# MEASUREMENT SOLUTIONS FOR THE PETROCHEMICAL INDUSTRY

Reliable measurements even under the most challenging process conditions

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# PETROCHEMICAL INDUSTRY

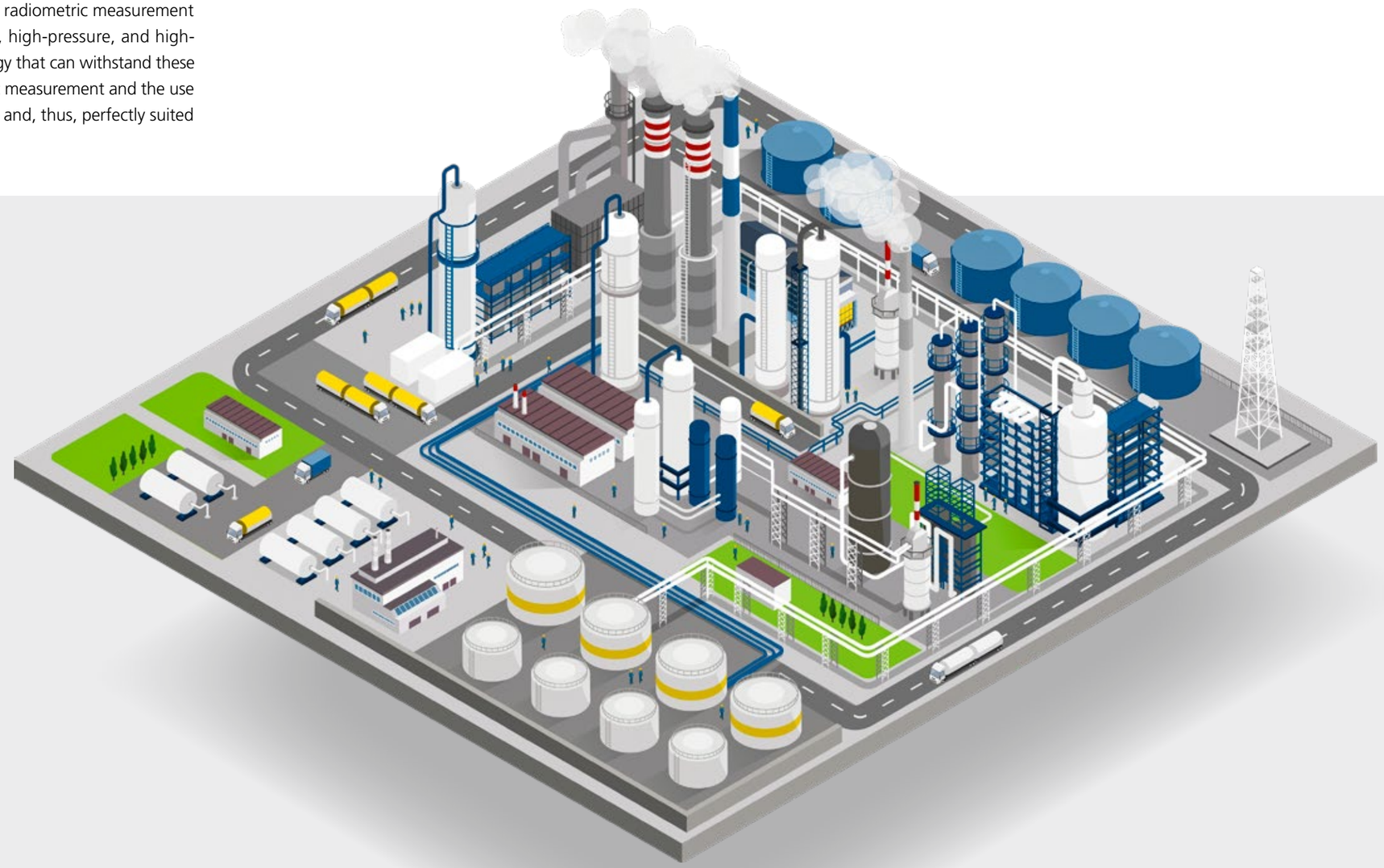
In order to produce a variety of plastics and polymers, petrochemistry deals with the synthesis of hydrocarbon compounds, derived from the refining of crude oil and/or processing of natural gas. During the production of polymers, extreme conditions can occur, such as high-pressure and high-temperature. Thus, conventional density, level and level-switch measurement solutions can often not be applied or cannot withstand these extreme conditions.

## The experts for measurement solutions

Berthold's radiometric measuring systems are used where conventional measurement techniques fail. Berthold is the worldwide leading supplier of radiometric measurement systems for the petrochemical industry. Corrosive, abrasive, high-pressure, and high-temperature environments require a non-contacting technology that can withstand these conditions. Due to the non-intrusive nature of the radiometric measurement and the use of rugged material, the system is normally wear and tear free and, thus, perfectly suited for the variety of applications in petrochemical plants.

## Advantages of radiometric technology

- Suitable for all extreme operating conditions
- High reliability and reproducibility due to patented aging and temperature compensation
- Non-intrusive, with the product to be measured and thus not exposed to the harsh process conditions
- Free of wear and tear
- Easy to install on existing pipes and vessels
- Lowest cost of ownership
- No need for frequent recalibration



## Major Applications

**Level and level switch measurements**

- Gas phase reactors
- Oxidation reactors
- Stirred reactors
- Purge bins/columns
- Low & high pressure separators
- Catalyst tanks
- Crystallizers
- Product and/or fluff chambers

**Density and density switch measurements**

- Chunk detection
- Loop reactors
- Multi-zone circulating reactors
- Slurry and/or catalyst lines
- Hoppers

**Level and density profile measurements**

- Crystallizers
- Fluidized bed reactors
- Gas phase reactors
- Separation vessels

# RADIOMETRIC MEASUREMENT
# FOR EXTREME PROCESS CONDITIONS

Berthold's measurement systems are suitable for highly critical processes and harsh process conditions. They provide reliable and highly reproducible key process information in the production of e. g. polyolefins (polyethylene (LDPE, LLDPE and HDPE) and polypropylene (PP)), PVC, PS, PET, other polymers and intermediates. As a technology partner, Berthold readily supports their customers with expertise and know-how in the development of new innovative processes, especially when custom-made solutions are required.

## Measurement technology

A radiometric measurement is a system, which consists of a source that emits gamma radiation and a detector that can detect this radiation. Gamma radiation is attenuated as it passes through the vessel or pipeline and its contents. The amount of attenuation depends on the filling level or the product density: the higher the fill level or the denser the product, the less radiation reaches the detector.

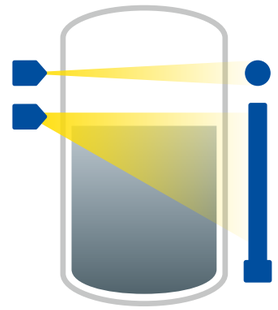
In this manner, the measurement is not influenced by pressure, temperature, viscosity, colour or chemical properties of the product to be measured. This results in a high level of reliability combined with freedom from wear and tear, even under harsh operating and environmental conditions.


## SIL certified option

The SENSseries LB 480 detectors are certified for use in SIL2 applications. SIL3 can be achieved with homogenous redundancy. The certificate covers all measurement applications, from high level or low level alarms to continuous level measurement and density measurement. Thus safe operation of critical processes is guaranteed.

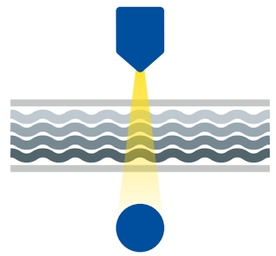
## Level and level switch measurement

Berthold's radiometric continuous level and level switch measurements monitor processes safely and reliably. Customized solutions for the unique process conditions in the petrochemical industry are achieved with a variety of detectors and sources in different arrangements and geometries, including the use of  dry-wells to insert sources into vessels. In critical applications, the use of level switches in conjunction with continuous level measurements provides increased process safety.



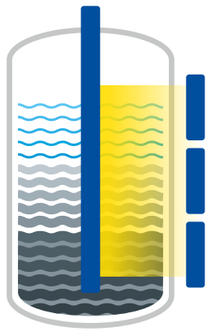
## Density and density switch measurement

Berthold's density measurement systems are used for continuous process control on pipelines and in vessels. Density, concentration or solids content are determined in a non-intrusive manner, without affecting the flow properties of the measured material. A density switch can be used to alert the operator when the process reaches a predefined density value in order to take corrective action or to perform a quality check on production.



## Level and density profile measurement

When the product density varies with increasing level height, for example, in gas phase reactors or fluidized bed reactors, a simple level measurement would not correctly represent process conditions.Here a combination of a density profile and level measurement provides better process visualisation and thus more improved process control.




# 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 is specialised in radiometric process measurements for 70 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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