Experience

ABLE has continued to lead in the technical development and application of nuclear level gauges ever since practical nuclear gauges were invented by nuclear pioneer Philip Ohmart over 50 years ago.

## Widest Variety of Detector Types

ABLE offers two types of ion chamber detectors and a scintillator detector. This allows for the widest range of options for sensitivity, length, source size and economy.



## Commitment to Development

HART Protocol, fireproof sourceholders, increased specials capabilities and other innovations are examples of ABLE's continuing dedication and commitment to advancing nuclear gauge technology.

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## High Durability Powder Coat Epoxy

ABLE's nuclear instruments are delivered standard with baked-on powder epoxy coating for protection against harsh plant environments.



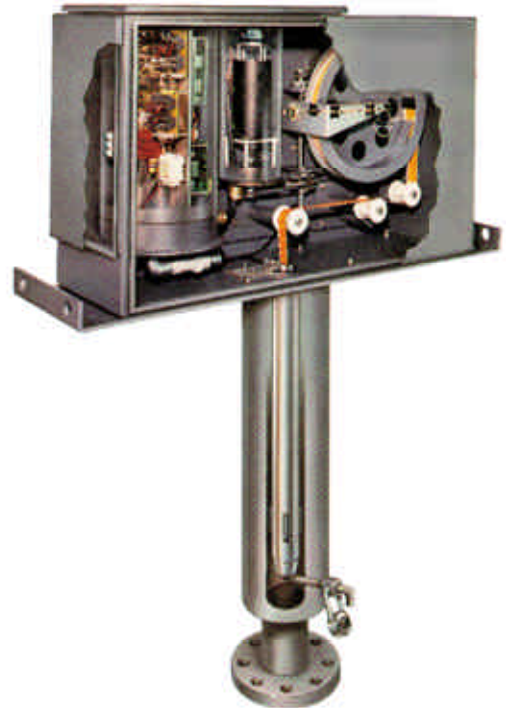
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## Specials Capabilities

We have the ability to design special source holders and detector configurations for special applications.



## Advanced Lead-free Fireproof Sourceholder

The SHF sourceholder provides the highest level of security for fire and drop conditions available.

## Automated Failsafe Sourceholders

We can offer a fully automated sourceholder for remote shutter operation and failsafe shutter closure.

*SmartScan provides a density profile and measures multiple interface levels.*



## HART Protocol Continuous Level Detectors

ABLE has all continuous level detector available with the industry standard HART protocol for programming and calibration. HART hand-held transmitter and modems eliminate the need for external electronics.

## Powerful Software in Remote Electronics

ABLE Smart Pro electronics and multigauge Pro Pac utilize advanced software to handle difficult applications and conditions.

## Support & Training

ABLE's staff of professionals offer the training, field service and radiation safety support required for the efficient and safe use of nuclear gauges.

## Excellence in Service

Ohmart's network of service technicians provide excellence in service and support, worldwide.



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# Nuclear Continuous Level and Point Level Measurement

## Continuous Level Detectors

### Three Standard Detector Types

Allows options between difference detector types for higher sensitivity, lower source size/radiation field, and extended lengths.



*The 'LS' Scintillator detector employs an artificial crystal material which produces visible light when struck by radiation.*

*The amount of light produced is proportional to the amount of radiation detected.*

*A photomultiplier tube mounted above the crystal produces a current proportional to the amount of light given off by the scintillator crystal.*

*This method of radiation detection is approximately 5x more sensitive than the standard LJ detector. This current is converted by the electronics to a 4-20 mA signal with HART (LSTH) or a digital signal to the SmartPro.*

*The 'LJ' & 'LN' Ion Chamber Detector consists of a metal tube or chamber containing a central electrode. The tube is filled with argon gas. When radiation strikes the argon gas, an electric current is produced proportional to the amount of radiation detected. This electrical current is processed and converted to a 4-20mA signal with HART (LJTH or LNTH) or a digital signal to the Smart Pro remote electronics (LJ or LN).*

#### **Note: Ion Chamber Do not 'Wear-out'.**

*The electrons moving up the centre conductor are continuously replenished by the bias connection to the walls of the detector.*

### 'LJ' Ion Chamber Detector

- Extremely rugged and reliable measuring system (even in harsh environments)
- Active Measurement lengths available to 19' (5.9m) (allows one detector to be used in place of two in longer range applications and greatly eases installation).

### 'LN' Ion Chamber Detector

The 'LN' Ion Chamber Detector uses a large diameter tube than the LJ for twice the sensitivity.

- Double sensitivity in rugged, reliable, ion chamber design.

### 'LS' Scintillator Detector

- Ultra high sensitivity detector reduces source size.
- Ultra high sensitivity detector minimizes radiation fields.
- Synthetic scintillator crystal used for higher reliability with vibration, temperature changes and other process conditions.

### Configuration/Programming Options

All ABLE level systems have two options for electrical configuration and programming:

- HART protocol for intergral transmitters.
- Smartpro remote electronics.

### SmartPro Electronics

Continuous level gauges are available with ABLE's feature packed SmartPro computerized electronics for operation, calibration, set-up and diagnostics.

- **Automatic Build-up Correction**  
Using one to three point level sensors, the zero and span can be recalibrated to compensate for build-up.
- **Automatic Vapour Density Compensation**  
Extreme pressure fluctuations can be monitored using a density gauge, using this input to compensate for the change in pressure.

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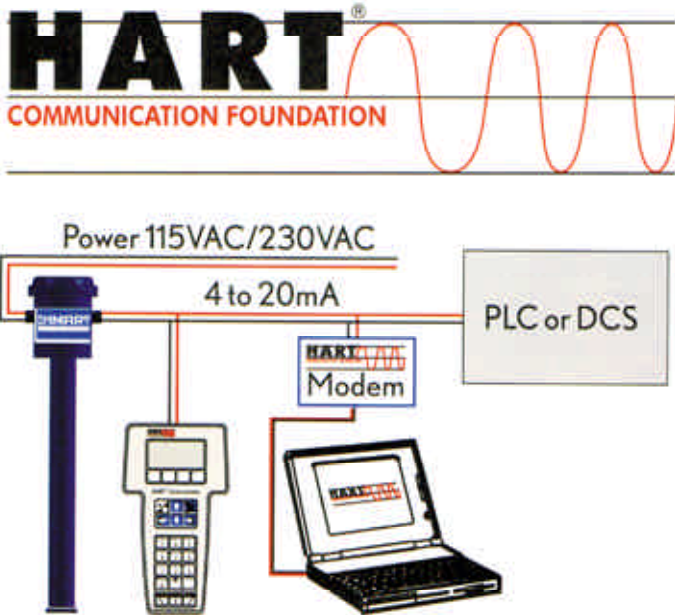


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# Nuclear Continuous Level and Point Level Measurement



Using either a HART Hand-held Transmitter or a personal computer with ABLE-View software, programming is made easy anywhere on the 4 to 20mA communication line to ABLE sensors.

## Transmitter Direct Output of 4 to 20 mA Measurement Signal

ABLE continuous level transmitters models LSTH, LJTH and LNTH provide a calibrated level measurement with a 4 to 20 mA output directly from the detector without any external electronics. Periodic communication with the transmitter for calibration, set-up and diagnostics can be established anywhere on the 4 to 20 mA loop using a HART hand-held transmitter.

## HART Eliminates Additional Electronics

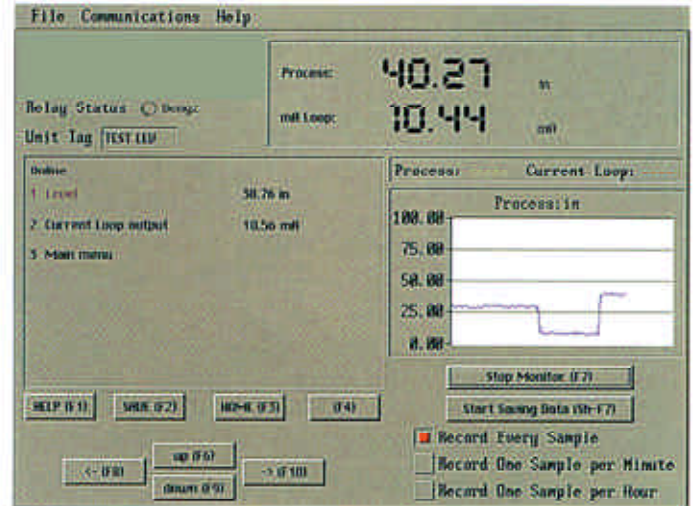
With HART protocol there are no additional remote electronics packages required. This lowers your equipment cost, wiring cost and saves control room space.

## Calibration Over 4 to 20mA Line

Using HART protocol, all calibration and programming occurs over the 4 to 20mA line. This eliminates any need to open the field enclosure for calibration purposes.

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## Ohmart View Software



ABLE-View software was designed using HART Standard Communication Protocol allowing communication from a personal computer.

## HART Standard Communication Protocol

HART protocol has become the standard communications method for thousands of facilities worldwide. With ABLE's HART gauges, programming is performed to this standard.

## HART Hand-held Terminal

The HART hand-held terminal provides programming capability from anywhere on the 4 to 20mA line, eliminating the need for specialized electronics.

## Ohmart View Software for HART Transmitter with HART Modem

ABLE View software and a HART modem turn any PC into a transmitter communication tool. Easy to use menus, graphics and help messages make calibration and diagnostics easy and uncomplicated.

## Diagnostic or Process Relay Alarm

A relay output is available that can be programmed by the user as either a process (level) or diagnostic alarm.



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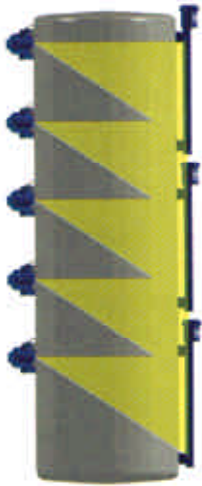
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# Nuclear Continuous Level and Point Level Measurement



- **Chemical**
  - **Petrochemical**
- Tall vessel with multiple sources and detectors.*



- **Chemical**
  - **Petrochemical**
  - **Pulp & Paper**
- Measurement of entire vessel including conical bottom.*



- **Dry Chemical**
  - **Cement**
  - **Pulp & Paper**
  - **Power**
  - **Mining**
- Continual measurement of conical section at bottom of silo.*



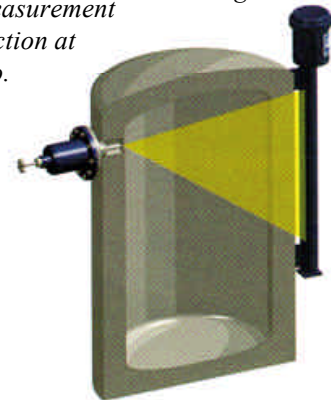
- **General**
- Sourceholder design showing 30° and 45° beam angle.*



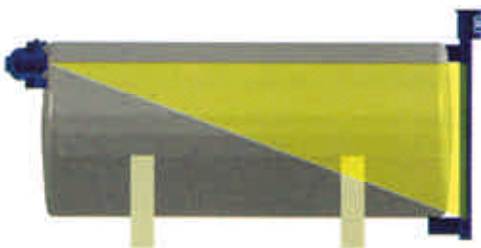
- **Chemical**
  - **Petrochemical**
- Vessel with large diameter or thick walls measured with multi-point source inserted into dry well.*



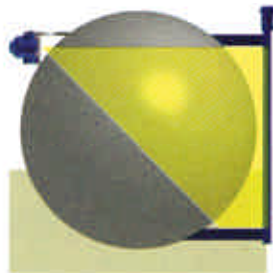
- **Dry Chemical**
  - **Cement**
  - **Pulp & Paper**
  - **Power**
  - **Plastics**
- Measurement of solids in a silo.*



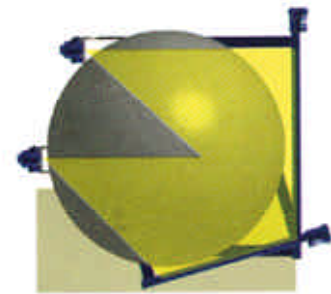
- **Chemical**
- In vessels with thick walls, a source can be inserted into a small recess cut out of the wall. This allows for much lower source size and no insertion into the vessel.*



- **General**
- Measurement of a horizontal, cylindrical vessel lengthwise allows monitoring of full vessel height.*



- **Chemical**
  - **Petrochemical**
- Single detector approach for spherical or horizontal cylindrical vessel.*



- **Chemical**
  - **Petrochemical**
- Dual detectors with a 60° source beam on spherical or horizontal cylindrical vessel.*

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# Nuclear Continuous Level and Point Level Measurement

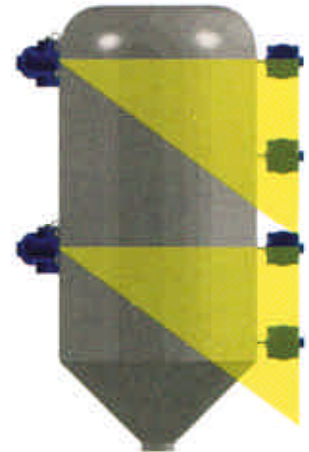
## Application Configurations for Continuous Level and Point Level



- **General**  
*Tall vessel showing high-level alarm with remote electronics for easy calibration and maintenance.*



- **Dry Chemical**
- **Corn/Soy Processing**
- **Power**
- **Mining**  
*High-level, low-level and clogged chute point detectors for silos or cyclones.*



- **General**  
*Single source used for multiple point detectors.*



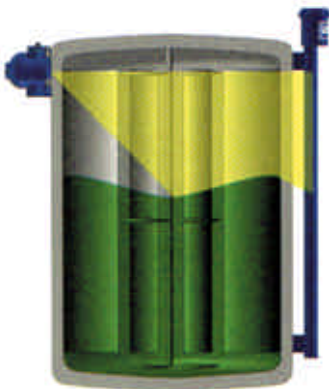
- **Klinker**  
*Firebrick or refractory removed in a small area to allow beam path between source and point detector.*



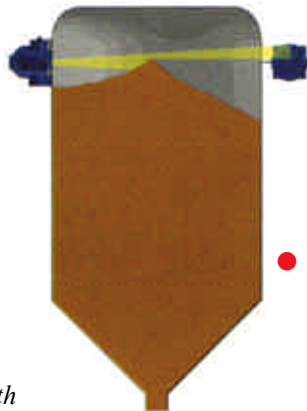
- **Chemical**  
*Vapour density compensation is achieved by measuring the density of the vapour area above the continuous level detector.*



- **Mining**
- **Power**  
*High-level, low-level and complete empty for bulk solids.*



- **Chemical**  
*Continuous level measurement with no interference from an agitator.*



- **Petrochemical**  
*Point level measurement based upon a predetermined width of bulk solid.*



- **Chemical**  
*Process build-up can be compensated for by using a point detector in conjunction with a continuous detector.*

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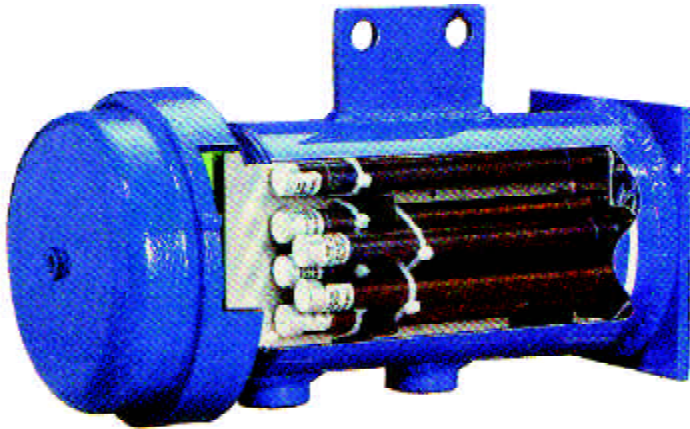
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# Nuclear Continuous Level and Point Level Measurement

Geiger-Mueller Technology



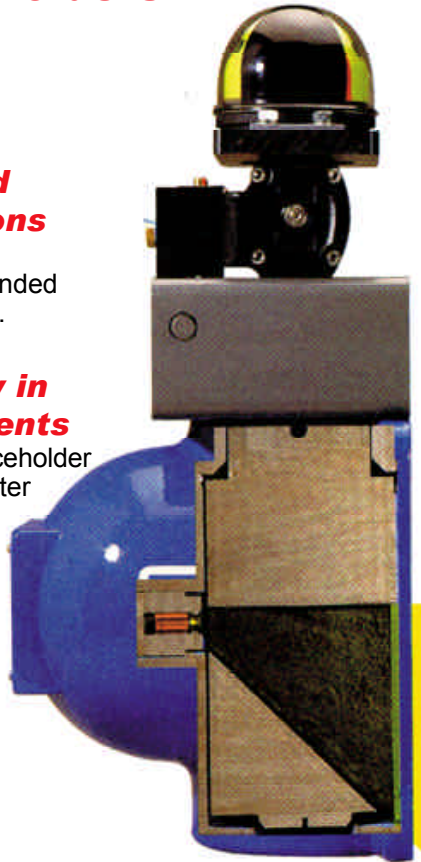
## Point Level Detector & Sourceholder Technologies

- **Small, rugged design.**  
Employing gas filled Geiger-Mueller tubes to detect radiation, the ABLE point level sensor is extremely and compact.
- **Easy installation and calibration**  
Installed outside of the process vessel and employing easy to use push button programming, ABLE point sensors offer quick installation and start-up.
- **Extreme sensitivities available**  
ABLE has the unique option of employing one to six tubes in our point detector. With additional tubes, sensitivities can be greatly increased allowing smaller source sizes, reduced radiation fields and measurement in thick walled vessels or over large distances.

## Advanced Sourceholders

### SHF Series Fireproof Sourceholders

- **No lead to melt and flow in fire conditions**  
Ductile iron and tungsten construction withstands extended exposures to 1472°F (800°C).
- **Designed for safety in extreme environments**  
Rugged construction of sourceholder body and shutter allows shutter operation after a fall of 30' (9.1m) onto an unyielding surface. This prevents the shutter from jamming in the 'open' position emitting stray radiation fields.



### Shutter Automation

- **Easy to automate shutter for failsafe operation.**  
Internal rotary shutter mechanism with ball bearings allows for failsafe operation with spring return electrical or pneumatic actuators. This closes the shutter on loss of air pressure or electricity.
- **Remote calibration and shutter check**  
For installations with the sourceholder in a difficult to reach location, automated sourceholders allow remote shutter operation for calibration and shutter checks.
- **Interlock of shutter prevent exposures**  
Automatic sourceholders are able to be used with interlocks to automatically close the shutter upon opening of vessel doors preventing any accidental exposures.

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# Nuclear Continuous Level and Point Level Measurement

## Specifications

### HART Transmitter

<b>Current Loop Output</b>	LS/LJTH/LNTH	4 to 20mA into 300 to 1000 ohm
<b>Cable Length</b>	Maximum	(1000m)
<b>Active Lengths</b>	LS/LSTH	153mm to 1830 mm in 152.4mm increments
	LJ/LJTH	305mm to 5948mm in 305mm increments
	LN/LNTH	305mm to 3054 mm in 305mm increments
<b>AC Power</b>	LN/LNTH	110 or 230 VAC at 50 to 60Hz
	LJ/LJTH	110 or 230VAC at 50 to 60Hz
	LS/LSTH	90-270VAC at 50 to 60Hz, at 15VA max power consumption
<b>DC Power</b>	LS/LSTH	10-54VDC (less than 100mV, 1-1000 Hz ripple) at 8VA
		Note: DC power is not currently available on LJ/LJTH & LN/LNTH
<b>Operating Temperature</b>	LS/LSTH	-20°C to 60°C, Lower temperatures available
	LJ/LJTH & LN/LNTH	Water cooling required above 60°C
		-29°C to 60°C, Lower temperatures available.
		Water cooling required above 60°C.
<b>Hazardous Area Ratings</b>	Weatherproof	Designed to meet NEMA 4X, IP65
	CENELEC	Designed to meet EExd IIC T5, IP-66
		Class 1, Div. 1, Groups A, B, C, D; Class II, Div. 2, Groups E, F & G
<b>Relay Output</b>	Process Diagnostic	SPST

### Output to Smart Pro

<b>Detector Output</b>	LS/LJ/LN	0 to 10 kHz optoisolated digital frequency
<b>Cable Length</b>	Maximum	1524m

### Smart Pro and Pro Pac Support Electronics (Non HART Installations)

<b>Inputs</b>	Measurement signal	Frequency, 0-100kHz, optoisolated
	Auxillary	4 to 20mA; relay voltage, RTD, RS-232 digital, TTL logic level
<b>Electrical</b>	Power requirements	115VAC or 230VAC, $\pm 10\%$ , 50 or 60Hz, 10W max (60W for Pro Pac)
		Redundant power supply optional (for Pro Pac)
<b>Operator Interface</b>	Display Panel	4 row, 20 character alphanumeric backlit LCD
	Keypad	20 button keypad, provides quick access to most commonly used functions.
	Pro Pac Rack	Up to four display panel (one each for each Pro unit)
<b>Smart Pro Wall Unit</b>	Temperature	Ambient 0°C to 122°C
	Weight	4.5kg
<b>Pro Pac Rack Unit</b>	Temperature	0°C to 50°C
	Weight	9.1kg
<b>Outputs</b>	Analog (2)	Isolated (ISA std. 50.1, type 4, class U)
	Relay (4)	SPDT (4 from C)

### Point Level Detector

<b>Relay Outputs</b>	Process Alarm Relay	DPDT 2Amp at 250VAC (option for 10 Amp at 250VAC)
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# Nuclear Continuous Level and Point Level Measurement

## Ordering Information

### Point Level Detector

<b>Relay Outputs</b>	Failsafe Alarm Relay	SPST
<b>Electronics</b>	Power Requirements	115 or 230 VAC $\pm$ 10%, single phase, 50 or 60Hz
<b>Hazardous Area Ratings</b>	CENELEC EExdIIC TS	Exd

<b>LJ</b>	Ion chamber detector with frequency output to ABLE Smart Pro or Pro Pac
<b>LN</b>	Ion chamber detector with frequency output to ABLE Smart Pro or Pro Pac
<b>LJTH</b>	Ion chamber detector and transmitter with 4-20mA output and HART protocol
<b>LNTH</b>	Ion chamber detector and transmitter with 4-20mA output and HART protocol
<b>LS</b>	Scintillator detector with frequency output to ABLE Smart Pro or Pro Pac
<b>LSTH</b>	Scintillator detector and transmitter with 4-20mA output and HART protocol

**Detector active length in 305mm increments up to 5944mm for models LJ/LJTH**

**Detector active length in 305mm increments up to 3050mm for models LN/LNTH**

**Detector active length 153mm increments, starting from 305mm up to 1829mm for models LS/LSTH**

#### Voltage

**V1** 115VAC  $\pm$ 10% 50/60Hz (for models LJ/LN/LJTH/LNTH)

**V2** 230VAC  $\pm$ 10% 50/60Hz (for models LJ/LN/LJTH/LNTH)

**V4** 90-270VAC  $\pm$ 10% 50/60Hz (for models LS/LSTH)

**V5** 10-54VDC (for models LS/LSTH)

#### Hazardous Area Approvals (for all models)

**H0** No certification

**H1** CSA certification

**H2** CENELEC certification

#### Standard Options (for all models)

**S00** No options

**S22** No housing

**S50** HART hand-held terminal (only models LJTH/LNTH/LSTH)

**S51** HART modem and ABLE-View software (only models LJTH/LNTH/LSTH)

#### Packing (for all models)

**P0** Truck packing (open skid)

**P1** Air packing (closed wooden box)

**P2** Ocean packing (wood box with liner)

#### Extra Manuals (for all models)

**D1xx** LJ/LN/LS manual (xx=quantity)

**D2xx** LJTH/LNTH/LSTH manual (xx=quantity)

#### Cables (for all models)

**C0** No cables

**C1xx** Belden 8760 for conduit (xx=length per 1m)

**C2xx** Belden 9341 for cable tray (xx=length per 1m)

Important: Some of the information and images in this brochure may not be correct due to product development since this brochure was devised. ABLE reserve the right to make changes at any time, without notice, to materials, specification, accessories and models.



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