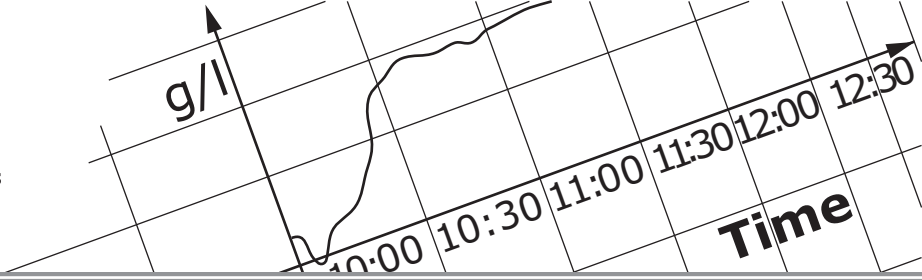
BERTHOLD TECHNOLOGIES

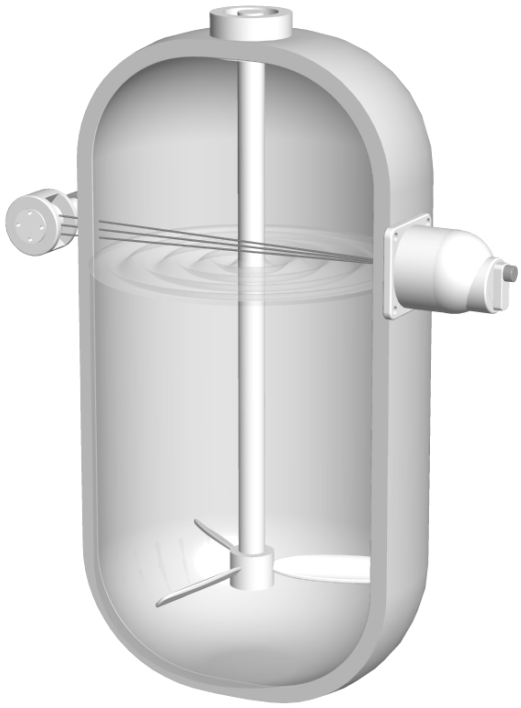


detect and identify

Process Control

sensseries LB 480

Limit Switch



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1

About this User's Manual

1.1 Typographical Conventions

The symbols and typefaces used in this User's Manual have the following meaning:

▶	prompts you to carry out an action.
1, 2, 3, …	identifies items in a graphic.
•	identifies enumerations.
italic typeface	highlights important information.
bold typeface	indicates commands or menu items.
bold italic	identifies user entries.

The term BERTHOLD TECHNOLOGIES is used in this User's Manual for the company BERTHOLD TECHNOLOGIES GmbH & Co. KG.

Please observe the warnings and safety instructions given in this User's Manual to rule out personal injury and property damage. They are identified by the following symbols: DANGER, WARNING, CAUTION or IMPORTANT.

⚠ DANGER

Indicates a direct threat of danger. The consequences will be death or most severe personal injuries.

⚠ WARNING

Indicates a possibly dangerous situation. If the situation is not avoided, death or serious bodily injury could result.

⚠ CAUTION

Indicates a possibly dangerous situation. If the situation is not avoided, minor or moderate bodily injury could occur.

NOTICE

Indicates a situation which could result in material damage if the instructions are not observed.

IMPORTANT

Paragraphs marked with this symbol provide important information on the product and on handling the product.

Tip

Includes application tips and other helpful information.

1.2 Meaning of Other Symbols Used in this Documentation

Warning: Do not step or stand under a suspended load.

Warning: Radiation

Warning: Ex-protection

Warning: Risk of crushing

Requirement: Switch off power

Requirement: Wear a hardhat

Requirement: Wear safety shoes

1.3 Meaning of Warning Signs on Detectors and Source Shieldings

Warning: Radiation
This warning is located on the source shielding.

Warning: Please read the User's Manual prior to installation
This warning is located on or in the terminal compartment of the detector.

1.4 Terms Used in this User's Manual

CrystalSENS	Standard point detector version in the SENSseries LB 480.
UniSENS	Standard rod detector version in the SENSseries LB 480.
SuperSENS	Highly sensitive detector with large volume plastic scintillator 150 x 150 mm for large pipe or tank diameter.
TowerSENS	Rod detector with an especially large potential measuring length. In contrast to multi-detector configurations, only one detector is required here.
NaI detector	NaI = sodium iodide crystal = scintillator Scintillation detectors are very sensitive probes for gamma radiation.
Isotope	Substance of the radiation source, e.g. Cobalt 60 (Co-60) or Cesium 137 (Cs-137).
Count rate	Value for the number of pulses standardized to one second.
Background	The count rate caused by the natural environmental radiation.
Cps	Unit for the count rate: *C*ounts *p*er *s*econd.
Factory setting	In the factory setting, all parameters are preset with default values. In most cases, this makes calibration of the detector a lot easier. Nevertheless, a calibration must *always* be carried out.
mSv	Milli-Sievert: The unit indicates the dose rate (dose equivalent).
mrem	Milli-rem (roentgen equivalent in man): traditional unit for the dose rate (100 mrem = 1 mSv).
MBq	Mega Becquerel: The unit indicates the activity of a source. Each Bq corresponds to one disintegration per second, i.e. 1 MBq equals one million disintegrations.
mCi	Milli-Curie: Traditional unit for the activity of a source (1 mCi = 37 MBq).
ATEX	Atmosphère explosive: is used as a generic term for the ATEX Product Directive 94/9/EC and the ATEX Workplace Directive 1999/92/EC. The directives contain provisions for equipment and components for use in explosion hazardous areas.
FM	Factory Mutual: an American industrial property insurance company that, among other things, issues certifications in the field of explosion protection.

CSA

Canadian Standard Association: sets norms and standards that are important for Canada (and America), among other things, the Directive for Explosion Protection and Low Voltage.

PMT

Photomultiplier or only multiplier: converts the flashes of light generated by the radiation in the detector into electrical signals.

HV

HV = High voltage

The multiplier is operated at high voltage, so that flashes of light can be converted into electrical pulses.

The high-voltage control allows for measurements that are stable to temperature and aging. Each multiplier has a slightly different sensitivity, and must therefore be operated at a different high voltage.

active / passive (Source / Sink)

Depending on the detector type, the current output can be configured as a current source or current sink. The following terms are used interchangeably:

- Current source: active / Source Mode
- Current sink: passive / Sink Mode

1.5 General Information

The most important safety measures are summarized in this volume. It supplements the appropriate provisions which the staff in charge is *obliged* to follow.

Please pay attention to:

– the national safety and accident prevention regulations

– the national assembly and installation directions (for example, EN 60079)

– the generally accepted engineering rules

– the information on transport, assembly, operation, service, maintenance in this User's Manual

– the safety instructions and information in this User's Manual and the enclosed technical drawings and wiring diagrams

– the parameters, limit values and the information on operating and ambient conditions on the type labels and in the data sheets

– the labels on the device

Depending on the field of application, the corresponding chapters have to be taken into account.

2

Proper Use

The measuring system SENSseries LB 480 is a detector which, depending on its design, can be used for different measurement tasks:

- Level measurement
- Limit monitoring
- Density measurement

The measurement system is designed for the continuous monitoring and detection of levels and limit levels of liquids and bulk solids in bins, or to determine the density of liquids in tanks and pipes. The proper use is defined in the project planning stage by BERTHOLD TECHNOLOGIES, the system delivered may be used only for this purpose.

If the detector is used in a way which is not provided for during the project planning stage and which is not described in the User's Manual, then the detector's protection is compromised and the guarantee claim becomes invalid.

BERTHOLD TECHNOLOGIES only accepts liability for / guarantees the correspondence of the systems of the SENSseries LB 480 to its published specifications. The detectors of the SENSseries may only be installed in an undamaged, dry and clean condition. Alterations and modifications to the system components are not allowed. Repairs to the detector may only be made if expressly authorized by the operating manual.

Conformity to standards

The standards and guidelines the SENSseries complies with are itemized in the CE conformity declaration.

Warning about misuse

The following use is inappropriate and has to be prevented:

- Use under other conditions and prerequisites than those specified by the manufacturer in his technical documents, data sheets, operating and assembly instructions and other specifications.
- The repair of detectors that are used in explosion hazardous areas by persons who were not authorized by BERTHOLD TECHNOLOGIES.
- Using the device in a damaged or corroded condition.
- Operation with open or inadequately closed cover.
- Operating with inadequately tightened adapters and cable fittings.
- Operation without paying attention to the manufacturer's safety precautions.
- Manipulating or bypassing existing safety installations.

Maintenance

The measuring system of the SENSseries LB 480 may only be installed, serviced and repaired by trained persons (see *chapter 3.2*, *page 1-20*).

Repair

Spare parts for detectors used in the Ex-area may be assembled only by the BERTHOLD TECHNOLOGIES service or by persons authorized by BERTHOLD TECHNOLOGIES. If this is not possible, you have to replace the entire detector or return it to the manufacturer for repair.

Parameter settings

Never change the parameter settings without a full knowledge of this User's Manual, as well as a full knowledge of the behavior of the connected controller and the possible influence on the operating process to be controlled!

Sources and shieldings

This measuring system uses radioactive sources. The radiation protection instructions in this User's Manual and the relevant statutory provisions are to be observed strictly, see also *chapter 8, "Visual Inspection"*, *page 1-119*.

3

Qualification of Personnel

At different parts in this User's Manual, reference is made to personnel with certain qualifications who can be entrusted with different tasks during the installation, operation and maintenance.

These three groups of people are:

1. Persons with a general knowledge, see *chapter 3.1*.
2. Experts, see *chapter 3.2*.
3. Authorized persons, see *chapter 3.3*.

The following chapters explain the meaning of these terms and the prerequisites for the particular group of people.

IMPORTANT
All work on and with the measurement systems SENSseries LB 480 must be performed by persons having at least a general knowledge; they must always be guided by an expert or an authorized person.

3.1 Persons with a General Knowledge

Persons with a general knowledge are e.g. technicians or welders who can undertake different tasks during the transportation, assembly and installation of the measuring systems SENSseries LB 480 under the guidance of an authorized person. This can also refer to construction site personnel. The persons in question must have experience in the transportation and assembly of heavy component parts.

Persons working with Ex devices must in addition have knowledge on how to work with these devices, for example, that the devices must not be subject to mechanical damage (blow, etc.).

IMPORTANT
Persons with a general knowledge must always be guided by a trained expert at the very least.
When dealing with radioactive substances, a Radiation Safety Officer must also be consulted.

3.2 Experts

Experts are persons who have sufficient knowledge in the required area due to their specialist training and who are familiar with the relevant national health and safety regulations, accident prevention regulations, guidelines and recognized technical rules. Expert personnel must be capable of safely assessing the results of their work and they must be familiar with the content of this User's Manual.

3.3 Authorized Persons

Authorized persons are those who are either designated for the corresponding task due to legal regulations or those who haven been authorized by BERTHOLD TECHNOLOGIES for particular tasks. When dealing with radioactive materials, a Radiation Safety Officer must also be consulted.