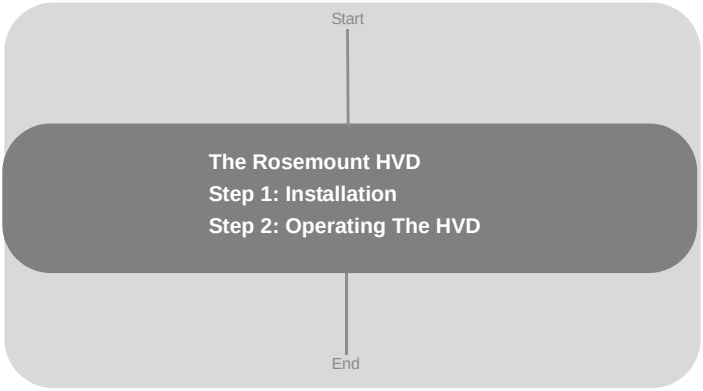
Rosemount
Gauged Head Verification Device (HVD)



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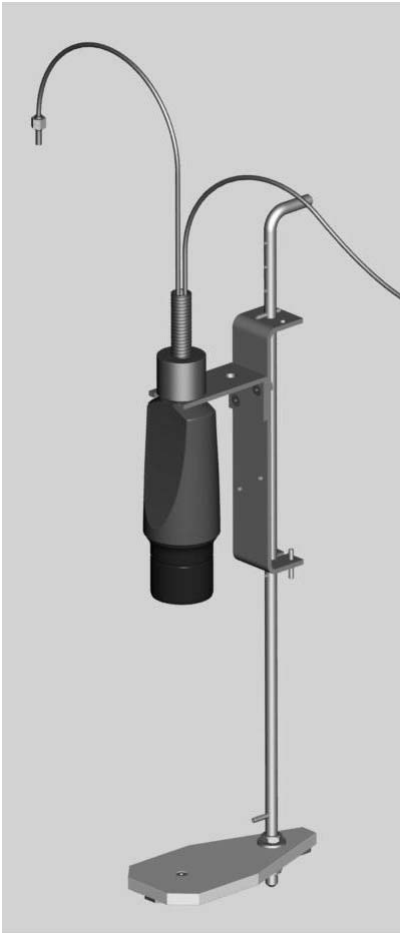
The Rosemount HVD

The HVD is a combined mounting bracket and verification device (reference target) to check and certify the Rosemount 3107 Ultrasonic Level transmitter or 3108 Flow transmitter in an open channel flow application.

- Valuable aid for instrument calibration, commissioning and certification
- Easy reference check of calibrated flow
- Essential tool for setting the bottom reference dimension of a tank
- Corrosion resistant stainless steel construction
- Reinforced polypropylene target plate

Figure 1. Rosemount HVD



Unreliable flow data can result in inefficient plant operation and unnecessary investment in plant upgrades. This is particularly true with measuring industrial and municipal effluents, and yet it is frequently given the least priority and attention. Flow data obtained from a dependable source enables plant to be operated in an efficient manner. By optimizing treatment processes, operators can ensure the maximum treatment capacities are achieved, before additional investment is made.

Open Channel Flow measurement systems such as weirs and flumes, frequently use non-contact ultrasonic level measuring instruments to determine flow. The most common cause of unreliable flow data is due to inaccurate setting of the gauge zero and measurement span of the ultrasonic device.

With the aid of the Head Verification Device (HVD), regular flow system checks can be carried out in a matter of minutes.

STEP 1: INSTALLATION

Installing The HVD

The HVD package includes a universal mounting bracket designed to bolt directly to standard Uni-Strut or similar mounting system. The HVD should be assembled as shown in the picture (Figure 2) and with reference to the installation pictures on page 5. It should be installed on a securely mounted section of horizontal Uni-Strut or suitable mounting system, such that the retractable target can be lowered and rotated under the ultrasonic sensor without interference from the surrounding channel or chamber. The HVD should be positioned upstream of the flume or weir at a position as recommended in the relevant ISO or BS standard for the primary measuring device.

Figure 2. Typical Installation

The target plate shaft is provided with a selection of holes to accept a dowel pin to enable the optimum reference height to be set with relation to the invert level of the flume or vertex of the weir. After final assembly and when the structure is fully tightened and aligned, the exact HVD reference height should be determined using a suitable optical or laser level. The target plate should be set to represent a level reading of 75% to 90% of the maximum span. This enables the target to be lowered and rotated under the sensor and to simulate a flow reading within the normal measurement span.

Calculating The Transmitter Mounting Height

To minimize the measurement uncertainty, it is recommended to mount the transmitter as low as possible in the flume approach section or weir chamber. As a typical guide, the optimum height or reference height (3107/3108 parameter **P010**) should be calculated as follows:

P010 = Maximum Gauged Head + Transmitter Deadband + 2 in.

Where:

Transmitter Deadband = 12 in. for 3107 and 3108

For example, consider a rectangular weir application using a Rosemount 3108 transmitter and Rosemount 3490 controller, where the maximum flow to be measured is 2000 gallons per minute and the maximum gauged head is 14 in.

The transmitter reference height above the datum (P010) is calculated as follows:

NOTE:
Ensure the Transmitter Base Units are set to the required units (in., ft. or m)

H_{max} = 14 in. and 3107/3108 Minimum Transmitter Deadband = 12 in.
Therefore, Transmitter Height (**P010**) = 14 in. + 12 in. + 2 in. = **28 in.**

In the example above, the HVD should be mounted in the weir chamber so that transmitter face is minimum of 28 in. above the datum level which, in this case, is the horizontal sill of the weir. An allowable tolerance for this height is ±1 in. as this will be set precisely when the transmitter is calibrated using the target plate on the HVD.

Setting The HVD Target Plate Reference Height

The HVD system comes fully assembled. If further adjustment is needed to achieve the desired height of the transmitter, it may be necessary to adjust the relative position of the transmitter mounting bracket on the main HVD assembly. This is achieved by removing the two countersunk cap-head screws and locknuts, and re-positioning the bracket as required. If the target plate height needs to be adjusted in the “READ” position, remove the locking pin from the main 0.5 in. diameter stainless steel shaft and re-fit to achieve a reference height as detailed in the example below.

Rectangular Weir - Q_{max} = 2000 GPM

H_{max} = 14 in.

Sensor Height Above Datum = 28 in. (*result from previous calculation*)

Therefore, Target Height Above Zero Datum = 0.9 * H_{max} = 0.9 * 14 in. = **12.6 in.** (Max.)

Or = 0.75 * H_{max} = 0.75 * 14 in. = **10.5 in.** (Min.)

Operating the HVD

STEP 2: OPERATING THE HVD

When the HVD has been finally adjusted to achieve a target height (as described above), the transmitter readings can be verified after the *exact* reference height has been measured. The most convenient way to measure the actual reference target height above the datum level is to use an optical or laser level. This normally involves using a surveyors' staff (or similar rigid pole or rule) and observing the relative heights of the target and datum by using the optical level. To be more precise with the measurement, a suitable ruler can be temporarily fixed to the staff to allow a more accurate reading. The actual height of the reference target is taken as the difference between the target plate level and the datum level.

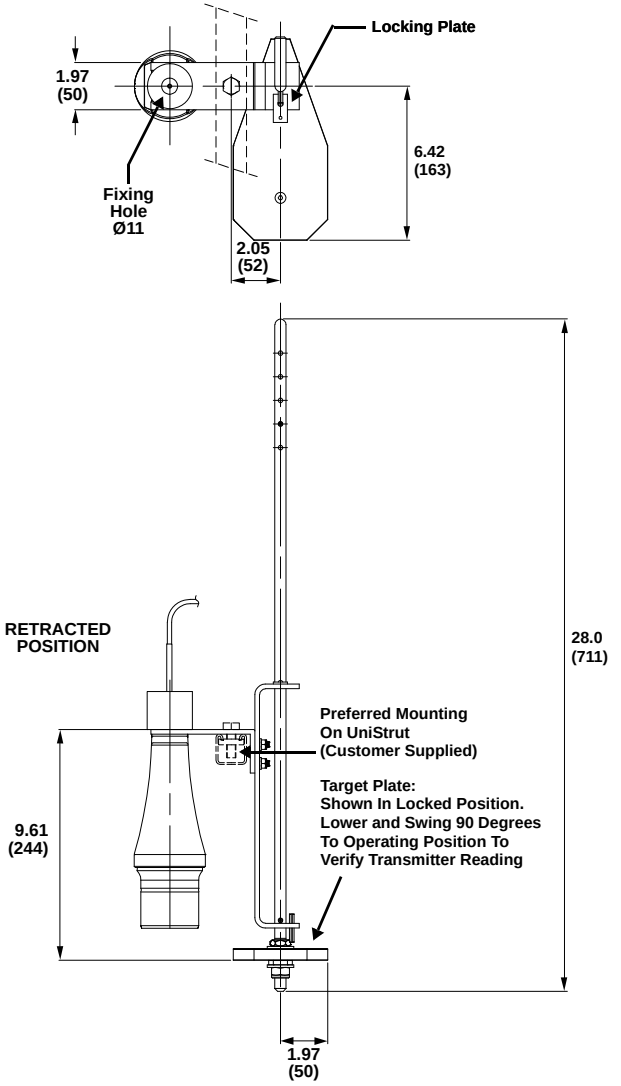
When the exact reference target height is known, the **target plate** should be lowered down and moved directly underneath the transmitter to simulate a level or flow reading. If the 3107 or 3108 is being used with a Rosemount 3490 controller, the display can be configured to indicate the actual level being measured by the transmitter. This is normally the PVin value which is the Primary Variable (level in inches) being sent to the 3490 controller. Alternatively, this can be read from the “MONITOR” option on the 3490 main menu.

The target plate should be left under the transmitter for a minimum of three minutes to provide a stable reading for the level. If the transmitter bottom reference or reference height **P010** has been set correctly, the transmitter should indicate a level reading corresponding to the actual reference target height.

If the transmitter needs to be adjusted to achieve a correct reading, the transmitter’s bottom reference parameter P010 can be adjusted in two ways. Either calculate the error in the reading and correct for this by re-setting **P010** by the required offset, or using the Set-up menu on the 3490 controller to go to transmitter Set-up and select “Depth now”. When prompted, enter the actual level and confirm “Depth now”. The 3490 will automatically configure parameter P010 to the correct value to read the true target plate height.

Figure 3. Dimension Drawings

Note: Dimensions Are Shown In Inches (mm)



Liquid Level

Note: Ensure Liquid Level Is Below Target Plate When Taking Measurements

Note: Dimensions Are Shown In Inches (mm)