

# Density Measuring UNIPROBE LB 491



# Determining density and concentration using the UNIPROBE LB 491

## Applications

Concentration measurements of acids, alkalis, saline solutions and suspensions.

Crystallisation and polymerisation monitoring.

Measurement of the solid matter content in slurry, in flue gas desulphurisation suspensions, in aluminium production and in mining.

Determination of the bulk density in washing powder and clinker.

The measuring system LB 491 is used for contactless, continuous measurement of **liquids, slurries or bulk materials** in pipes and vessels.

It can easily be installed on existing pipelines without down time. It works reliably and is unaffected by colour, temperature, pressure or chemical properties of the product to be measured

## **Measuring principle**

The gamma radiation emitted by a source is attenuated when it passes through matter. The extent to which it is attenuated depends on the measuring path and on the density of the product. Given a constant distance in the measuring path, radiation absorption is a function of the density of the material being measured.

## **Measuring arrangement**

The figure below shows a typical schematic arrangement of a complete measuring system. It consists of the source with shielding, a clamping device and the UNIPROBE LB 491.

The UNIPROBE LB 491 contains a scintillation counter with NaJ crystal and evaluation unit in one housing. The detector has an excellent sensitivity and long term stability.

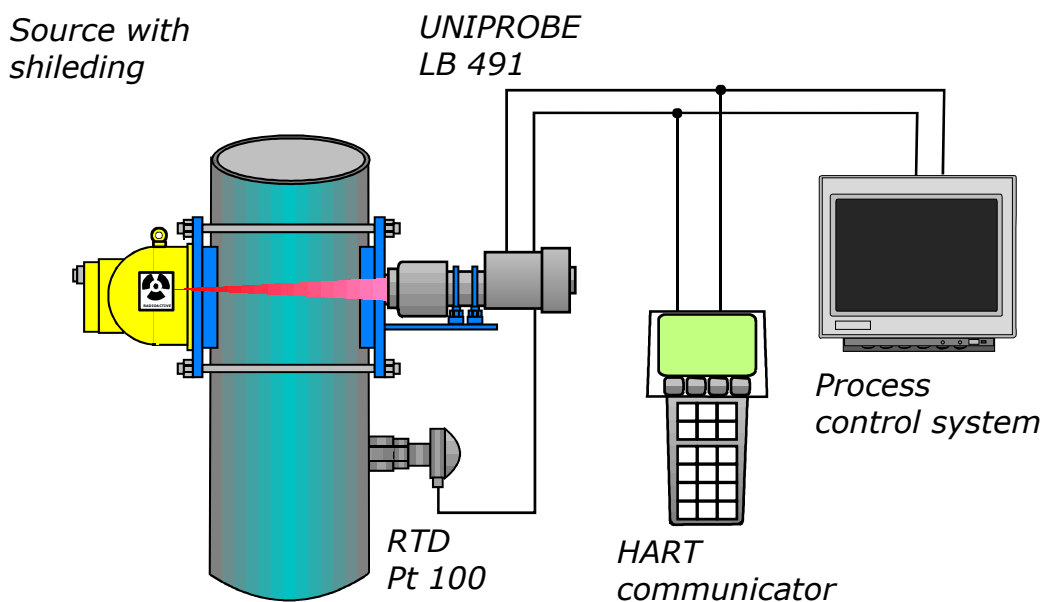
For temperature compensation a RTD Pt 100 can be connected.

This system is used for very precise measurements in the chemical industry and for application under very tough conditions on dredgers.

Installation can be carried out without pipeline modification or production downtime. Both the shielding and the UNIPROBE LB 491 can be mounted on the outside of the pipe using various clamping device (90°, 45°, 30° irradiation angle).

For very precise measurements a special s- or u- shaped measuring pipe is available.

The evaluation unit uses state-of-art micro-processor technique; parameters can be set via HART communicator. This communicator can be connected to any position in the current loop of the 4-20 mA output signal



# Technical Data LB 491

## Operating Data

Power supply	90 – 265V AC
Power consumption	approx. 15 VA
Operating Temperature	- 20 to + 50°C
Storage temperature	-40°C to 55°C
	-40 to 130°F

## Inputs

Digital input	1 for hold signal
---------------	-------------------

## Outputs

### Relay outputs

SPDT max.	5A at 250V AC or 30 V DC
1 for error signal	
3 for either	Max.. alarm
	Min.. alarm
	Detector temperature
	Interference radiation

### Current outputs

4-20 mA, isolated max.	500 Ω
	1 for density
Or	1 for mass flow

### Interfaces

HART  
RS 232

## Cable connections

Conduits	4 conduits NPT 3/4 inch
Terminal	cross-section max. 1.5 mm <sup>2</sup>

## Electronics

CPU	Data storage in flash memory
	Self monitoring by
	watchdog timer

## Detector

Scintillation counter with NaI crystal 2"  
Long term stability ± 0.1 %

## Protection types

Explosion protection Pressure-resistant capsule  
FM according to NEC 500  
Class 1 Division 1 Group A,B,C,D  
Class 2 Division 1 Group E,F,G  
Temp. class T6

IP protection class NEMA 4X  
Roughly corresponding to IP 66

Housing material Stainless steel 1.4301  
Roughly corresponding to 304

Source and shielding see separate brochure.

Design modification may occur without notice.



# Determining density and concentration using the UNIPROBE LB 491

## Applications

Concentration measurements of acids, alkalis, saline solutions and suspensions.

Crystallisation and polymerisation monitoring.

Measurement of the solid matter content in slurry, in flue gas desulphurisation suspensions, in aluminium production and in mining.

Determination of the bulk density in washing powder and clinker.

The measuring system LB 491 is used for contactless, continuous measurement of **liquids, slurries or bulk materials** in pipes and vessels.

It can easily be installed on existing pipelines without down time. It works reliably and is unaffected by colour, temperature, pressure or chemical properties of the product to be measured

## **Measuring principle**

The gamma radiation emitted by a source is attenuated when it passes through matter. The extent to which it is attenuated depends on the measuring path and on the density of the product. Given a constant distance in the measuring path, radiation absorption is a function of the density of the material being measured.

## **Measuring arrangement**

The figure below shows a typical schematic arrangement of a complete measuring system. It consists of the source with shielding, a clamping device and the UNIPROBE LB 491.

The UNIPROBE LB 491 contains a scintillation counter with NaJ crystal and evaluation unit in one housing. The detector has an excellent sensitivity and long term stability.

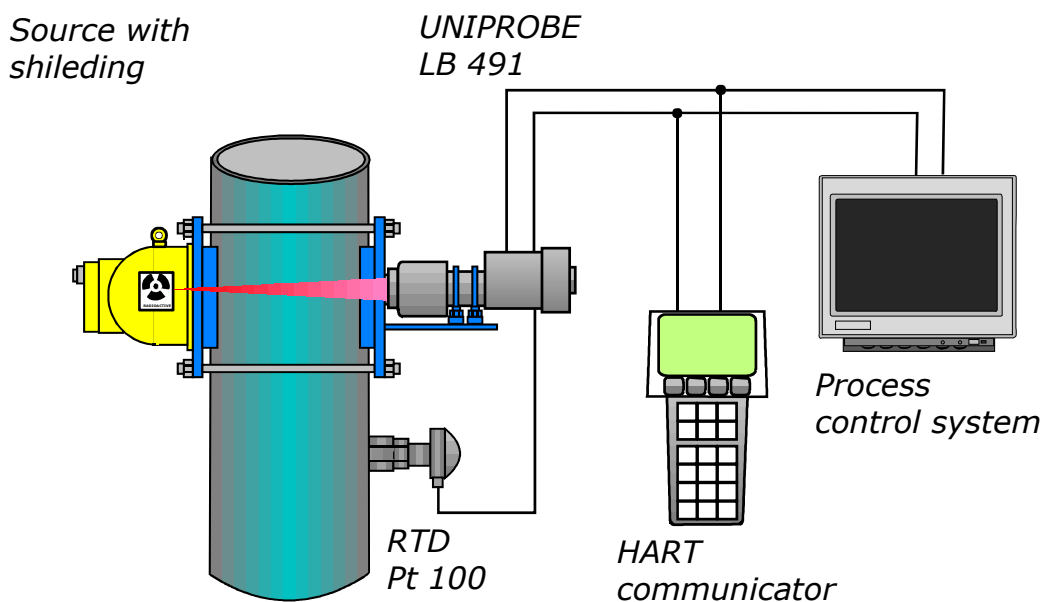
For temperature compensation a RTD Pt 100 can be connected.

This system is used for very precise measurements in the chemical industry and for application under very tough conditions on dredgers.

Installation can be carried out without pipeline modification or production downtime. Both the shielding and the UNIPROBE LB 491 can be mounted on the outside of the pipe using various clamping device (90°, 45°, 30° irradiation angle).

For very precise measurements a special s- or u- shaped measuring pipe is available.

The evaluation unit uses state-of-art micro-processor technique; parameters can be set via HART communicator. This communicator can be connected to any position in the current loop of the 4-20 mA output signal



# Technical Data LB 491

## Operating Data

Power supply	90 – 265V AC
Power consumption	approx. 15 VA
Operating Temperature	- 20 to + 50°C
Storage temperature	-40°C to 55°C -40 to 130°F

## Inputs

Temperature inputs:  
RTD Pt 100 and 4-20 mA

Digital input            1 for hold signal

## Outputs

Relay outputs SPDT max. 5A at 250V AC or 30 V DC

1 for error signal

3 for either    Max.. alarm

Min.. alarm

Hold signal

Detector temperature

Interference radiation

Current outputs

4-20 mA, isolated max. 500 Ω

1 for density

Or                            1 for mass flow

Interfaces                HART  
                                 RS 232

## Cable connections

Conduits            4 conduits NPT 3/4 inch  
Terminal            cross-section max. 1.5 mm<sup>2</sup>

## Electronics

CPU    Data storage in flash memory  
         Self monitoring by  
         watchdog timer

## Detector

Scintillation counter with NaI crystal 2"  
Long term stability ± 0.1 %

## Protection types

Explosion protection Pressure-resistant capsule

FM according to NEC 500

Class 1 Division 1 Group A,B,C,D

Class 2 Division 1 Group E,F,G

Temp. class T6

IP protection class    NEMA 4X

Roughly corresponding to IP 66

Housing material      Stainless steel 1.4301

Roughly corresponding to 304

Source and shielding see separate brochure.

Design modification may occur without notice.



BERTHOLD TECHNOLOGIES GmbH & Co. KG .P.O. Box 100163 .D-75323 Bad Wildbad, Germany

Phone (+49) 7081/177-0 .Fax (+49) 7081/177-100 .E-Mail: berthold@BertholdTech.com .www.BertholdTech.com