Claims

1. Method for the on-site calibration of a fill-level measuring device (6) which is designed to determine and/or monitor a fill level (L) of a medium in the container (1), in particular a process medium (PM) or a cleaning medium (RM), which is in particular a fill-level measuring device (6) that operates contactlessly,

comprising at least the steps of:

–determining a volume (Vmed) of the medium in the container (1), which is a remaining volume of the container (1) which can be assumed by the medium by:

– measuring a first pressure initially present in the container (1);

– flowing of a gaseous pressure-boosting medium (Mtest) in through an inlet (2) into the container (1), wherein the pressure-boosting medium (Mtest) flowing into the container (1) occupies a remaining empty volume (V_leer) in the container (1) and the initially present first pressure is increased to an increased second pressure ;

– measuring said increased second pressure;

– determining the pressure increase Δp = increased second pressure - first pressure caused by the inflow of the pressure-boosting medium (Mtest);

–determining a volume (V_Mtest) of the pressure-boosting medium (Mtest) flowing into the container (1);

–measuring a temperature (T) present in the container (1);

–determining the remaining empty volume (V_leer) on the basis of the pressure increase Δp, the volume (V_Mest) of the pressure-boosting medium (Mtest) and the temperature (T);

wherein the remaining empty volume (V_leer) for the container (1) filled with medium is determined, and wherein the volume (Vmed) of the medium in the container (1) is determined using a difference between a total empty volume (V_gesleer) in the empty container that can be occupied by a medium, in particular by the process medium (PM) or a cleaning medium (RM), and the remaining empty volume (V_leer) for the container (1) filled with medium:

$$Vmed = V_gesleer - V_leer$$

–measuring the level (L) of the medium in the container (1) by the fill-level measuring device (6);

–determining a volume of the medium (Vmed) in the container (1) by the fill-level measuring device (6) using an in particular initially determined, saved relation (Vmed(h)) between the fill level (1) measured with the fill-level measuring device (6) and a volume (Vmed) of the medium in the container (1) dependent on the fill level (1);

–establishing, documenting and/or displaying at least the difference between the volume (Vmed) of the medium in the container (1) determined by the fill-level measuring device (6) and the volume (Vmed) of the medium in the container (1) determined using the method for determining the remaining empty volume (V_leer).

2. Method according to Claim 1, wherein the steps of determining the volume (Vmed) of the medium in the container (1) are carried out with an empty container (1),and wherein the remaining empty volume (V_leer) of the empty container (1) determined in the process is determined as the total empty volume (V_gesleer) in the container (1) which can be occupied by a medium, in particular by the process medium (PM) or by a cleaning medium (RM).

3. Method according to Claims 1 or 2,
comprising the step:

- adjusting the fill-level measuring device (6), wherein the measured value of the fill-level measuring device (6) is adapted such that the volume (Vmed) of the medium in the container (1) ascertained using the fill-level measuring device (6) matches the volume (Vmed) of the medium in the container (1) ascertained by the method for determining the remaining empty volume (V_leer).

4. Method according to Claims 1 to 3,
wherein ambient air or a high-purity gas, in particular purified ambient air or CO2, is used as the pressure-boosting medium (Mtest).

5. Method according to at least one of Claims 1 to 4,
wherein during the inflow of the pressure-boosting medium (Mtest), a pressurized gas cylinder (10) or a compressed air system (11) of a processing system is used in which the on-site method for calibrating a fill-level measuring device (6) is carried out.

6. Method according to at least one of Claims 1 to 5,
wherein the on-site calibration of the fill-level measuring device (6) takes place after a cleaning of the container (1) with a cleaning medium (RM), wherein the cleaning medium (RM) serves as the medium used in the on-site calibration,
and wherein the container (1) is steam-sterilized in particular after the on-site calibration of the fill-level measuring device (6).

7. On-site calibration module for a fill-level measuring device which is designed for the on-site calibration of the fill-level measuring device (6) according to at least one of Claims 1 to 6, comprising a flowmeter (3) arranged on the inlet (2), a pressure gage (7) designed to measure the initial pressure (p0) and the increased second pressure (ph), a temperature measuring device (8) designed to measure the temperature in the container (1), and a control/evaluation unit (5).

8. Calibration module according to Claim 7,
wherein the pressure gage (7) and/or the temperature measuring device (8) are arranged on the inlet (2).

9. On-site calibration module according to Claims 7 or 8,

wherein the on-site calibration module is designed as a mobile on-site calibration module which can be connected in particular to a second valve unit (9) arranged on the container (1).

10. On-site calibration module according to Claims 7 or 8,

wherein the on-site calibration module is arranged on the container (1) and fixedly connected to the container (1).