Mr. [illegible] Chief
[illegible] Health
Department of Public Health
[illegible] State Office Building
Des Moines, Iowa 50319-0075

OCT 16 1997

Dear Mr. Flater:

This is to acknowledge receipt of your letter dated September 23, 1997 on the "Photon Gauge" distributed by BSI Instruments.

We have referred your letter to Mr. Steven Baggett of our Sealed Source Safety Section for review and response. You can expect to hear from him by November 10, 1997.

We appreciate your bringing this matter to our attention.

Sincerely,

Original Signed by
Cardelia Maupin
Paul H. Lohaus, Deputy Director
Office of State Programs

220056

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NAME	LBolling:nb		PHLohaus		RLBangart					
DATE	10/ 15/97*		10/15/97*		10/16/97*					

9710230059 971016
PDR STPRG ESGIA
PDR

OSP FILE CODE: SP-AG-9

Mr. Donald A. Flater, Chief
Bureau of Radiological Health
Department of Public Health
Lucas State Office Building
Des Moines, Iowa 50319-0075

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Office of State Programs

Distribution:
DIR RF (7S253)
SDroggitis
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DCD (SP03)
PDR (YES_✓, NO_)

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OFFICE	OSP	OSP:DD	SD:OSP:D		
NAME	LBolling:nb	PHLohaus	RLBangart		
DATE	10/ 15 /97	10/ 15 /97	10/ 16 /97		

OSP FILE CODE: SP-AG-9

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 16, 1997

Mr. Donald A. Flater, Chief
Bureau of Radiological Health
Department of Public Health
Lucas State Office Building
Des Moines, Iowa 50319-0075

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Sincerely,

Cardelia Maupin for

Paul H. Lohaus, Deputy Director
Office of State Programs

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF PUBLIC HEALTH
CHRISTOPHER G. ATCHISON, DIRECTOR

September 23, 1997

97 SEP 30 AM 10: 12

OSP

Richard L. Bangart, Director
Office of State Programs (03D23)
US Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Bangart:

In the mail on September 18, 1997, I received the attached information regarding a company who has developed a "Photon Gauge" for material density and level determinations. Their intent is to market the device without radioactive sources. Exempt sources would be purchased by the gauge buyer and these sources would be installed by that buyer to put the gauge into service.

You will note on Pages 1 and 2 of the package that references are made to the US Nuclear Regulatory Commission (NRC). If any of the references are true, I have serious concerns about our previous decision to relinquish our authority to review and evaluate sealed sources and devices which use radioactive material in the operation process. I have contacted the radiation safety officer (RSO) of the gauge manufacturer and she indicated that they have no written correspondence or the photon gauge from the NRC. The only thing they do have are results of meetings/telephone conversations with NRC staff. No staff of NRC were named during my telephone conversation with the RSO. However, it is noted that Mr. Baggett was scheduled to receive a copy of the attached transmittal memo.

Because we relinquished our authority to NRC for sealed source and device (SSD) review/evaluation, this letter is our formal request for an SSD review/evaluation, by your agency, of the devices listed in the attached literature. The decision has been made to not allow the distribution of the "Photon Gauge" in Iowa until NRC has performed the SSD review. Our decision is based on public health and safety concerns.

In reviewing the company's data, it is noted that a gauge owner could, in the current gauges, purchase up to 30 10μCi "EXEMPT" Cs-137 sources for loading into the gauges. This would mean that the gauge was loaded with 300 μCi of Cs-137. The 300μCi produce an unshielded exposure rate of approximately 1 Rem at 1cm and 1.1mR/hr at 30 cm. With no other information, we must also consider the skin dose from the 351 keV β emitted in the Cs-Ba_m decay. I, therefore, have genuine concerns about the dose to owner personnel loading the "EXEMPT" sources into the "Photon Gauge." I don't know whether or not anyone has done a health physics evaluation to justify the company's claim that the housings are capable of limiting the exposure after loading to 0.5 mREM or less. I also wonder what the mREM referenced in the manufacturer's literature means without a time factor indicated.

LUCAS STATE OFFICE BUILDING / DES MOINES, IOWA 50319-0075 / 515-281-5787
FAX # (515) 281-4958 / TDD-DEAF SERVICES #(515) 242-6156

Aside from the issues outlined above, we are starting to consider questions regarding how many, what isotope, what exposure rate, etc. or combination thereof are allowed for exempt source(s) to no longer be exempt. We believe that this could truly be a public health issue. In fact, we are seriously considering a rule change to exclude from exemption devices containing more than the exempt sources. This would involve changing Iowa's counter part to 10 CFR 30.15(a) (9). That regulation is now designated compatibility Category B. Any changes would remove Iowa's "essential sameness".

Mingled with our concerns, I have raised some issues which I am formalizing as requests from NRC:

- We are requesting a safety evaluation of the subject device.
- We are requesting copies of the NRC documentation "approving" the distribution procedures outlined by the company.
- We are requesting a legal interpretation of the intent of 10 CFR 30.15(a) (9).

We await your response to our request. If you have questions, please contact me.

Sincerely,

Donald A. Flater

Donald A. Flater, Chief
Bureau of Radiological Health
515-281-3478 - Office
515-242-6284 - FAX
dflater@idph.state.ia.us.

DAF/lr

cc: Steve Collins (IL)
J. Lynch (NRC)
Charles Hardin, (CRCPD)

Enclosure: BSI Instruments package

i:\bangart.doc

BSI INSTRUMENTS
Hopewell Business Park
101 Corporation Drive
Aliquippa, PA 15001
Phone: 412-378-1900
Fax: 412-378-1926
http://www.bsi-1.com

September 3, 1997

To: Various Radiation Control Program Directors

cc: Charles Hardin, CRCPD, Frankfort, KY
Steve Baggett, NRC headquarters

Subject: THE PHOTON GAUGE

Earlier this month, the Conference of Radiation Control Program Directors (CRCPD) issued via E-mail a summary description of our Photon Gauge program. In summary, BSI Instruments has developed a line of density and level gauges using "exempt" Cs-137 sources. Our purpose is to provide industrial process customers with gauges utilizing non-invasive gamma sources exempt from regulatory licensing, wipe or shutter tests, or disposal concerns.

For your added information, we are mailing to you a printed copy of that E-mail, as well as descriptive brochures. If and as you need additional information, please contact me at 412 378-1900 or via E-mail at http://www.bsi-1.com.

Sincerely yours,

Mary Dedola

Mary Dedola
Radiation Safety Officer

Attachments:
Summary Description
Brochure: Photon Density Gauge
Photon Continuous Level Gauge
Photon Point Level Gauge

INSTRUMENTS

Hopewell Business Park
101 Corporation Drive
Aliquippa, PA 15001
Phone: 412·378·1900
Fax: 412·378·1926
http://www.bsi-1.com

September 3, 1997

Summary Description for
Radiation Control Program Directors:

The Photon Gauge

Background: BSI Instruments has developed a line of density and level gauges using "exempt" Cs-137 sources. In doing so, their stated purpose is to provide industrial process customers with gauges utilizing non-invasive gamma sources exempt from regulatory licensing, wipe or shutter tests, or disposal concerns. Long-term, their goal is to greatly reduce (or eliminate) customer demand for generally licensed devices. The company calls their gauge its "Photon" gauge, and identifies applicable 10-microcurie Cs-137 exempt sources as "photon" sources.

BSI Instruments is the name given to Berthold Systems, Inc. and its affiliated Apgee Corporation and Sweetwater Technologies, Inc. Since 1984, the company has been NRC-registering, licensed and distributing the German "Berthold" line of nuclear gauges since 1984, importing the German "Berthold" line of nuclear devices. BSI Instruments continues to distribute Berthold devices in addition to its own line of devises and gauges.

The Photon Housing: BSI Instruments has designed two photon housings, one housing photon sources for density gauging and another for level gauging. The density holder resembles a lead "donut". The level holder consists of a lead-lined coated steel channel. Both holders house between ten to 30 photon sources.

Minimum Regulatory Requirement: The Nuclear Regulatory Commission has confirmed to BSI Instruments that its Photon gauge follows 10CFR 30.18 and 32.19, and may pursue its program free of NRC registration or NRC/Agreement state licensing so long as BSI (1) markets only the photon housing and not the sources, (2) advises customers to obtain sources separately from a licensed distributor, and (3) provides customers with instructions in the safe handling and use of sources. Additional information is available by contacting NRC headquarters.

Additional Measures Taken: BSI Instruments has added several features to its Photon gauge program, in the interest of maximizing safety and source control:

1. BSI Instruments manufactures its photon housings to assure installed surface radiation levels of 0.5 mrem or less.

2. Each photon housing is serialized, and stickered with instructions to return to housing to BSI Instruments for disposal.

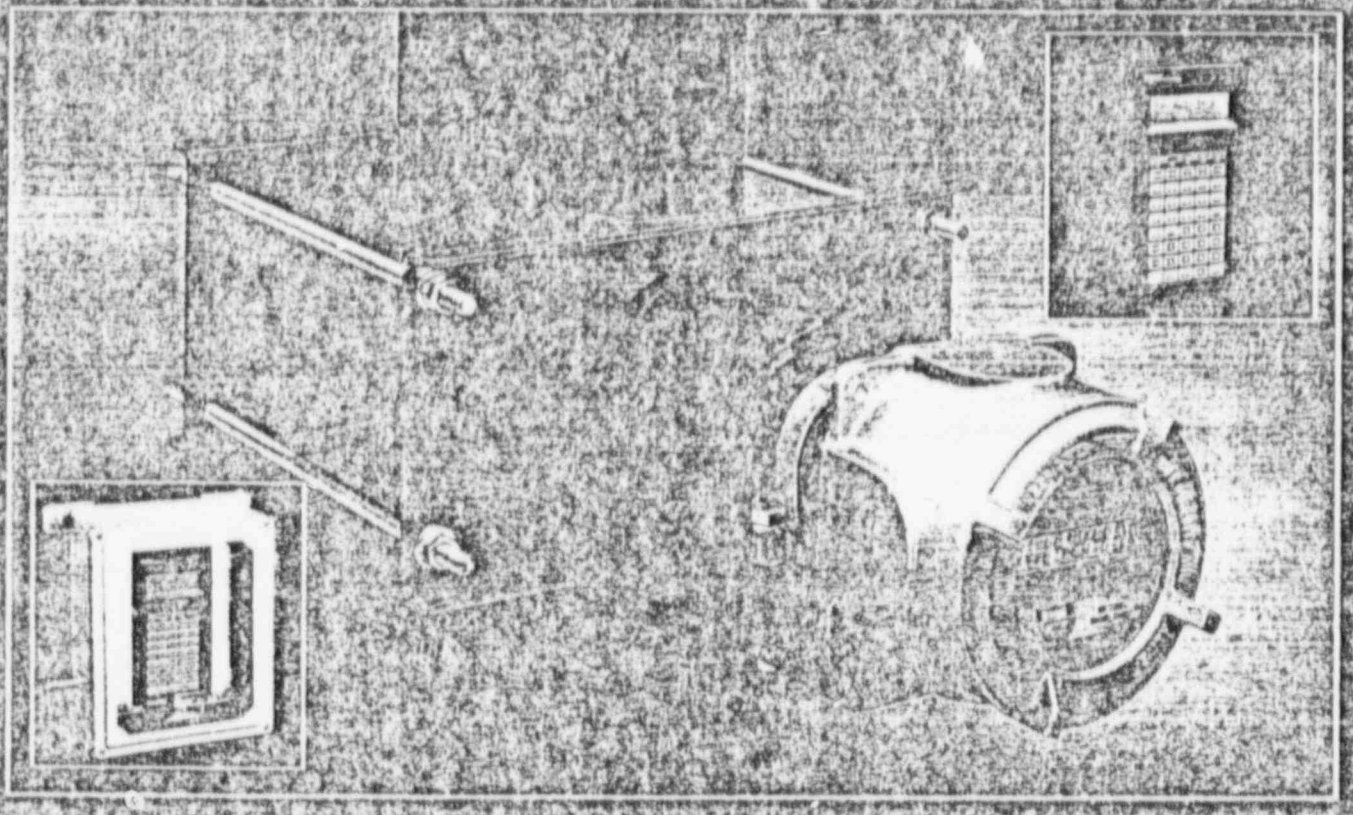
3. photon housings are so constructed that assembled photon sources cannot be readily removed.

4. On-site assembly of photon sources in their housing is performed by a BSI engineer or contractor, or by a customer employee given specific instruction.

BSI Instruments plans to forward additional information to each state radiation control program director, During September. Alternatively, you may contact BSI's radiation safety officer Mary Dedola at 412 378·1900 or via E-mail at http://www.bsi-1.com.

BSI NEW FROM INSTRUMENTS

PHOTON DENSITY GAUGE NW2100



The Photon Density Gauge is a non-contacting on-line measurement which provides monitoring for fluid or bulk density, percent solids and percent concentration under normal process conditions.

Features

- No license is required. Complies with NRC regulations 10CFR part 30.18 Exempt quantities.
- Non-contacting, non-invasive, non-intrusive on-line measurement.
- No moving parts, drift free calibration and operation. Can be applied to existing process vessels or pipes.
- Independent of pressure, viscosity, conductivity, temperature or color.
- Output and calibration can be performed in any standard units of measurement.

bsi INSTRUMENTS PHOTON

bsi INSTRUMENTS FORMERLY BERTHOLD SYSTEMS

Operating Principle

The NW2100 Photon density gauge operates using the measuring principle of scintillation technology. The system consists of a source holder with a small photon source, a scintillation detector, mounting hardware, and microprocessor unit.

The energy field emitted by a small photon source is attenuated as it passes through the process material. With the measuring distance held constant, the attenuation of energy field is proportional to the change in density.

A precise and efficient scintillation detector, incorporating a solid state scintillation crystal, measures the energy field and supplies a drift free signal to the microprocessor unit.

Calibration

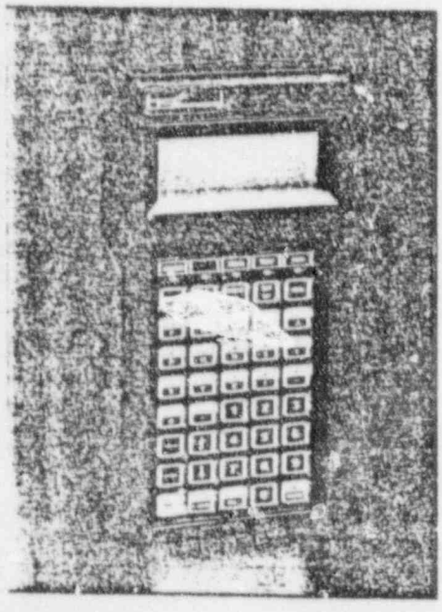
Calibration is completed on-line with comparative samples taken from the process. The versatile software program allows for a quick precise calibration and start-up of the system. Only one calibration point is needed for start-up, but several points can be added for a more precise measurement.

NW2100-1 Density Gauge with Integral Electronics

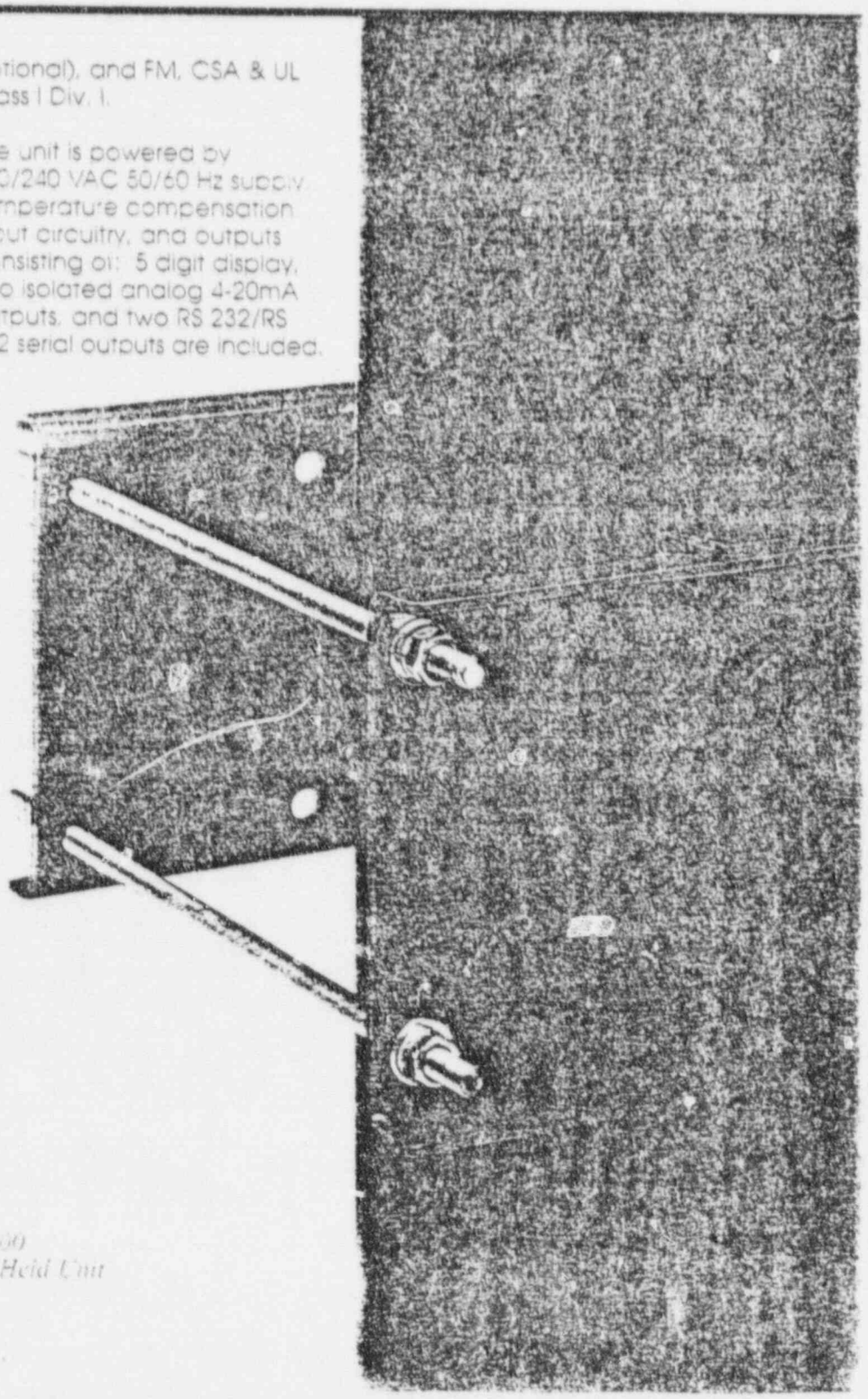
The NW2100-1 density gauge has the scintillation detector and microprocessor unit packaged into one compact unit which is clamped directly onto the existing process. Interface with the microprocessor is via the NW1100 hand held unit which plugs directly into the housing by an environmentally sealed connection. Therefore, one NW1100 hand-held unit can be used to interface with multiple systems.

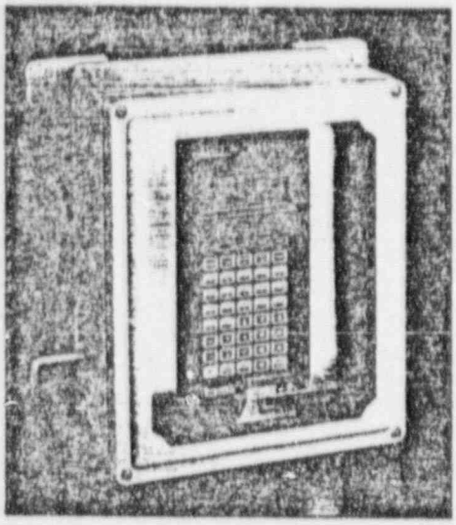
The single stainless steel/cast aluminum explosion proof housing containing the scintillation detector and microprocessor unit, is suitable for areas rated Nema 4 (4x epoxy coated optional), and FM, CSA & UL Class I Div. I.

The unit is powered by 120/240 VAC 50/60 Hz supply. Temperature compensation input circuitry, and outputs consisting of: 5 digit display, two isolated analog 4-20mA outputs, and two RS 232/RS 422 serial outputs are included.



NW1100 Hand Held Unit





NW2100-2 Wall Mounted Unit

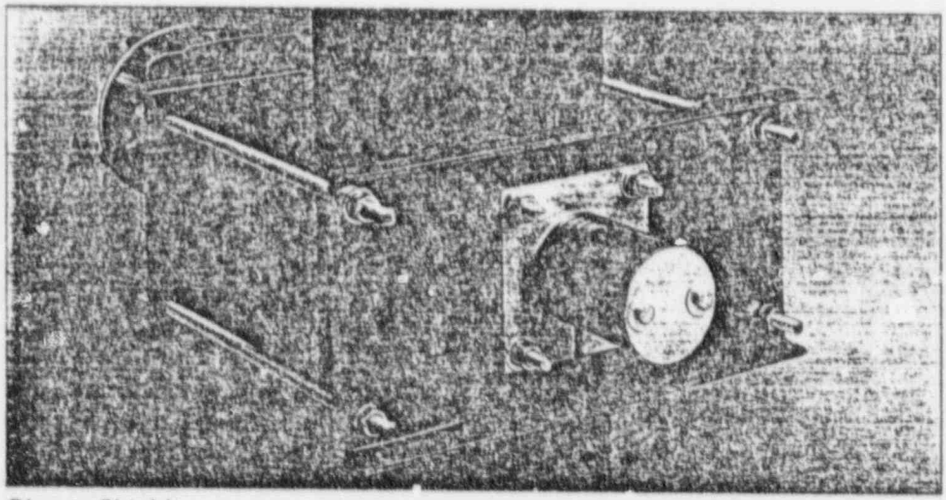
NW2100-2 Density Gauge with Remote Electronics

For applications where the location hinders access to the detector, the **NW2100-2** remote mounted microprocessor unit is recommended. With this arrangement the **NW2001** scintillation detector is mounted on the process, and the **NW2100-2** containing the microprocessor unit is mounted remotely up to a maximum of 5,000 feet away.

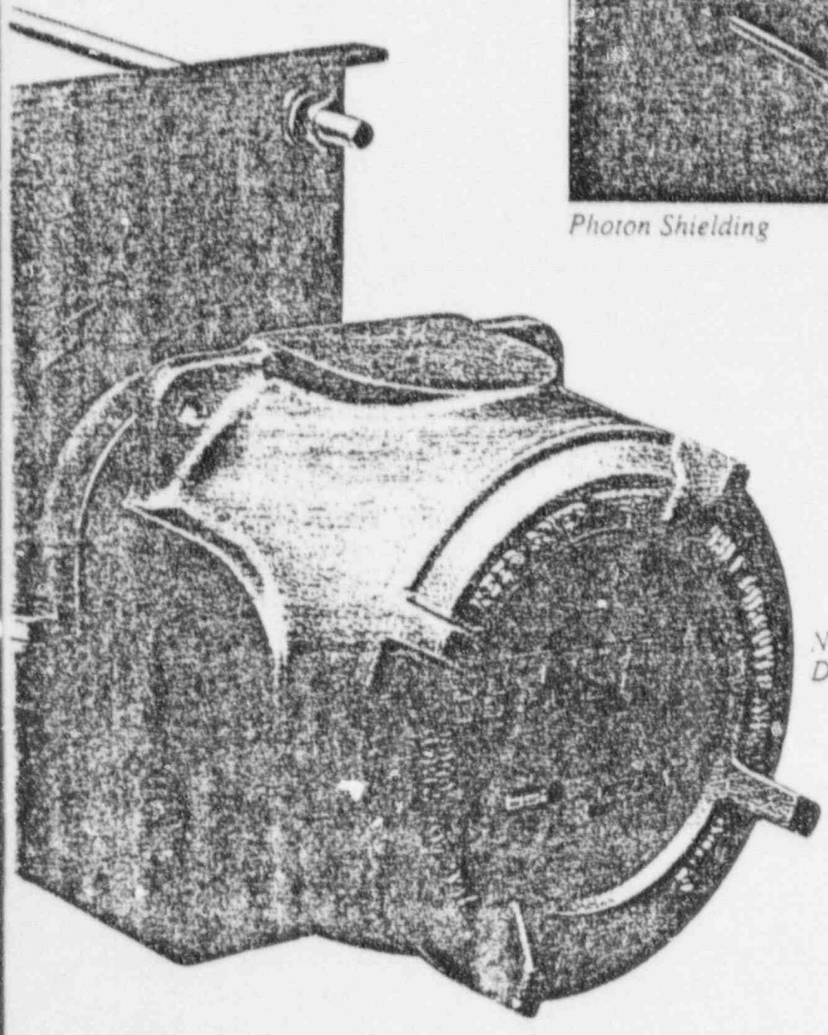
The **NW2100-2** microprocessor unit is a wall mounted housing suitable for areas rated Nema 4x. It is connected to the **NW2001** scintillation detector via 3 conductor shielded cable. The microprocessor is accessed by a membrane keypad located on the front of the unit. The unit is powered by 120/240 VAC 50/60 Hz supply. Temperature compensation input circuitry, and outputs consisting of: 5 digit display, two isolated analog 4-20mA outputs, and two RS 232/RS 422 serial outputs are included.

Retrofits

The NW2100 density gauge can utilize and extend the productive life of nuclear sources that are currently in place for density measurements.



Photon Shielding



NW2100-1 Density Gauge

Application Information Required

The following information is required when engineering a system.

- Type and diameter of process line.
- Wall thickness and material; including insulation details.
- Density range of process material.
- Operating temperature range.

Technical Data NW2100

Calibration software:
- Variable calibration mathematics
- Adjustable time constant
- Temperature compensation circuitry

Display:
Digital, 4.5 digits

Data Storage:
EE-Prom

Decay Compensation:
Auto control via quartz clock

Count Rate Range:
0 - 99999 cps

Temperature Range:
-20°C to +50°C

Auxiliary Power:
AC: 60v AC to 240v AC, 50/60 Hz

DC: 18v DC to 36v DC

Power Consumption:
15vA to 20vA

Outputs:
Analog: Two (2) isolated analog outputs (0/4-20mA)

Serial: RS-232 / RS-422

Inputs:
- Two (2) analog 0/4-20mA
- Temperature compensation with PT100 or current signal

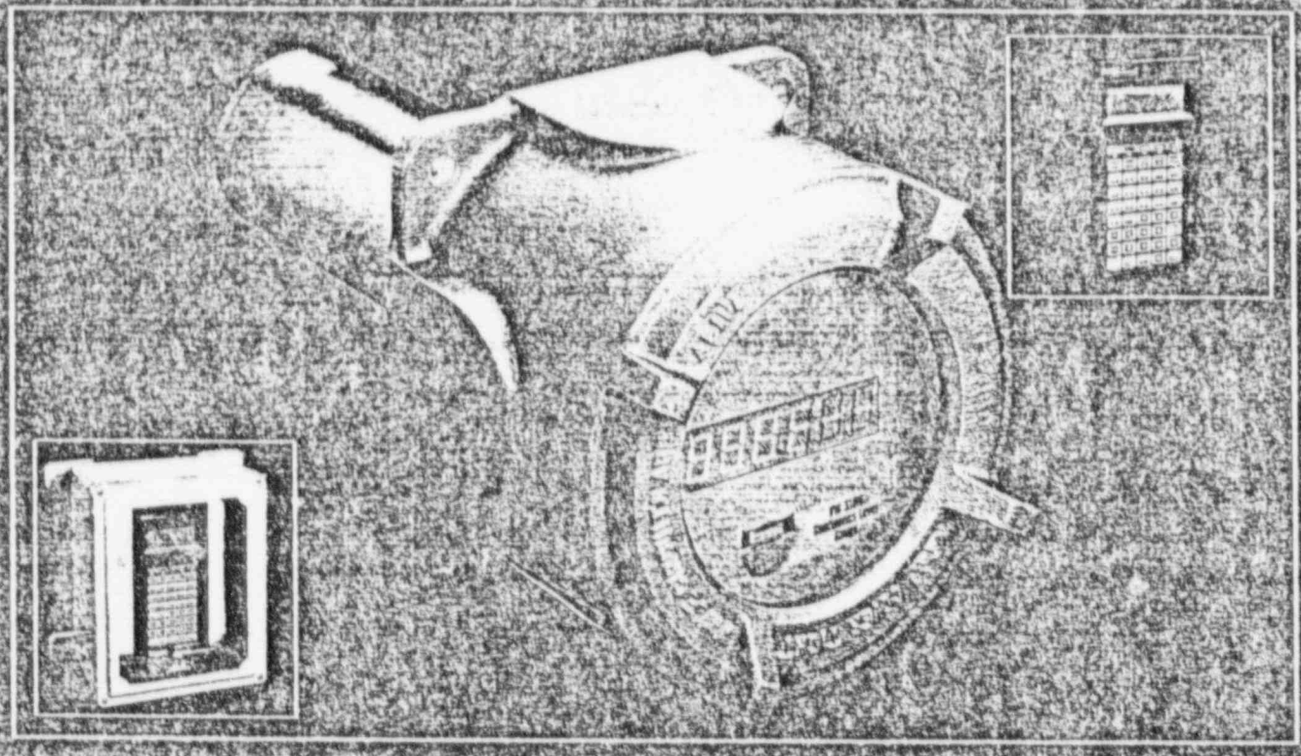
NW1100 Hand-Held Unit:
- 4 line, 20 character LCD back lit display
- Membrane keyboard data entry

For more information, contact

bsi INSTRUMENTS™
Hopewell Business Park
101 Corporation Drive
Aliquippa, PA 15001
Phone: 412 • 378 • 1900
Fax: 412 • 378 • 1926
http://www.bsi-1.com

NEW FROM BSI INSTRUMENTS

PHOTON CONTINUOUS LEVEL GAUGE NW3100



The Photon Continuous Level Gauge is a non-contacting on-line measurement which detects the presence or absence of process material and provides a continuous level indication for tanks, pipes, hoppers and chutes.

Features

- No license is required. Complies with NRC regulations 10 CFR part 30.18 Exempt Quantities.
- Non-contacting, non-invasive, non-intrusive on-line measurement.
- No moving parts, drift free calibration and operation.
- Can be applied to existing process vessels.
- Independent of pressure, viscosity, conductivity, temperature or color.

bsi INSTRUMENTS PHOTON

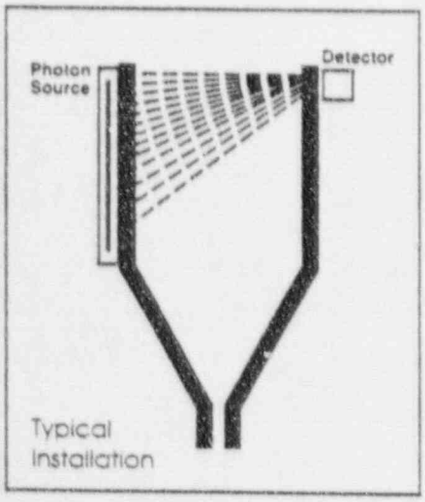
bsi INSTRUMENTS FORMERLY BERTHOLD SYSTEMS

Operating Principle

The **NW3100** Photon continuous level gauge operates using the measuring principle of scintillation technology. The system consists of a source holder with small photon sources that span the measuring range, a scintillation detector, mounting hardware, and microprocessor unit.

The energy field emitted by the small photon sources is attenuated when the process material is in the measuring path. With the measuring distance held constant, the attenuation of energy field is proportional to the change in level.

A precise and efficient scintillation detector, incorporating a solid state scintillation crystal, measures the energy field and supplies a drift free signal to the microprocessor unit which outputs a continuous level indication.



Typical Installation

Calibration

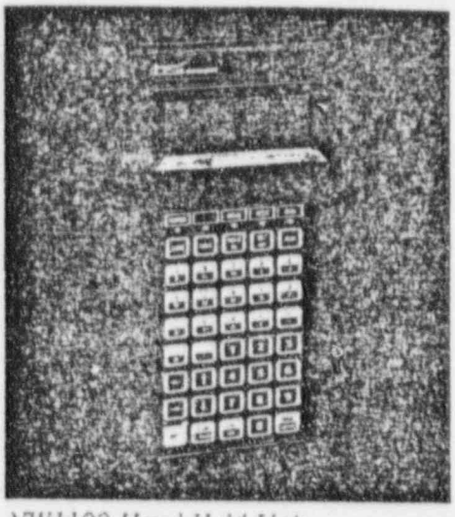
The versatile software program allows for a quick precise calibration and start-up of the system. Only one calibration point is needed for start-up, but several points can be added for a more precise measurement.

NW3100-1 Continuous Level Gauge with Integral Electronics

The **NW3100-1** level gauge has the scintillation detector and a microprocessor unit packaged into one compact unit which is clamped directly onto the existing process. Interface with the microprocessor is via the **NW1100** hand-held unit which plugs directly into the housing by an environmentally sealed connection. Therefore, one **NW1100** hand-held unit can be used to interface with multiple systems.

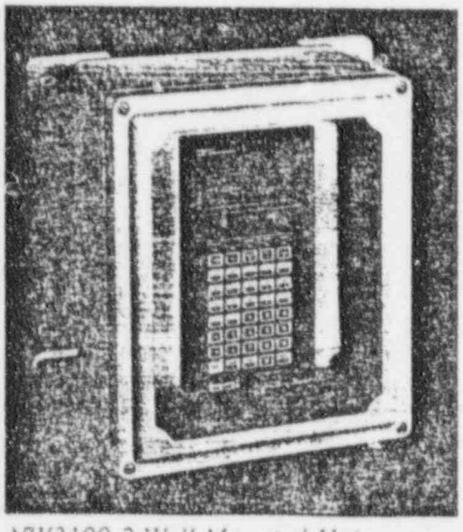
The single stainless steel / cast aluminum explosion proof housing containing the scintillation detector and microprocessor unit, is suitable for areas rated Nema 4 (4x epoxy coated optional), and FM, CSA & UL Class I Div. I.

The unit is powered by 120/240 VAC 50/60 Hz supply. Outputs consisting of: 5 digit display, two isolated analog 4-20mA outputs, and two RS 232/ RS 422 serial outputs are inluded.


NW1100 Hand Held Unit

NW3100-2 Continuous Level Gauge with Remote Electronics

For applications where the location hinders access to the detector, the **NW3100-2** remote mounted microprocessor unit is recommended. With this arrangement the **NW2001** scintillation detector is mounted on the process, and the **NW3100-2** containing the microprocessor unit is mounted remotely up to a maximum of 5,000 feet away.


NW3100-2 Wall Mounted Unit

The **NW2001** scintillation counter is suitable for areas rated Nema 4 (4x epoxy coated optional), and FM, CSA & UL Class I Div. I.

The **NW3100-2** microprocessor unit is wall mounted housing suitable for areas rated Nema 4x. It is connected to the **NW2001** scintillation detector via 3 conductor shielded cable. The microprocessor is accessed by a membrane keypad located on the front of the unit. The unit is powered by 120/240 VAC 50/60 Hz supply. Outputs consisting of: 5 digit display, two isolated analog 4-20mA outputs, and two RS 232 / RS 422 serial outputs are included.

Technical Data NW3100

Calibration software:
- Variable calibration mathematics
- Adjustable time constant

Display:
Digital, 4.5 digits

Data Storage:
EE-Prom

Decay Compensation:
Auto control via quartz clock

Count Rate Range:
0 - 99999 cps

Temperature Range:
-20°C to +50°C

Auxiliary Power:
AC: 60v AC to 240v AC, 50/60 Hz
DC: 18v DC to 36v DC

Power Consumption:
5vA to 20vA

Outputs:
Analog: Two (2) isolated analog outputs (0/4-20mA)
Serial: RS-232 /RS-422

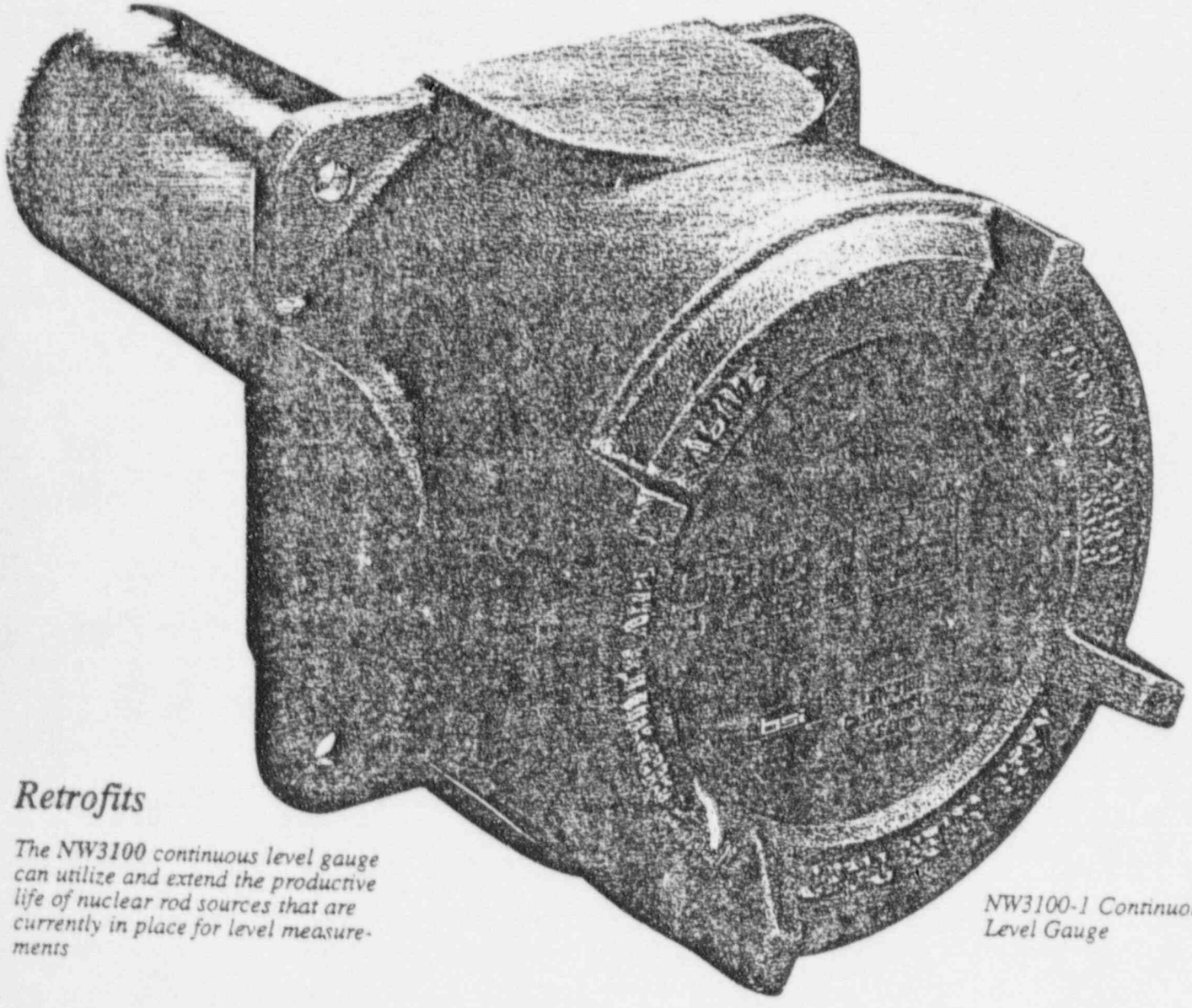
Inputs:
- Two (2) analog 0/4-20mA

NW1100 Hand-Held Unit:
- 4 line, 20 character LCD back lit display
- Membrane keyboard data entry

Application Information Required

The following information is required when engineering a system.

- Type and dimensions of vessels.
- Wall thickness and material; including insulation details.
- Density of process material.
- Gas density in the case of high pressure systems.
- Operating temperature range at the vessel.

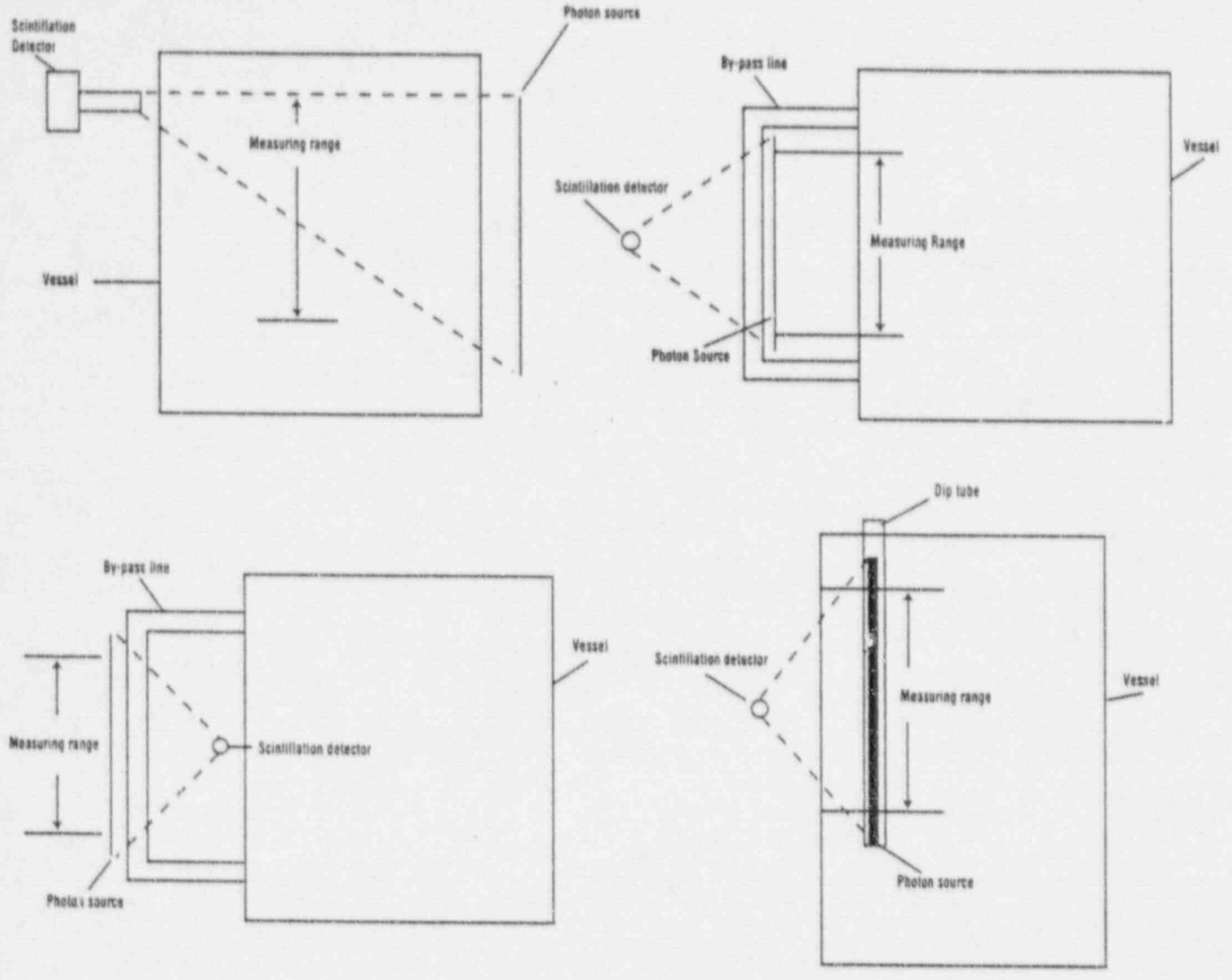


NW3100-1 Continuous Level Gauge

Retrofits

The NW3100 continuous level gauge can utilize and extend the productive life of nuclear rod sources that are currently in place for level measurements

Installation Configurations



For more information, contact

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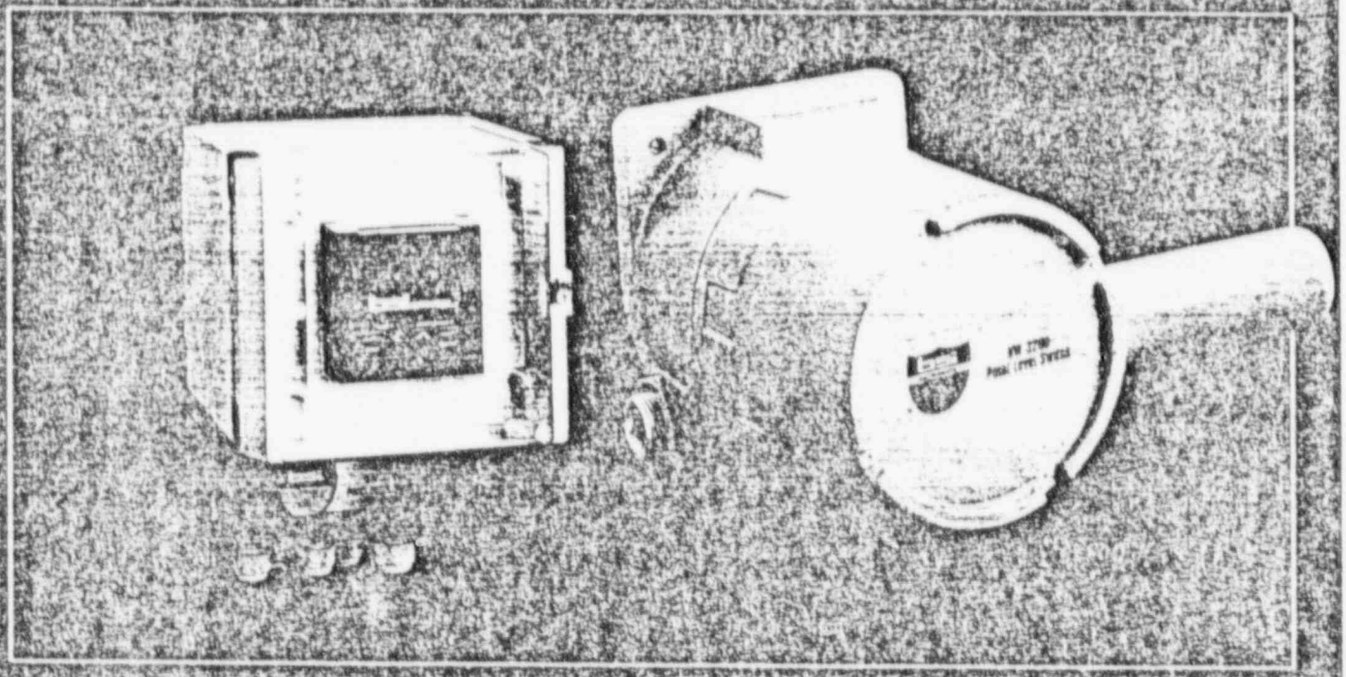
Fax: 412 • 378 • 1926
http://www.bsi-1.com

NEW FROM BSI INSTRUMENTS

PHOTON POINT LEVEL SWITCH NW3200



The photon level switch is a non-contacting measurement which detects the presence or absence of process material and provides a minimum or maximum level indication for tanks, pipes, hoppers, and chutes.

Features

- No license is required. Complies with NRC regulations 10CFR part 30.18 Exempt Quantities.
- Selectable setting of switch point and time constant.
- Non-contacting, non-invasive, non-intrusive on-line measurement.
- No moving parts, drift free operation.
- Can be applied to existing process vessels or pipes.
- Independent of pressure, viscosity, conductivity, temperature or color.

bsi INSTRUMENTS PHOTON

bsi INSTRUMENTS FORMERLY BERTHOLD SYSTEMS

Operating Principle

The **NW3200** Photon point level switch utilizes the measuring principle of scintillation technology. The energy field emitted by a small photon source is attenuated when the process material is in the measuring path. A precise and efficient scintillation detector, incorporating a solid state crystal, measures the energy field and supplies a drift free digital signal to the relay module.

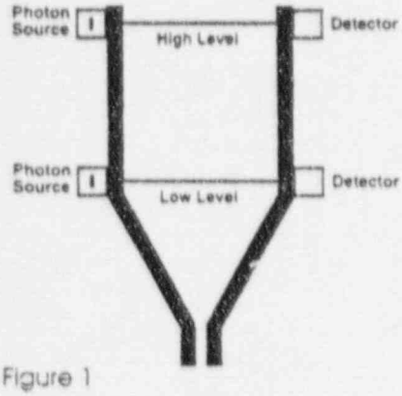


Figure 1

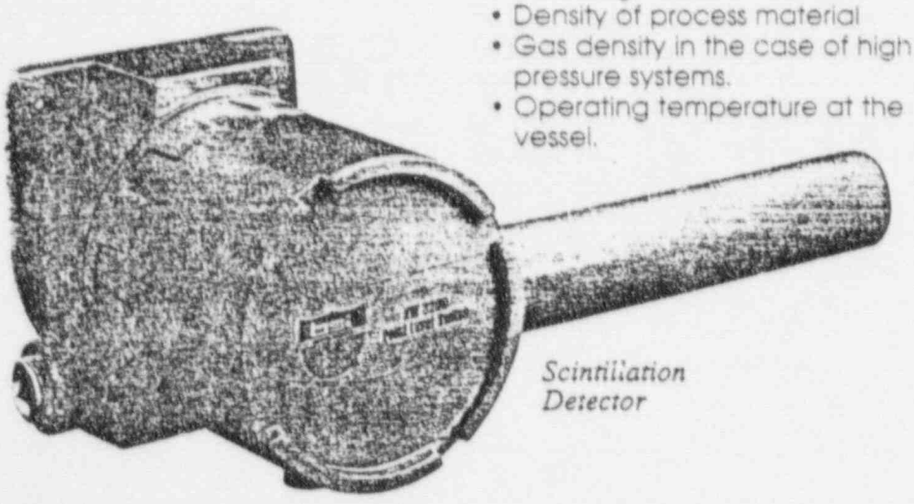
System Arrangement

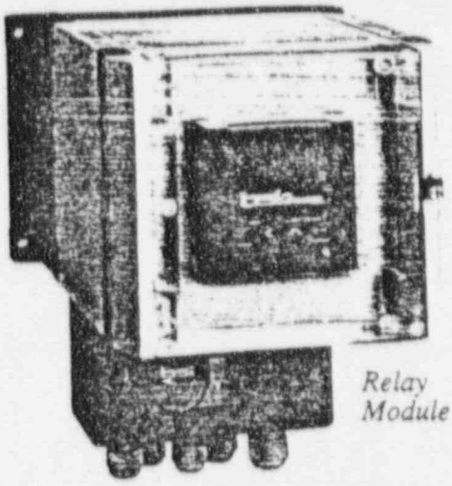
Figure 1 shows a typical layout of the level switch. The Photon sources and detector are located outside of the vessel at the desired switch level. The detector is located opposite of the Photon sources and is connected to the remote relay module via 4 conductor cables. The relay module may be mounted up to a maximum of 5,000 feet away from the detector. The relay module is powered by 12/240 VAC 50/60 Hz supply and outputs a DPST contact rated 10 amp @ 30 VDC or 250 VAC. The detector housing is Nema 4X rated and FM/CSA Class I, Div. I approved. The relay module may be panel mounted or provided in a Nema 4X wall mount enclosure.

Application Information Required

The following information is required when designing a system.

- Type and dimensions of vessel
- Wall thickness and material; including insulation details
- Density of process material
- Gas density in the case of high pressure systems.
- Operating temperature at the vessel.


Scintillation Detector


Relay Module

Retrofits

The **NW3200** point level detector can utilize and extend the productive life of nuclear sources that are currently in place for point level applications.

Technical Data NW 3200

Display: 8 Digit, 14 Segment

Time Constant: 0.5 to 8 s

Temperature: -4° to +120°F

Power supply: 120/240 VAC 50/60 Hz

Power consumption: 15 vA

Contact load of relays: 10 amp @ 30 VDC or 250 VAC, 1/4 hp

Memory: Non-Volatile EEPROM

Connection cable: 4 conductor, shielded, max. length 5,000 feet (used for NW 3200-2 remote module)

Electronic housing: Nema 4X

For more information, contact

bsi INSTRUMENTS ™

Hopewell Business Park
101 Corporation Drive
Aliquippa, PA 15001
Phone 412 • 378 • 1900
Fax: 412 • 378 • 1926
http://www.bsi-1.com