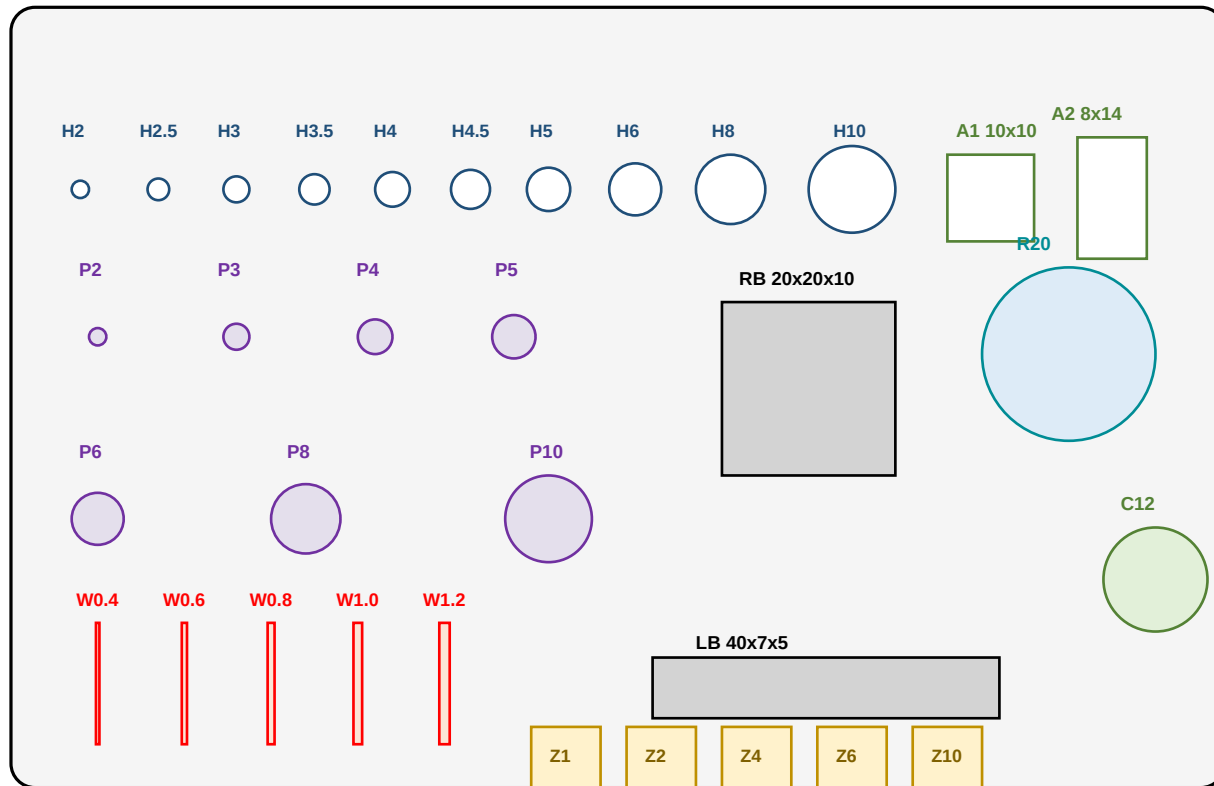


# D&L PQ-01 Measurement Guide v1.2

v1.2 improves external-feature measurement access and controls the measurement plane so height-dependent diameter variation is no longer mixed into repeat readings.



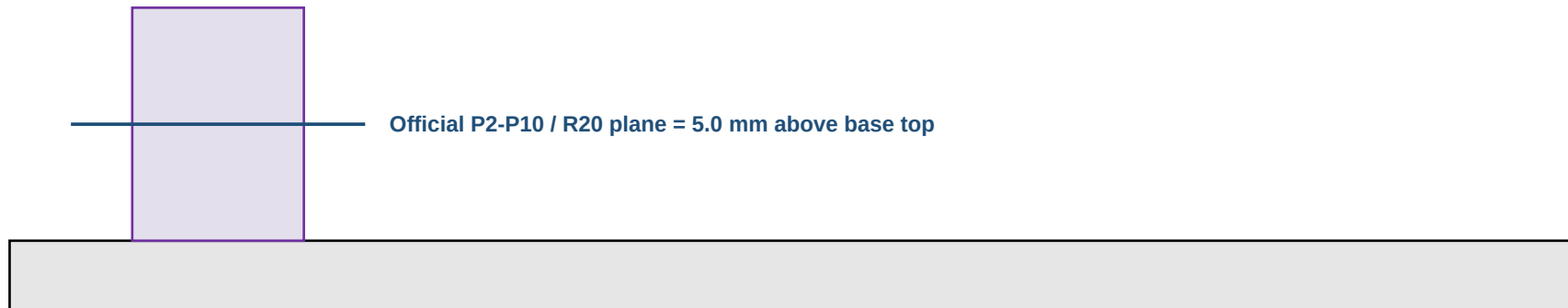
# Measurement instructions

Measure after cooling to room temperature. Keep caliper jaws square to the feature and use the defined measurement plane.

| Feature              | Nominal            | Where / how to measure                                                                                                         | Record                |
|----------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Overall X / Y        | 140 / 90 mm        | External jaws across straight side faces; avoid rounded corners.                                                               | X and Y               |
| Base thickness       | 3.00 mm            | Underside to base top on a clear plate area.                                                                                   | 1-3 reseated readings |
| Holes H2-H10         | 2 to 10 mm         | Internal jaws in printer X and Y. H2-H3.5 are indicative with normal calipers; gauge pins preferred for better bore metrology. | X and Y               |
| A1 / A2              | 10x10 / 8x14       | Internal width/height between opposite faces.                                                                                  | X and Y               |
| Pins P2-P10          | 2,3,4,5,6,8,10 mm  | All pins are 10 mm high. Measure at the MID plane, 5.0 mm above base top. Repeat by reseating at the same plane.               | X and Y               |
| Walls W0.4-W1.2      | 0.4 to 1.2 mm      | Measure near mid-length in the upper half, away from the root.                                                                 | Thickness             |
| Reference block RB   | 20x20x10 mm        | X/Y across side faces; Z from base top to block top.                                                                           | X, Y, Z               |
| Long bar LB          | 40 mm X            | External jaws across the two end faces.                                                                                        | X                     |
| Z edge pads          | 1,2,4,6,10 mm      | Measure TOTAL thickness from coupon underside to pad top. Workbook subtracts measured base thickness.                          | Total thickness       |
| Round boss R20       | 20 mm x 10 mm high | Measure at the MID plane, 5.0 mm above base top.                                                                               | X and Y               |
| Profile cylinder C12 | 12 mm x 15 mm high | Measure X/Y at LOWER 3.0 mm, MID 7.5 mm and UPPER 12.0 mm above base top.                                                      | X/Y at all 3 planes   |

## Controlled external-feature measurement

The v1.1 trial showed that measured diameter changed depending on whether the caliper was placed near the root, middle or top of a boss. v1.2 removes that ambiguity for the standard pins



Readings 1-3 are three reseatings at this same plane - not bottom/middle/top readings.

### Required method

1. Standard pins P2-P10 and R20 are measured only at 5.0 mm above the base top.
2. Take up to three readings by fully releasing and reseating the caliper at that same height.
3. Measure once in printer X and once in printer Y to retain directional/ovality information.
4. Do not average arbitrary root/middle/top measurements into one diameter value; use C12 when axial profile is the quantity of interest.

## C12 height-profile cylinder

C12 deliberately turns the observed height dependence into a controlled metric. The CAD feature is a straight 12 mm cylinder, so any measured change with height is produced by the print/



**C12 is nominally cylindrical. Variation between these planes reveals printed taper/bulging/height-dependent contour behaviour.**

### Interpretation

- Upper-lower diameter change indicates the direction of axial size drift.
- Maximum axial range captures the total diameter spread across all three planes and both axes.
- X-Y difference at each plane captures local ovality/directional behaviour.
- The lower plane is intentionally 3 mm above the base to reduce first-layer/root effects; the upper plane is 3 mm below the top.

## Z-height method and recommended comparison



Feature height = measured total thickness - measured base thickness

### Current controlled comparison

PQ01-X1C-04 - Bambu Lab X1C - 0.4 mm nozzle - 0.20 mm layer height

PQ01-H2D-04 - Bambu Lab H2D - 0.4 mm nozzle - 0.20 mm layer height

### Baseline controls

- Use the same material and ideally the same filament spool.
- Use each machine's normal production profile; do not tune specifically for PQ-01 before the baseline.
- Do not apply special XY/hole compensation for the first baseline.
- Record slicer/profile, temperatures and material details.
- Print at 100% scale with no supports.
- A single coupon is screening data; use repeated prints before claiming formal process capability or setting production compensation.