

BULK FLOW MEASUREMENT

Reliable and precise for
all types of conveyors



QUALITY
MADE IN
GERMANY

BERTHOLD

RADIOMETRIC BULK FLOW MEASUREMENT

Berthold's radiometric measuring systems monitor bulk flow and totalized mass in a non-contacting manner. They are used in many industries, such as mining, paper production, building materials and power as the measurement solution can be applied to all conveyor systems. Radiometry is often the only reliable method for determining flow rates. Our measuring systems are particularly suitable for monitoring loading processes, dosing and mixing processes, as well as production control. Capable of measuring the current conveying capacity, totalized mass (tonnage), and batch processes. The measurement can be carried out with any size of material, ranging from powders and granulates all the way to large lumps of rock and logs. The typical measuring range is between 100 kg/h and 1000 t/h.

After a simple calibration, our systems operate with high precision for many years, with a reproducibility of $\pm 1\%$. Fully non-contact – the measurement is uninfluenced by wind, vibrations, dust, dirt, fluctuating belt tension or fluctuating bulk densities. Retrofitting to existing conveyor systems is possible without any problems.

The measuring principle

In simple terms, a radiometric measurement system consists of a radioactive source that emits gamma radiation and a detector that measures this radiation. The gamma radiation is attenuated when it passes through the conveyor and the process material. The extent to which the radiation is attenuated depends on the area weight (density x loading height). In combination with the conveyor width and the conveyor speed, the exact bulk flow can be measured. The measurement is not influenced by temperature, colour or chemical properties of the material to be measured. Even under difficult operating and environmental conditions, this results in a high degree of reliability and freedom from maintenance.

Advantages of radiometry

- High reliability, even under extreme process conditions
- Simple installation, even on existing conveyor systems
- No contact with the product to be measured
- No wear and no maintenance
- Long-term stable measurement without recalibration

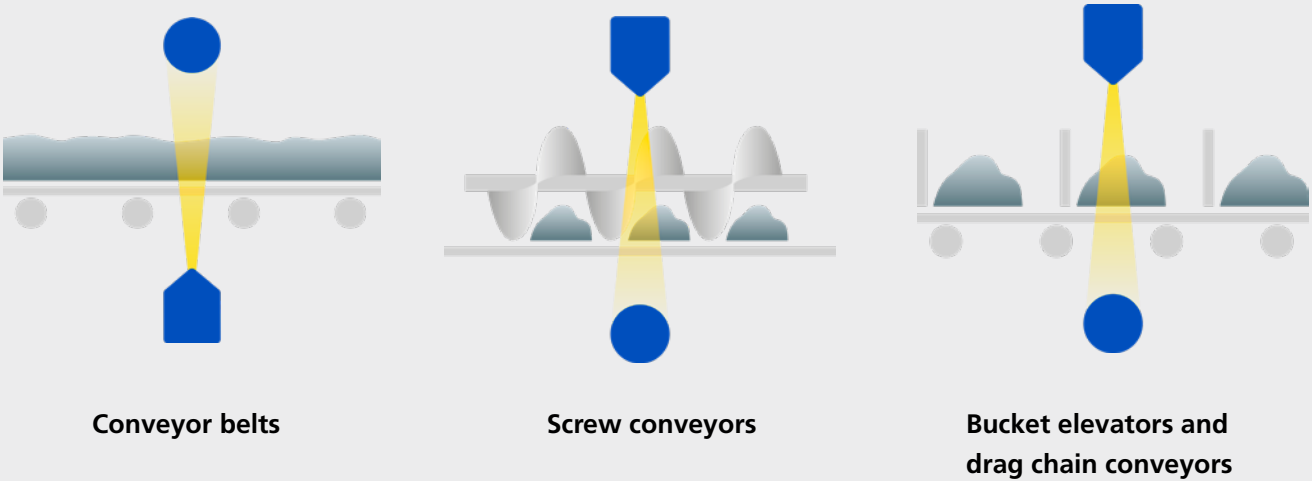
CUSTOMIZED ARRANGEMENTS ADAPTED TO YOUR MEASURING TASK

Customized solutions that are perfectly suited for the given application's requirements are achieved by using a variety of detectors, sources and mounting arrangements. Detector(s) and source(s) are installed around the conveyor system on a frame and can be arranged in various configurations. The configuration chosen depends on measurement geometry, accuracy requirements and economic factors. As radiometric bulk flow measurements are non-contact, they can be used on any type of conveyor. Measuring free-falling bulk and pneumatically conveyed materials is also possible, as well as bulk flow measurement on fully enclosed conveyors.

Applications

- | | |
|------------------------|-----------------------------------|
| ■ Recyclable paper | ■ Limestone |
| ■ Ash | ■ Clinker |
| ■ Wood chips / pellets | ■ Coal |
| ■ Biomass | ■ Granulates (e.g. urea, plastic) |
| ■ Fertilizer | ■ Chipboard |
| ■ Ore | ■ Salt |
| ■ Tree trunks | ■ Sand |

Bulk flow measurement on various conveyor systems, e.g:



THE SYSTEM

DuoSeries 2-wire system

Detector LB 4700

- Very robust: stainless steel housing (AISI 304)
- All current Ex-approvals
- Cost-efficient
- Communication with transmitter LB 472 via 2-wire technology (additional detectors communicate with transmitter via additional LB 47x extension modules)

Detector types for various requirements

DuoSeries detectors contain highly sensitive measurement technology to achieve optimal results. Even when facing challenging process conditions, the scintillators and photomultipliers deliver precise and stable measurement results.

UniSENS

Rod detector with a sensitive length of 0.5 to 2 m. Multiple UniSENS detectors can be cascaded to cover larger measuring ranges.

CrystalSENS

Point detector containing a high-quality sodium iodide scintillation crystal which provides a high sensitivity despite the comparably small volume.



Transmitter LB 472

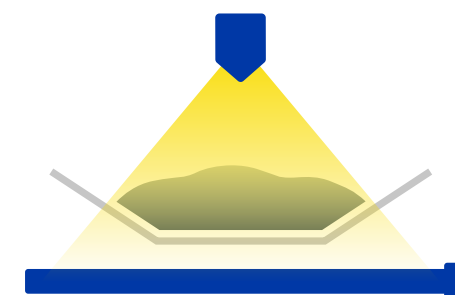
designed for bulk flow measurements

- Simple and intuitive: operation via 3.5" TFT display
- Reliable: incorporates important maintenance-oriented diagnostic functions and self-monitoring
- Ease of mounting and wiring: transmitter and extension modules are mounted in a standard 19" rack or in a wall-mounted housing



INDIVIDUAL AND FLEXIBLE:

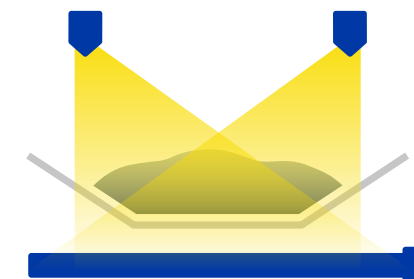
Point source / rod detector



Standard solution

- For low loads
- Cost efficient

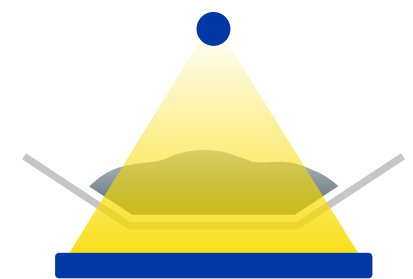
Point sources / rod detector



Highest sensitivity

- Ideal for very wide conveyor systems

Rod source / point detector



Best accuracy

- Ideal for high loading heights or very high bulk density
- Low source activity

SOURCES AND SHIELDS TAILORED TO YOUR SPECIFICATIONS

Berthold is the only radiometry provider in the world to have its own source production facility, thus offering maximum flexibility. The best measurement results and cost-optimized solutions can be achieved with a wide range of products: Point and rod sources, various isotopes (e.g., Co-60 or Cs-137), shielding with different collimation angles and materials (e.g., lead, tungsten, stainless steel), as well as special mounting frames for attachment.

Maximum safety is guaranteed using Safety Source Capsules (SSC) with double or triple encapsulation. The SSC are tested in accordance with ISO 2919, exceed the highest classification C66646, and are extremely robust and temperature-resistant up to 1200 °C. The unique rod source technology enables high responsiveness to changes in bulk flow in spite of challenging measuring geometry. Our project engineers strictly follow the ALARA principle (as low as reasonably achievable) to determine and calculate the required source activity for each measurement. Measurement systems are therefore designed to minimize dose rates in the surrounding area.

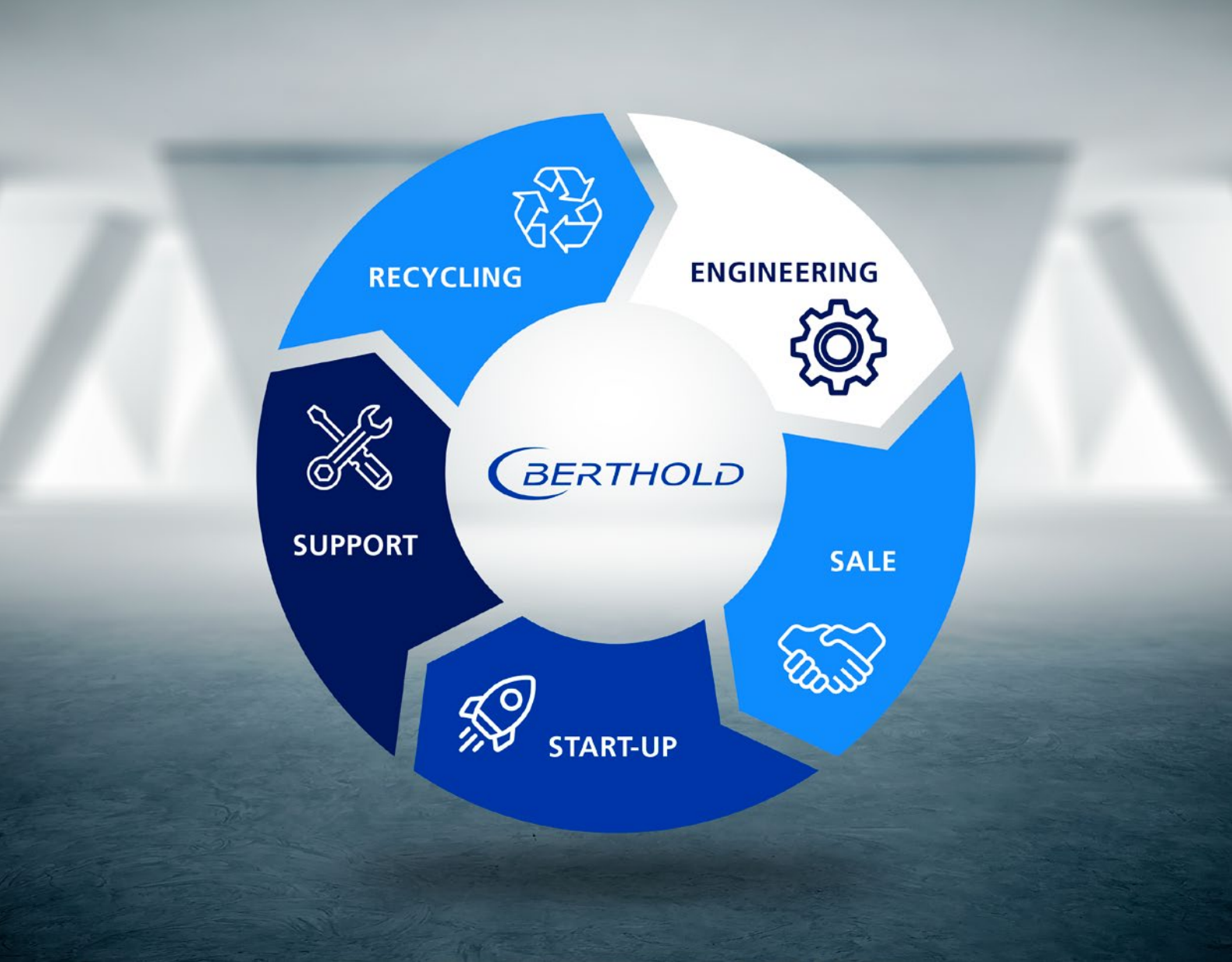
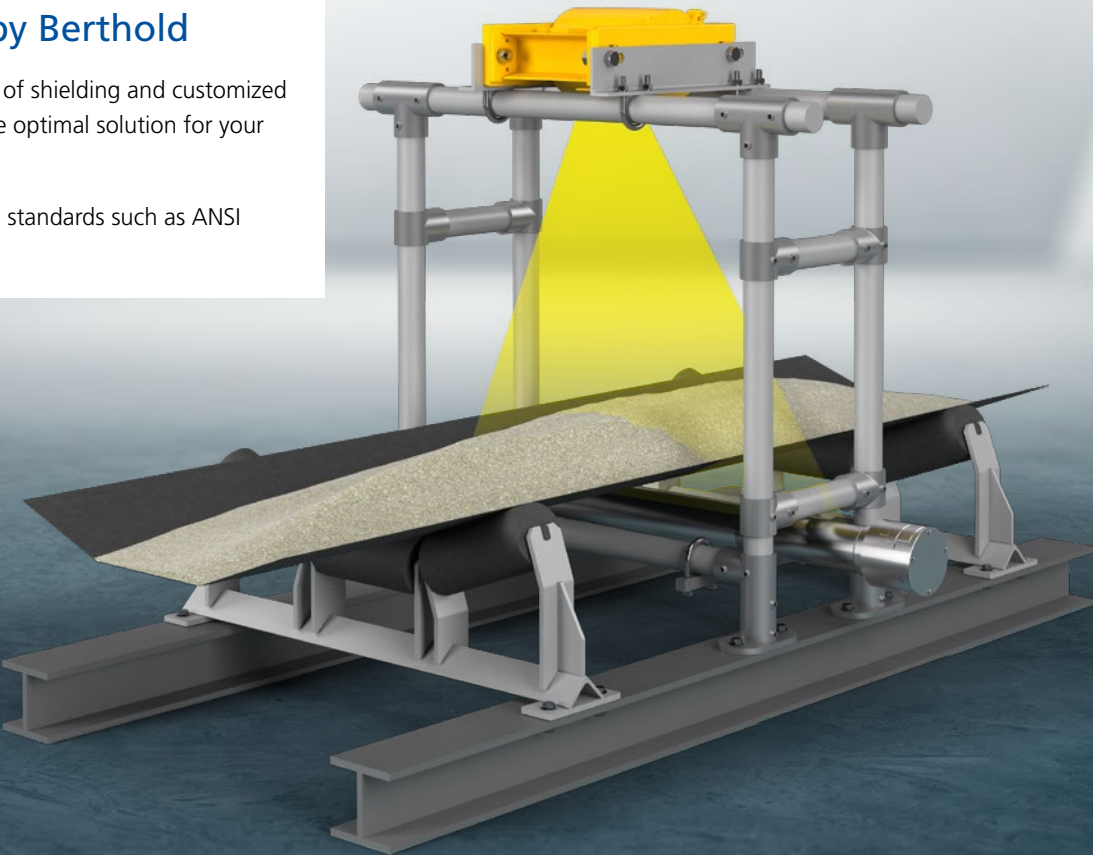
Typical radiation exposure in comparison:

| | |
|---------------------------------------|-------------|
| Full body CT scan | 10–20 mSv |
| Annual natural exposure | 2.1 mSv/a |
| Radiometric measurement from Berthold | 0.001 mSv/h |

Safety - Made by Berthold

With our unique selection of shielding and customized solutions, we offer you the optimal solution for your measuring task.

Built to meet international standards such as ANSI 43.8 and IEC 62598.



BERTHOLD – YOUR PARTNER SUPPORT OVER THE COMPLETE LIFE CYCLE

Berthold acts responsibly throughout the life cycle of a radiometric measurement. We take care of your radiometric measurement from design to final disposal. This includes shipping, import, commissioning and support. Berthold is committed to take back all delivered radiation sources - without further ado and at any time.

Our global network of experts is always available to provide you with fast and competent support and to find the ideal solution for you.



THE EXPERTS IN MEASUREMENT TECHNOLOGY

Berthold Technologies stands for excellent know-how, high quality and reliability. The customer is always the focus of our solution. We know our business!

Using our varied product portfolio, our enormous specialized knowledge and extensive experience, we develop suitable solutions together with our customers for new, individual measurement tasks in a wide variety of industries and applications. Berthold Technologies has specialised in radiometric process measurements for over 75 years. This is our core competence with state-of-the-art and cutting edge products and solutions covering a vast range of industries and applications.

We are here for you – worldwide!

The engineers and service technicians from Berthold Technologies are wherever you need them. Our global network assures you fast and above all competent and skilled assistance in case of need. No matter where you are, our highly qualified experts and specialists are ready and waiting and will be with you in no time at all with the ideal solution for even the most difficult measurement task.

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