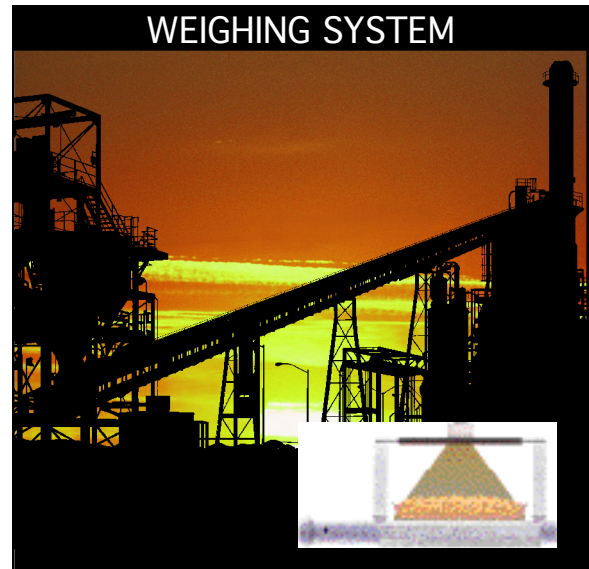
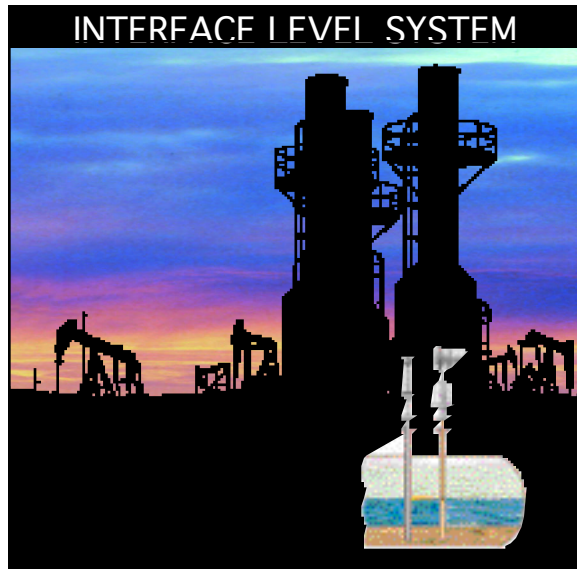
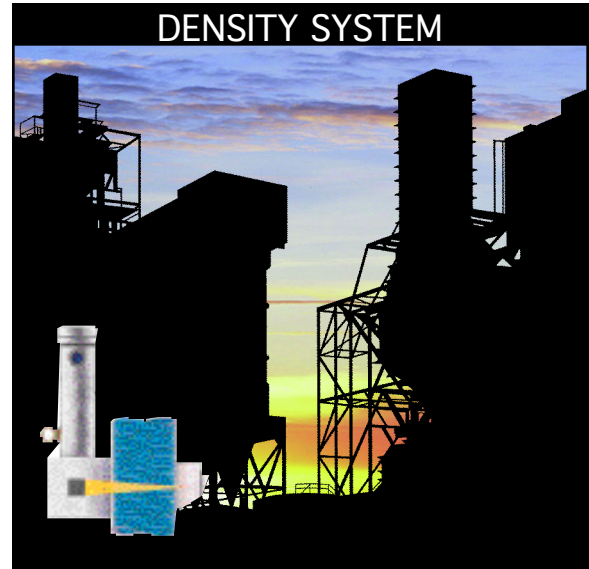




Measurements Division



RLL SERIES

Low Level Radiation Process Measurement
Level, Density, Weight

NON-CONTACT MEASUREMENTS USING

New, Proven RLL Series Gamma Radiation Devices

In the last fifty years, most radiation gages used for industrial applications requiring non-contact density, level or weighing measurements have always used relatively small quantities of radioactive material (10-100mCi). The Ronan RLL device, however, uses source activities that are generally 100 times less than what has been the norm. Lower source activities provide for gages that are obviously safer and easier to shield. But more important, because the source activity is low, they are exempted from a lot of the regulations, which apply to most radiation devices on the market.

The RLL devices are distributed by Ronan as General Licensed devices.

Possession and use of Generally Licensed Devices is regulated, or licensed by, the United States Nuclear Regulatory Commission (NRC). Per the statutes of Title 10 CFR Part 31.5. General Licensees do not have to obtain a specific license, nor are they subject to submit any forms or applications, but are still subject to conform to the general license regulations for that device. The information pertaining to the regulations are found on the labeling of the device and supplied in the Ronan manual shipped with the device.

Unlike other General Licensed devices, the Ronan "RLL Devices" do not require wipe testing, on-off shutter checks, and radiation surveys by the user. Furthermore, no RSO, radiation training or factory assistance is required to install and use these devices safely, as long as the

user instructions supplied by Ronan are properly followed. When the RLL devices are no longer in service, they should be returned to Ronan or a licensed waste broker for disposal.

To summarize, the Ronan RLL Series devices are the safest gamma ray devices on the market. Because they use only the very lowest activity sources of Cs-137 and/or Co-60, they are exempted from wipe testing and radiation surveys by the user. In addition, the user can install, relocate and use the devices without a licensed person present.

All RLL Series devices are registered and approved by the State of Kentucky, an Agreement State, for distribution by the Ronan Engineering Company.



RLL-1 Density Monitor

Measurements Division

RLL Series System Components:

The Ronan RLL Series Devices can be used for density, level and weighing applications. All components are mounted external to the process pipe, or vessel, allowing the system to be used in applications where high temperature, pressure, or corrosive and abrasive processes make conventional measuring devices unreliable or unsuitable for use.

Each system consists of an RLL-1 Source Device, Scintillation Detection Probe and Measurement Computer. The sources and detector are mounted in a fixed position around the process to be measured.

RLL-1 Series Source Devices:

The RLL Source Device contains a low source activity of Cs-137 or Co-60. Directional arrows on the device indicate the location of the beam port and its shipping shield, which is removed from the beam port when installed on the mounting brackets. Instructions for safe handling, mounting, storage and re-location of the RLL-1 Devices are provided for each application.

No radiation monitoring or surveys are required by the user. Wipe testing is also not required.



RLL-1 Source Device

Ultra Sensitive Scintillation Radiation Detectors:

The Ronan Scintillation Detector is a solid state crystal/photo tube assembly with integral high voltage and proprietary gain stabilized pulse circuitry. Point detectors are used for density applications and elongated, linear detectors are used for level and weighing applications.

The detectors are mounted in robust housings, which are suitable for use in the following classified areas: CL I Div I Gr. A, B, C, D; CL II Div I Gr. E, F and G.

Ronan detectors are designed to perform over wide operating temperature ranges and provide efficient detection of the radiation from the low-level sources. Radiation levels are typically in the mRem/h range.



Ronan Scintillation
Detector

Measurements Division

Measurement Computers:

The X96 or X99 Series of process computers are user-friendly and easy to configure. They bring flexibility and inherent stability of digital processing to process measurements. The diversity of the designs enables the customer to choose from a self-contained unit, a blind transmitter or any combination in between. All units offer features such as auto-cal, radiation discrimination and dynamic process filtering.

Both the X96 and X99 are modular in design, enabling the measurement computer to be tailored to the specific application. Push button programming permits the customer to choose menus and change parameters. Each computer consists of a CPU, input board, output board and power supply. Additional input and output boards are only added when required.

Measurement Computer Features:

- Microprocessor Based System
- Expandable I/O Capability
- Field or Control Room Mounting
- Menu Driven Push Button Programming
- Automatic Source Decay Compensation
- Dynamic Tracking of Process Fluctuations
- Adjustable Time Constant
- Isolated Transmitter Outputs
- 4 Line, 20 Character Per Line, LCD Back-Lit Display
- Modular Design
- Programmable Access Codes
- RS-485 Communication
- RS-232 Interface From X99 to Customer's Computer
- Customized Software for Special Applications



X99 Computer



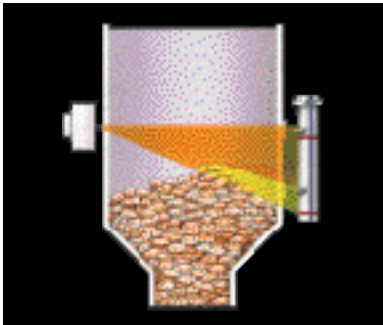
X96 Computer



Remote
Programmer

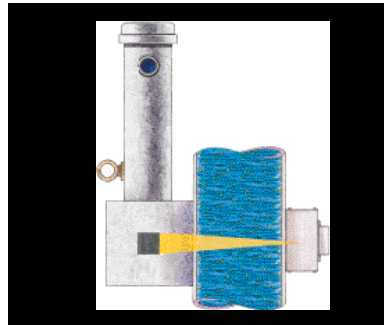
LEVEL SYSTEM

Application solutions for point, continuous, and interface level measurements. All system components are not wetted to the process, therefore, are capable of making measurements of processes with characteristics of extreme temperature, high pressure, corrosive, abrasion, and toxicity. The System consists of a low energy gamma ray emitting source and detector. It is mounted, depending on vessel size, either externally to the vessel or in sealed wells inside the vessel. As the process fills the vessel, gamma energy cannot penetrate the process so the signal is reduced to the detector. The signal is correlated to level, displayed, and outputted at the microprocessor. Measurement repeatability of +/- 1/2% of range.



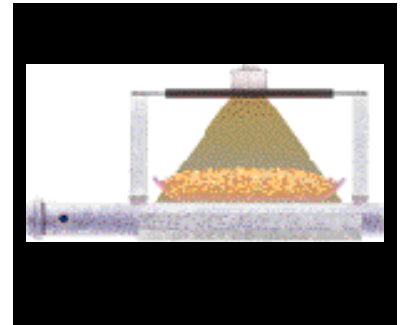
DENSITY SYSTEM

Application solutions for density and mass flow measurements. All system components are not wetted to the process. The system consists of a low energy gamma ray emitting source and detector normally mounted external to a pipe. The gamma rays are directed through the process to the detector, with the more dense process blocking more energy than lighter process densities. This field is measured by the detector and communicated to the microprocessor for display and output, of the density, in selectable units. Measurement repeatability of +/- 1/2% of span.



WEIGHING SYSTEM

Application solutions for weighing systems on belt and screw conveyors. All systems components mount around the conveyor, never contacting the process. This enables measurement of hot, sterile, abrasive, corrosive, wet, and toxic processes. The system consists of low energy gamma ray emitting source and detector mounted above and below the conveyor. Components can mount on horizontal or inclined conveyors often requiring no conveyor modifications. The measurement is obtained when mass increases between the source and detector reducing the energy at the detector. This signal is converted to Weight, Rate, and Velocity at our Microprocessor, displayed and outputted. Repeatability of +/- 1/2% of run time weight.



System Features:

Level:

- Multipoint Auto-Calibration
- Gas Density Compensation
- Background Radiation Discrimination
- Segmented Linearization

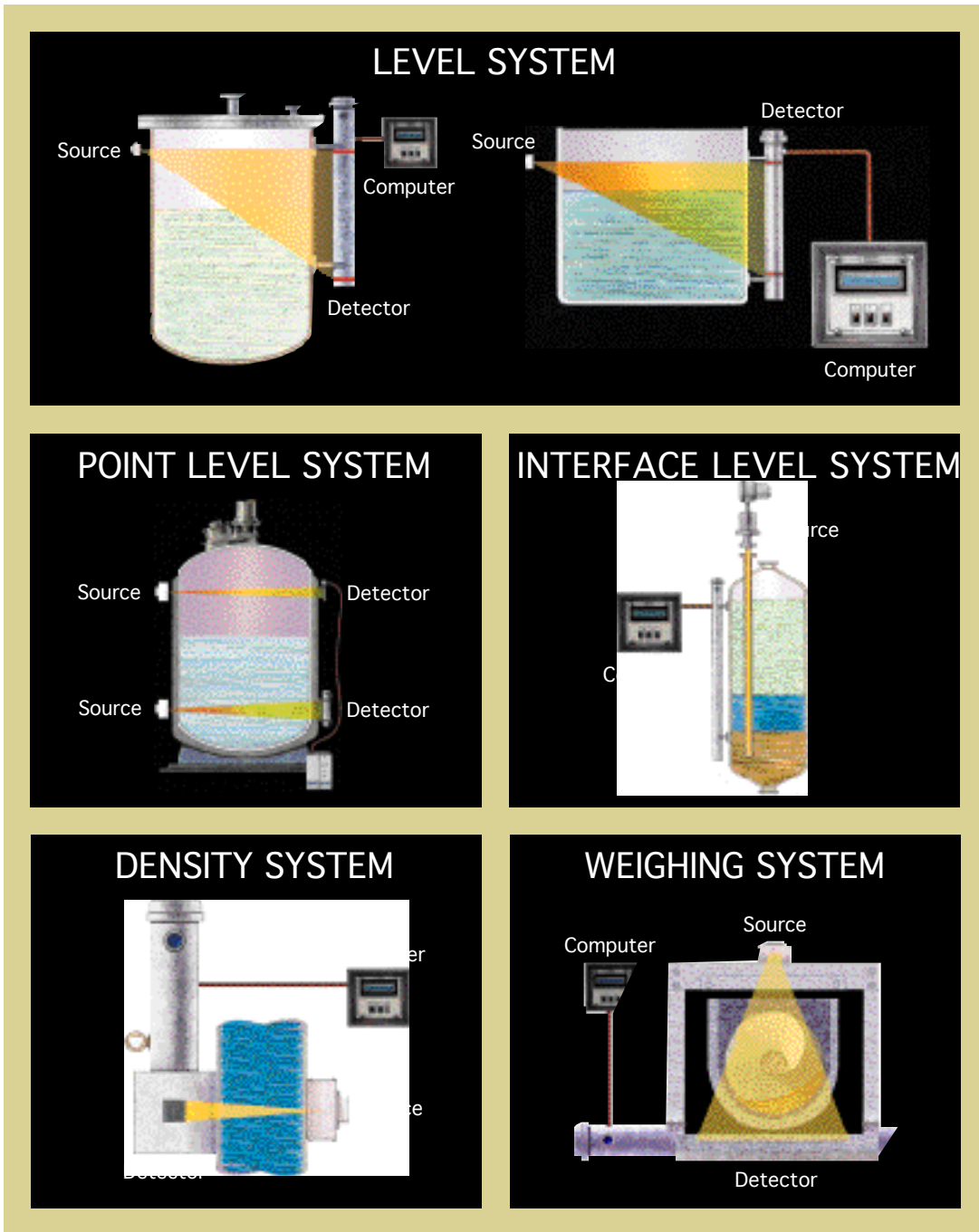
Density:

- Automatic Linearization, Logarithmic, or Segmented
- Automatic Restandardization
- Empty Pipe Protection
- Dynamic Time Filtering

Weight:

- Little to No Conveyor Modifications
- Measurements on Horizontal, Inclined, Forged Belts, Screw Conveyors, and Others
- Auto-Zero on Empty Conveyor

Applications



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