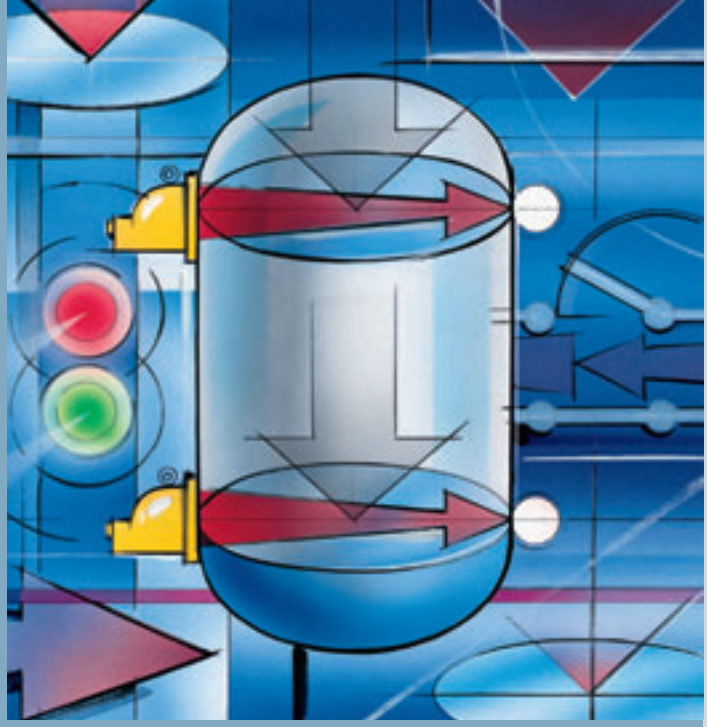


PROCESS CONTROL

Level Switch

Mini-Switch LB 471

BERTHOLD TECHNOLOGIES

Application

The BERTHOLD level switch is used in all branches of industry, including the food industry. This measurement system is applicable where one or more alarm levels of liquids or bulk solids have to be monitored. In fact, the BERTHOLD level switch is suitable for installation on all types of vessels or bunkers like storage tanks, hot-storage bunkers, vessels with agitators, high-pressure reactors, cyclones or feeder chutes.

Benefits

contactless

■

no abrasion

■

maintenance free

■

fail safe

■

long life time

■

no mechanical modifications to the vessel required

The Function

The operation of the measuring system is based on the application of the radiometric measuring principle, i.e. the physical law of absorption of gamma radiation as it passes through matter.
This measuring principle has been proved successful on the most difficult applications for many years now.

An arrangement of a level alarm switch is shown in picture 1. The shielded radiation source [1] is installed outside the vessel at the height at which the alarm must be indicated. The radiation detector [2], is mounted at the same height on the opposite side of the vessel. The detector signal is transmitted via a two-core standard cable to the evaluation unit [3].

Engineering data

Dimensions of the vessel at the measuring position

■

Thickness and density of each wall to be irradiated

■

Density of the product to be measured

■

Gas density under operating conditions in high pressure systems

■

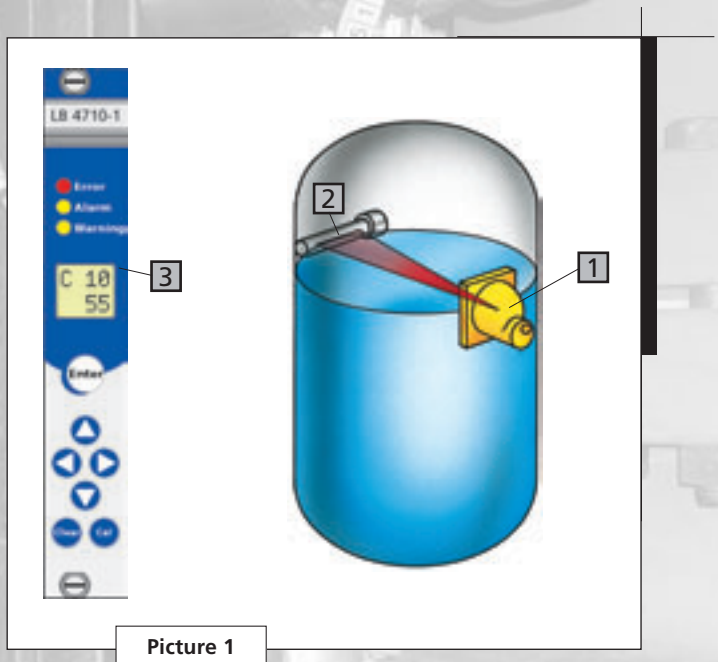
Max. ambient temperature outside the vessel

■

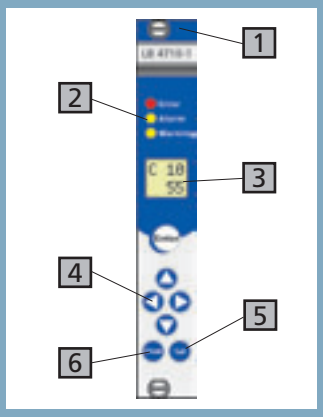
Dimensional drawings of agitators or other internals in the vessel

■

required Ex-proof class

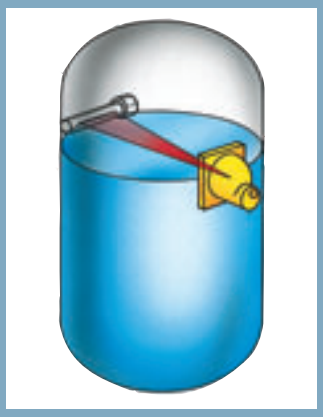


Picture 1



Evaluation Unit LB 471

1. space saving, width only 4TE (0.8")
2. 3 LED's for status control
3. two line Display, illuminated
4. easy data input using arrow keys
5. easy calibration with the pushbutton "Cal"
6. easily toggle to the measuring reading with the pushbutton "Clear"



GM-Detector

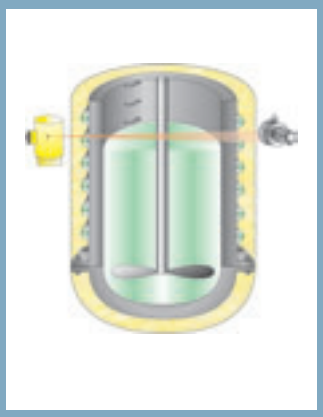
Especially for fluids with smooth surface, the GM Detector hits the spot. It is also applicable for bulk material. For easy applications, it is the most cost-efficient alternative solution.

For fast switching of 1,5 to 5s, or in order to reduce the source activity, the GM Detector is available with two counter tubes.

NaI-Detector

For bulk material which forms a cone it is essential to be able to adjust the threshold very accurately. The NaI-Detector provides precise monitoring of the bulk cone diameter.

Where high gas density is present in the vessel, the gamma radiation will be attenuated strongly even when the vessel is empty. Thus, the measuring difference between material and gas is smaller. The significantly more sensitive NaI-Detector guarantees a reliable switching function in this situation.



Super-Sens

An even higher sensitivity is achieved by using a scintillator 150/150mm in the Super- Sens. The integrated collimator ensures a good signal to noise ratio and reduces the background radiation interference.

The Super-Sens is used where the NaI Detector is pushed to its limits.

Software-Functionality

Standard-Mode

In order to reduce the time for commissioning, the menu "Standard-Mode" is available. It limits itself to the parameters for standard applications and offers the following functions:

- automatic calculation of full count rate and time constant
- calibration error indication by diagnostic routine
- permanent error diagnostic

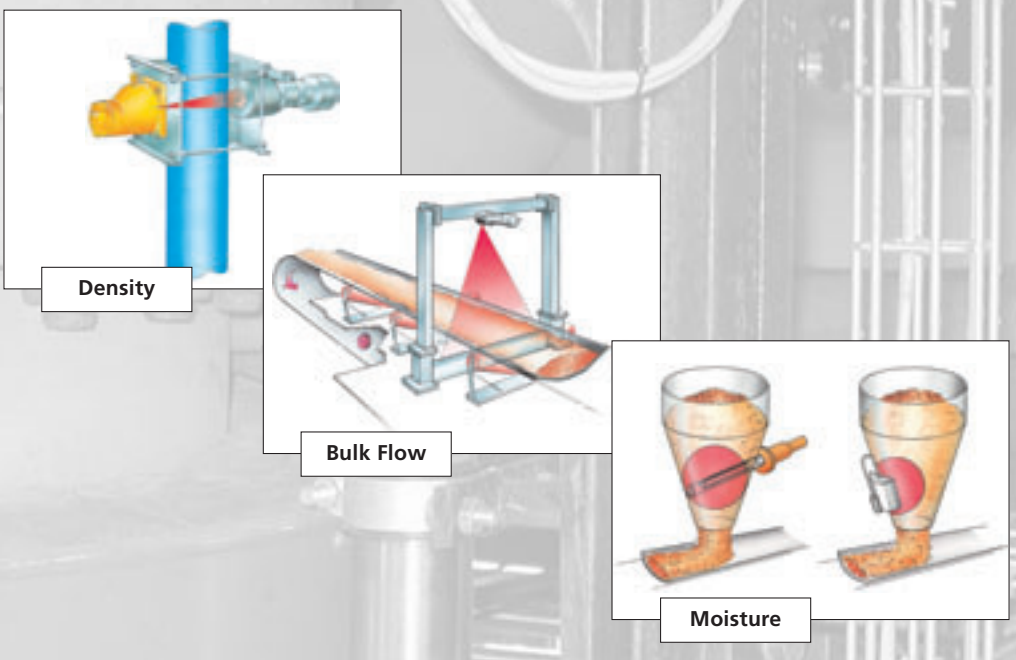
Professional-Mode

If you want to use additional functions, then you can switch to the "Professional Mode" any time and without interruption.

The "Professional Mode" offers:

- alternatively manual data entry for otherwise automatic calculated parameters
- automatic compensation of the empty count rate for gas pressured vessel
- password protection, alternatively automatic protection
- timely notice and indication of an required source exchange
- modification log
- error log
- relay multifunctional
- storage of a parameter set copy in the E≈-Prom
- ...

Further applications from BERTHOLD TECHNOLOGIES



Evaluation Unit LB 471

- compact design for a 19" rack (3HE; 4TE)
- permanent self-monitoring by „watch dog timer“
- intrinsically safe detector connection (option)

The diversity of applicable detectors results in the optimum solution for every application.

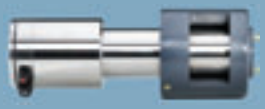
GM Detector

relative sensitivity: **1**

Apply a GM Detector with counter tube for vessels:

- with diameter between approx. 1 to 5m
- with typical wall thicknesses up to approx. 20mm

NaI Detector



relative sensitivity: **20**

Apply a NaI Detector instead of a GM Detector:

- to reduce the necessary source activity
- to keep the size of the shielding small
- for bulk cone measurements
- for high gas density in the vessel

Super-Sens

relative sensitivity: **65**

Apply the Super-Sens instead of a NaI Detector:

- for very thick walls
- for large vessels
- if there is a demand for smallest source activities
- to continue using existing sources

Technical Data LB 471

Evaluation Unit LB 4710

Types	LB 4710-0XX for GM Detector LB 4710-1XX for NaI Det. or Super-Sens
Arrangements	- In a 19" rack 3HE, 4TE, IP20 max. 19 modules for 24V max. 18 modules for 115/230V - In a Cassette 3HE, 7TE, IP 20 for any 19" rack - In a wall mounted housing, IP 66 max. 3 modules
Power supply	18-30V DC or 24V AC +10% -15% option: 115/230V AC transformer +10% / -15%, 47-65Hz
Power consumption	max. 4W per module
Operating temp.	-30 ... +60°C (243 ... 333 K)
Storage temp	-40 ... + 70°C (233 ... 343 K) keep dry!
Weight	0,3 kg per module
Detector connection	2 wire option: intrinsically safe [EEx ib] IIC
Digital In	for external empty
Digital Out	1 relay for min./max. (SPDT) 1 relay for failure signal 1 relay for warning signal alternative as min./max. usable
contact load	AC: max. 250V, max. 1A, max. 200VA DC: max. 300V, max. 1A, max. 60W ohm resistive load
Display	2 lines LCD illuminated each line 4 digits keyboard for data entry keyboard lockable via password
Time constant	0,5 - 999s
Decay compensation	automatic, for Co-60 and Cs-137
Timer	buffered with capacitor running period without power supply: approx. 1 Month
Certificate Ü	for overcharging in vessels which are used for storage water-endanger fluids according WHG

Sources and shielding according separate leaflet

BERTHOLD TECHNOLOGIES reserves the right to implement technical improvements and/or design changes without prior notice.

GM Detectors

Types	SZ5-GHS-3171-1/2: with Ex-proof GHS-3172-1/2: without Ex-proof
Explosion proof	ATEX: ⟨Ex⟩ II 2G EEx ib d IIC T6 ⟨Ex⟩ II 2G EEx de IIC T6 CSA: Class I Div. 2 Group B,C,D Class II Div. 2 Group E,F,G
Housing	stainless steel, IP 65
weight	4,5 kg for GHS 3172 6 kg for Sz5 GHS 3171
Operating temp.	-40 ... +50°C (233 ... 323 K) optional: water cooling jacket
Storage temp.	-40 ... +80°C (233 ... 353 K)
Cable gland	PG 16 for cable: Ø 5 ... 8mm
Cable	e.g. LiYY 2x1,0 shielded maximum 1000m, maximum 40 Ohm

NaI Detectors

Types	LB 4401 .. with Ex-proof LB 5401 .. without Ex-proof scintillation counter with NaI(Tl) crystal 50/50 temperature stability : +/- 0,1% automatic drift compensation
Explosion proof	ATEX: ⟨Ex⟩ II 2G EEx de IIC T6 ⟨Ex⟩ II 2G EEx ib d IIC T6 ⟨Ex⟩ II 2D IP 65 T 80° FM: Class I Div. 2 Group A,B,C,D Class II Div. 2 Group E,F,G
Housing	stainless steel, IP 65
Weight	6 kg without collimator 18kg with collimator
Operating temp.	-40 ... +60°C (233 ... 333 K) optional: water cooling jacket
Storage temp.	-40 ... +70°C (233 ... 343 K)
Cable gland	M 16 for cable: Ø 5 ... 10mm
Cable	e.g. LiYY 2x1,0 shielded maximum 1000m, maximum 40 Ohm

Super-Sens

Types	LB 4430 .. frontal irradiation LB 4431 .. radial irradiation scintillator 150/150 temperature stability +/- 0,5% automatic drift compensation
Explosion proof	ATEX: ⟨Ex⟩ II 2G EEx ib d IIC T6 ⟨Ex⟩ II 2G EEx de IIC T6 ⟨Ex⟩ II 2D IP 65 T 80° FM: Class I Div. 2 Group A,B,C,D Class II Div. 2 Group E,F,G
Housing	stainless steel, IP 65
Weight	54 kg up to 74 kg according design
Operating temp.	-40 ... +55°C (233 ... 333 K) optional: water cooling jacket
Storage temp.	-40 ... +70°C (233 ... 343 K)
Cable gland	M 16 for cable: Ø 5 ... 10mm
Cable	e.g. LiYY 2x1,0 shielded maximum 1000m, maximum 40 Ohm

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