

Interface Measurements

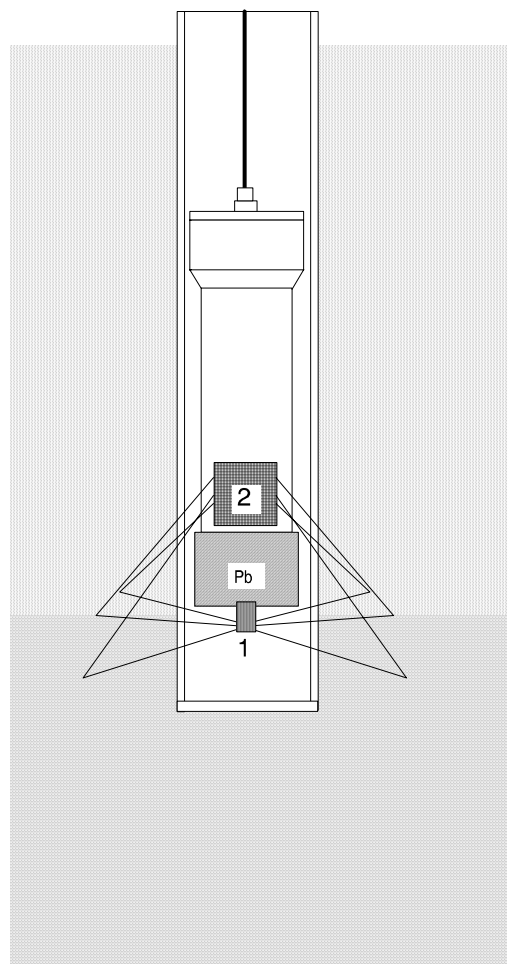
Methods:

The location of the position of the interface between two liquids or between a liquid and a solid sediment is often very important data for monitoring or control of a process. Radiometric measurements are especially suited for this since they are non-contact and do not interfere with or modify the interfaces in the vessel.

There are two measuring methods available:

Backscattering method:

In large vessels, where the interface position can vary widely, we recommend a measurement procedure based on a reciprocating source-detector combination (probe):



Measurement Principle: Backscatter

The gamma ray emissions from a Cs-137 source (1) are reflected by the product being measured. A change in the density of the product, also changes the intensity of the reflected radiation. The reflected radiation is measured (2) using a detector (Scintillation Counter) which provides impulses whose rates depend on the intensity. This information is processed by an evaluation unit into useable output signals such as 4-20 mA.

In order to measure over the large heights in large vessels, the probe is repeatedly moved up and down over the total measurement region using an electric motor. We call this a YoYo configuration. In this mode, the output represents density and therefore, density at each position of the probe.

Further, the probe can be halted at any position in the measuring height for specific measurements.

The motor and gear mechanism is mounted on top of the vessel in a housing which also hold a shielding. The probe may be withdrawn into the shielding for tank maintenance and transportation.

For the backscattering methods the evaluation unit LB 386-1C must be used.

Installation:

A stainless steel dip tube of 95-105 mm inside diameter, must be installed in the vessel to allow the probe to move up and down. The wall thickness should not exceed 6 mm. This tube requires a flange, to mate with the shielding to be welded to the dip tube. This flange is DN 100, PN 16 (Supplied by Berthold Technologies).

Transmission method

If there is a possibility to install

two dip pipes in a horizontal vessel

or

one dip pipe inside of a vertical vessel and the other one outside of the vessel

a system with transmission method can be used.

With this system source will be moved in one pipe, the detector in the other one.

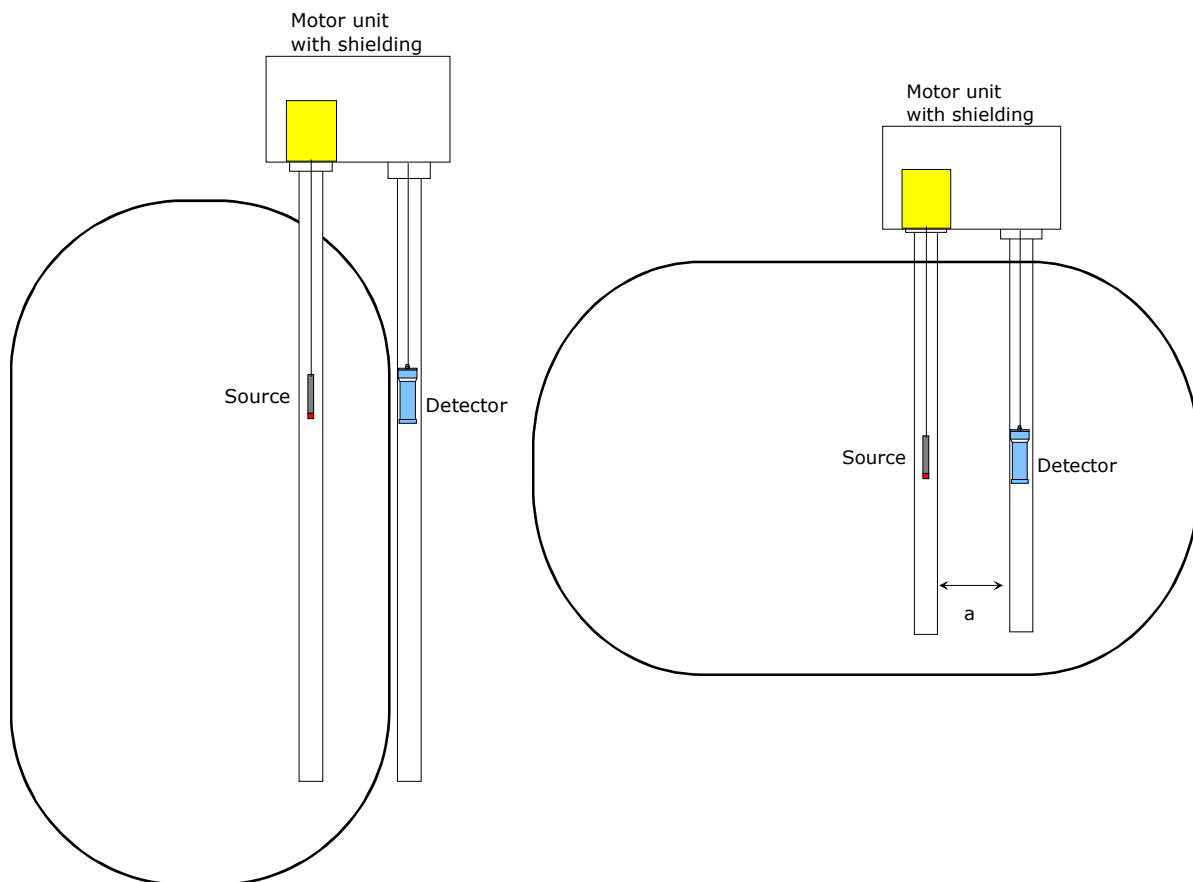
Requirements for the dip pipes:

Dip pipe for source: Inside diameter > 50 mm

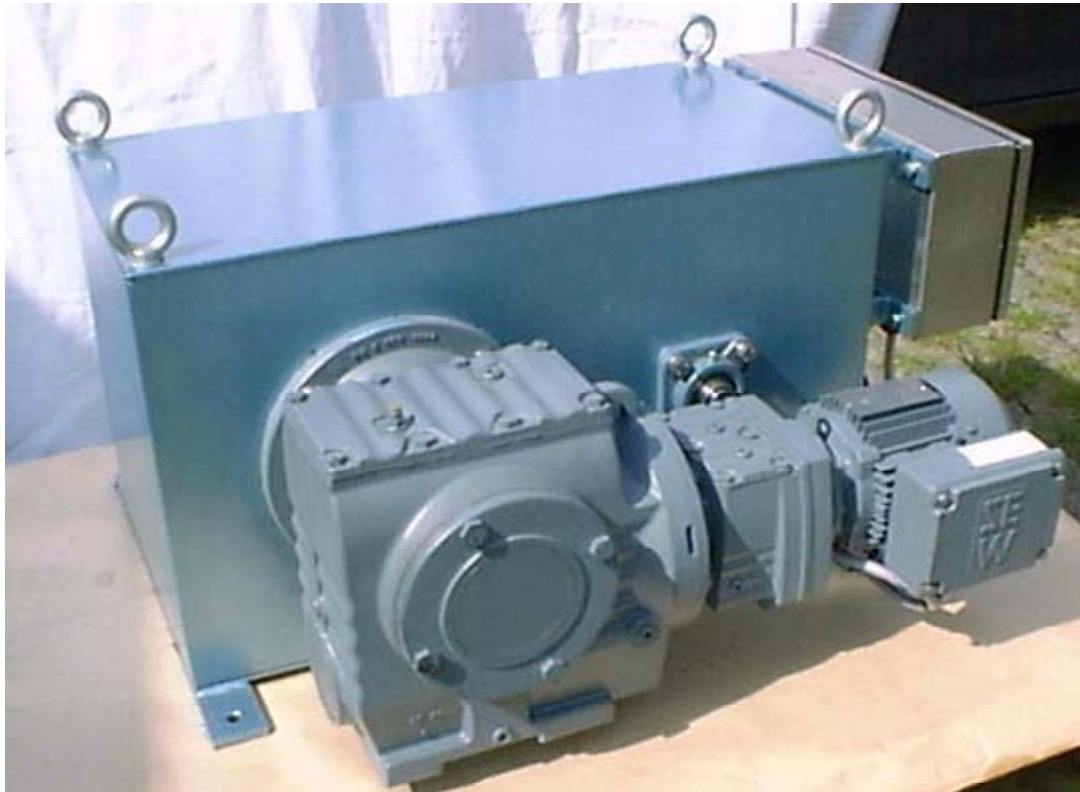
Dip pipe for detector: Inside diameter > 95 mm for probes connected to LB 386-1C, resp. > 115 mm for probes connected to LB 444

Wall thickness: Acc. to customers request

Dip pipes have to be provided by the customer.



Interface measurement installed in a vertical and in a horizontal vessel.



Motor Housing

The motor control and evaluation units are installed in a 19 inch rack which should be installed outside of any explosion proof area.



Cabinet with Evaluation Unit and Motor Controls

Technical Data:**1: Detector Evaluation Unit: See LB 386-1C Brochure****2. Detector: Sz5- DR 1 50/50**

Scintillation Counter with 50/50 (2"*2") NaI(Tl) Crystal
Stainless Steel Housing
Protection: Ex de II CT6 and CSA
Weight: aprox. 18kg.

2.1. Radioactive Source: Cs-137

Activity: 37 to 370 MBq, (1mCi-10mCi) depending on the shielding effect of the dip tube and the material measured

3. Motor Housing :

Stainless Steel Structure and Covers

Weight: aprox. 350 kg.

Detector Rate of Movement: 300 mm/min.

3.1 Motor Power Requirements:

3 Phase, 380 V, 0.9 kVA

Protection: IP 55

4. Outputs/Controls

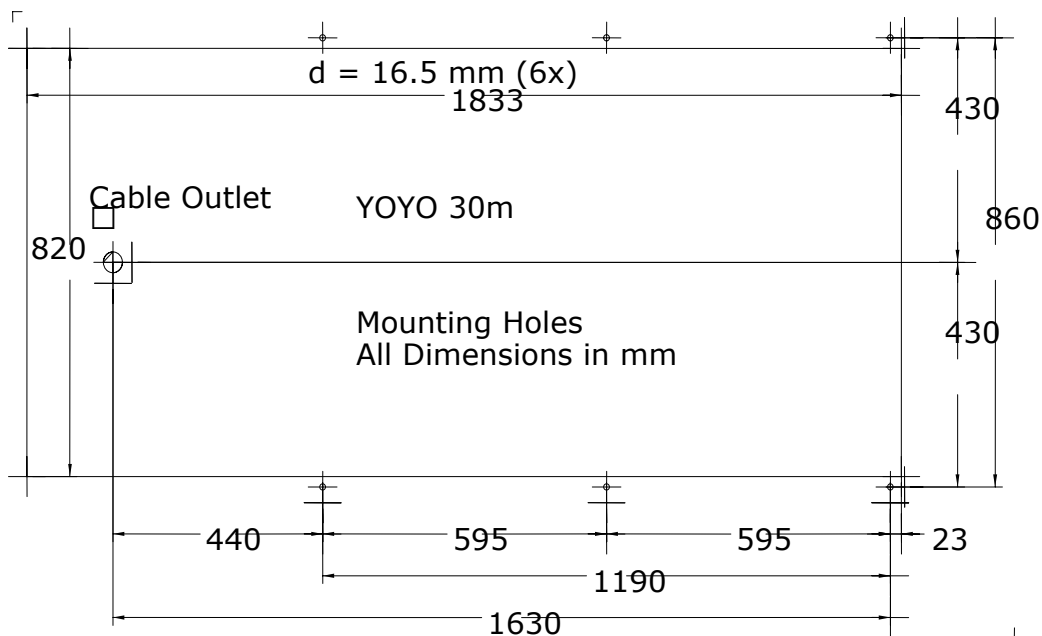
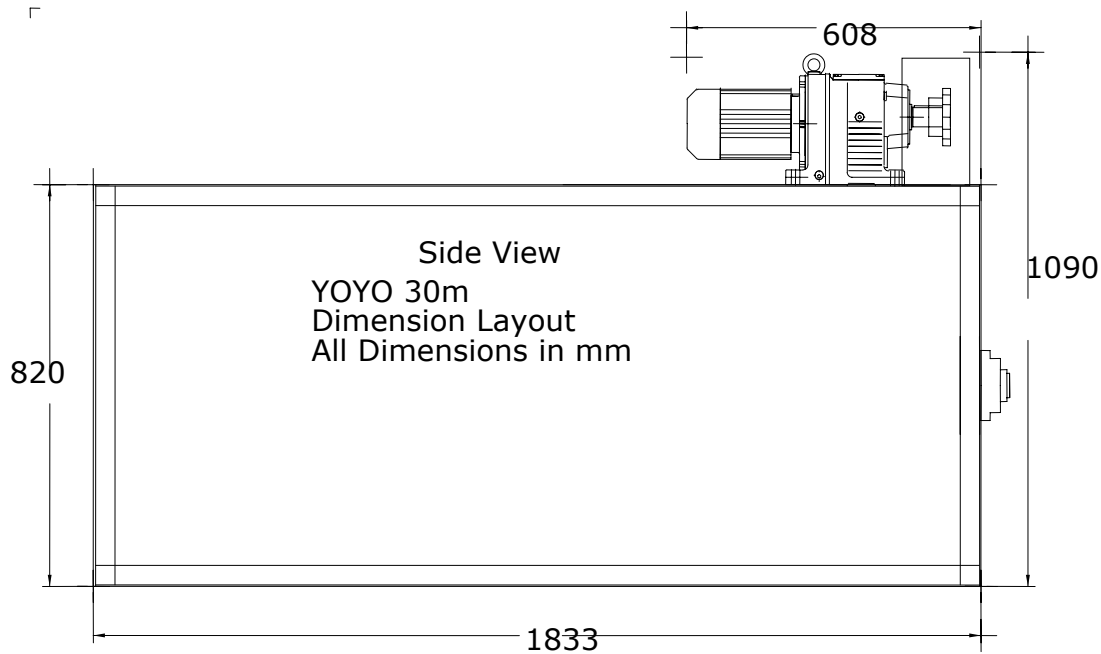
Detector Position Output: 4-20 mA, max. 500Ω
Detector Motion Modes: UP, DOWN, POSITIONING

Note: For the transmission method the evaluation unit LB 386-1C or LB 444 can be used.

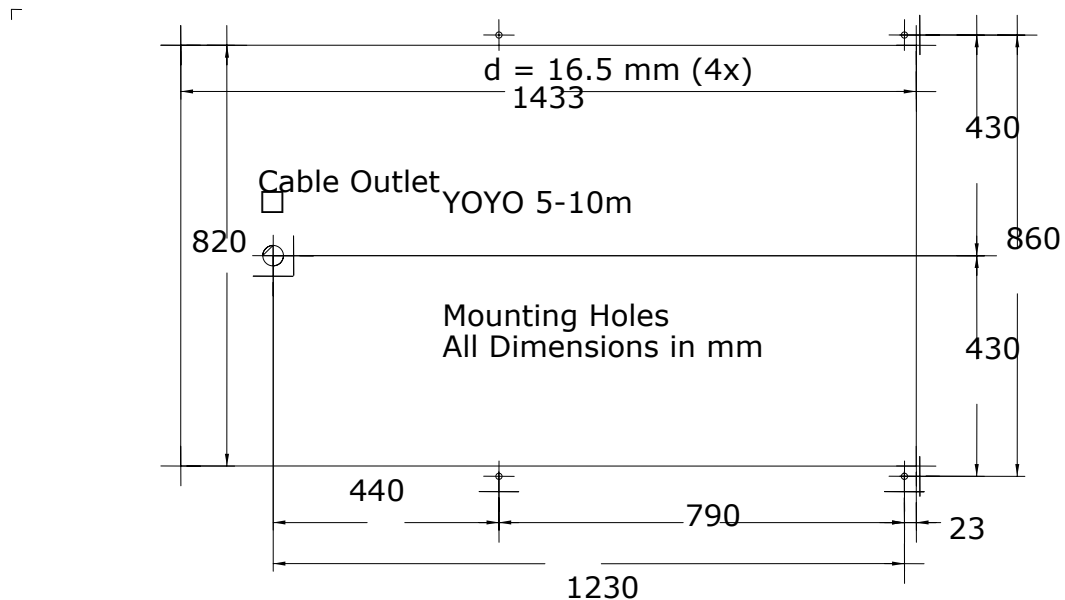
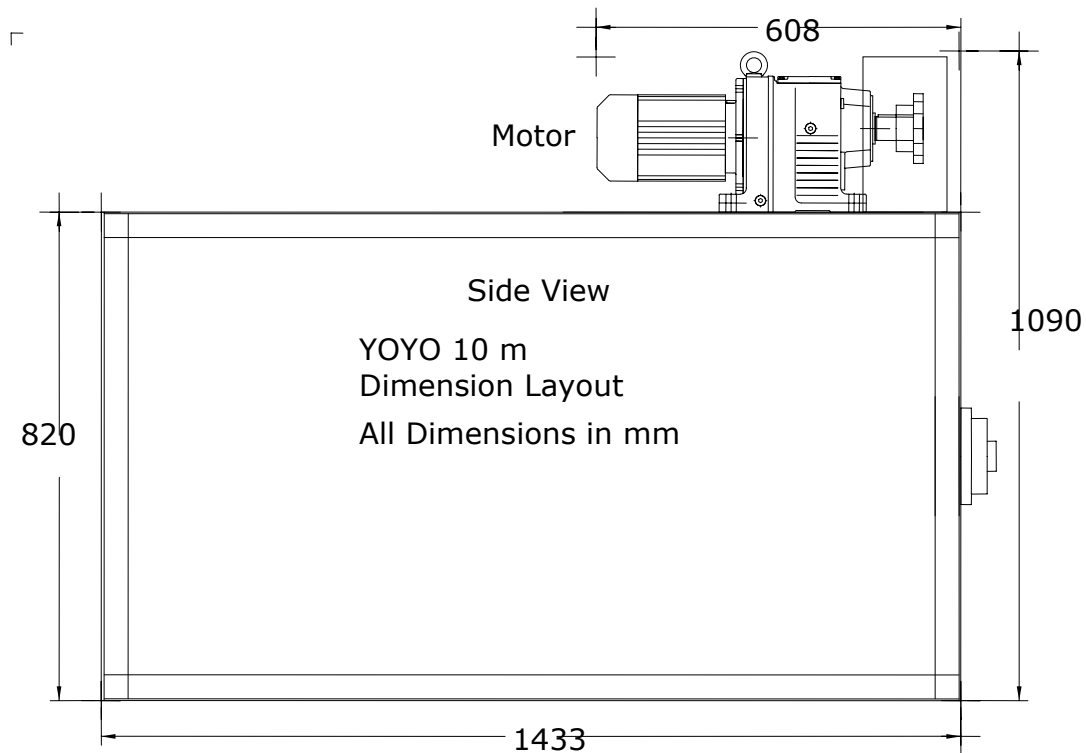
Subject to change.

Dimensions for backscattering system

Approximate Dimensions: For vessels up to 30 m high:



Dimensions: Arrangement for vessels up to 10 m:



Dimensions Transmission System

