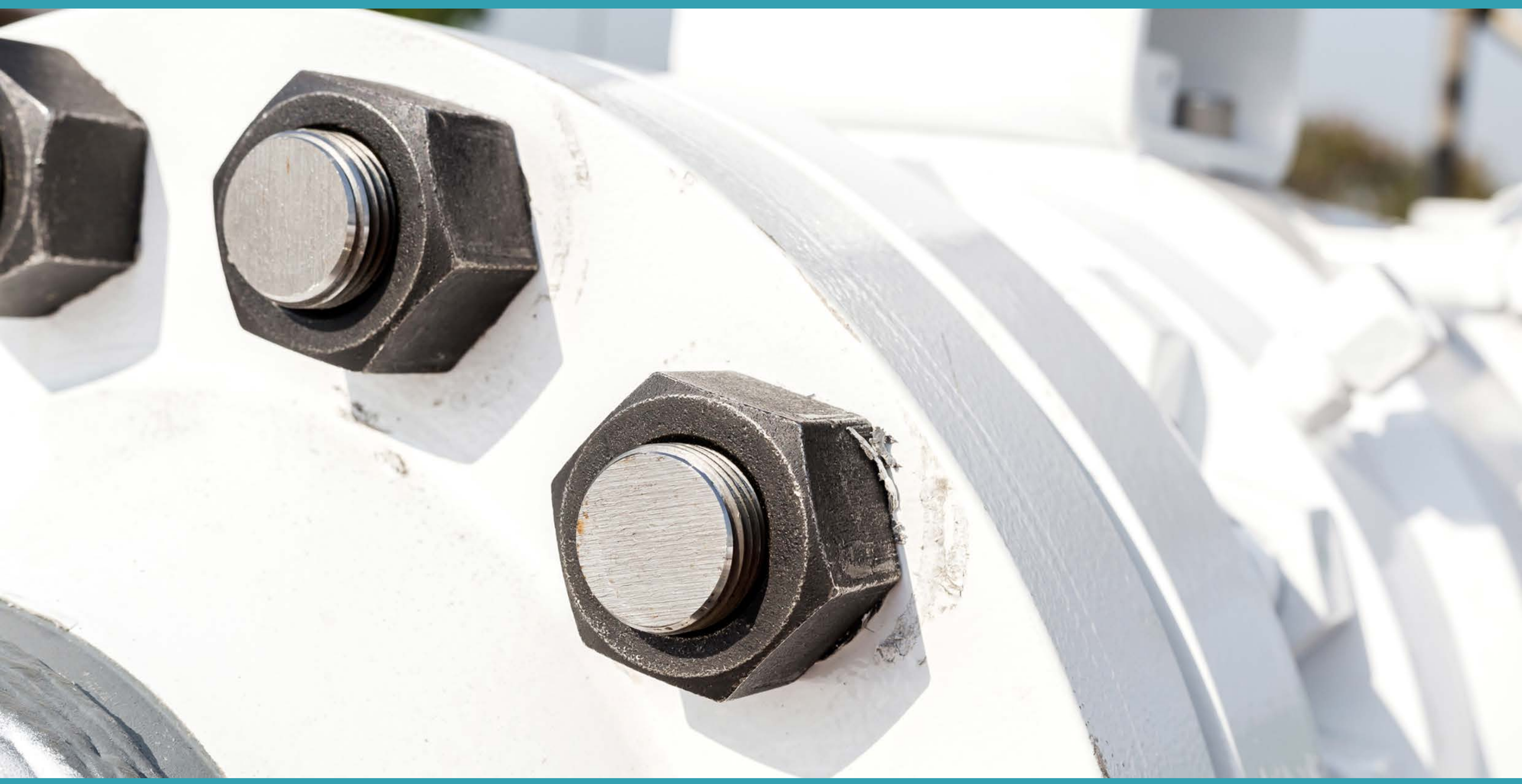
FLANGE AR



FLANGE AR
User Manual

V1.0.0

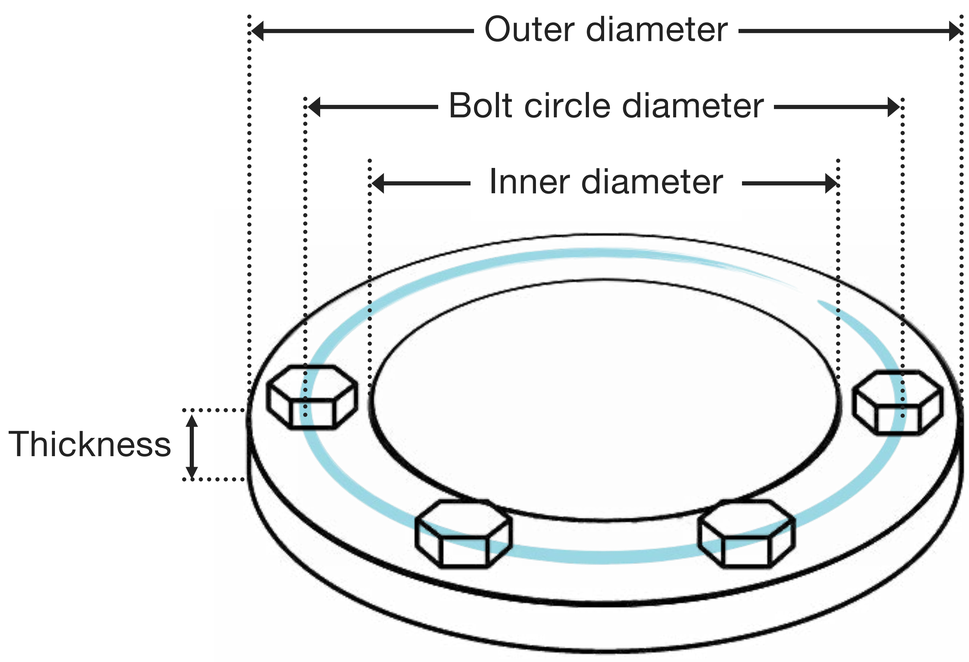
Basic Information

APP

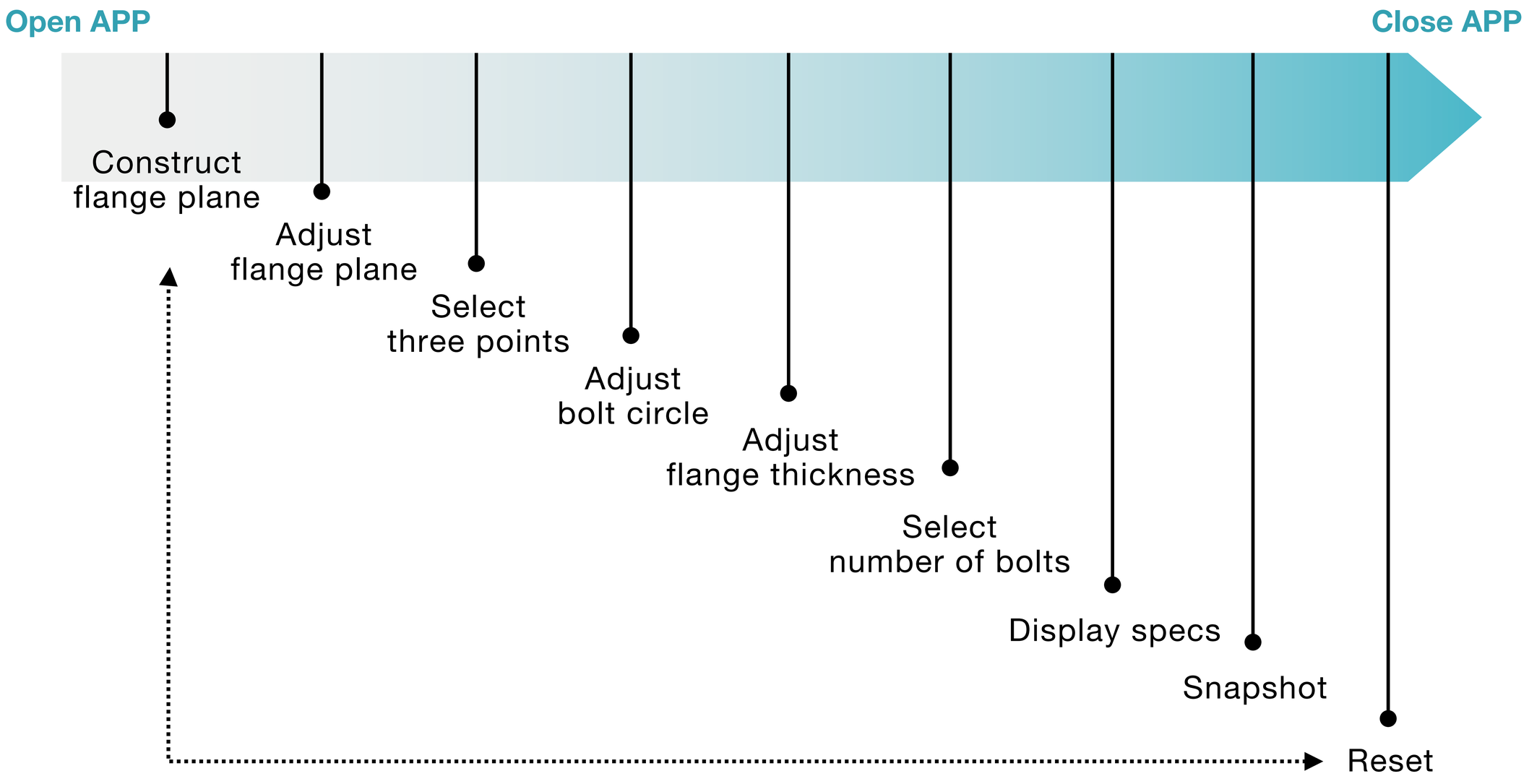
- **OS:** iOS 13.4 and above
- **Recommended hardware:**
  - iPhone X Series
  - iPhone Xs Series
  - iPhone 11 Series
  - iPhone 12 Series
  - iPhone SE 2
- **Update date:** February 2021
- **Size:** 54.6 MB
- **Language:** English, Traditional Chinese

Definition of Flange Parameters

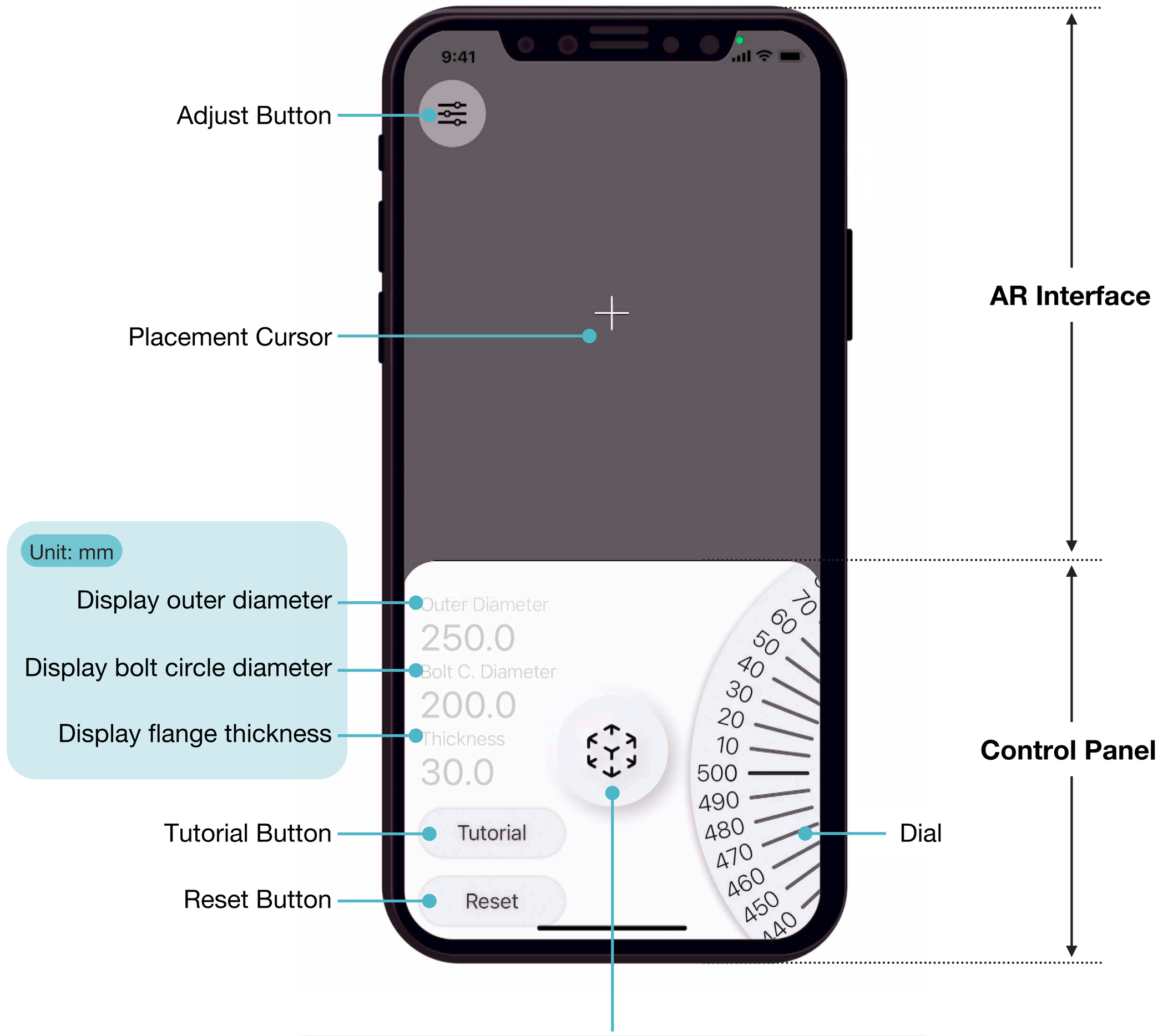
- **Outer diameter:** the large circle diameter of a flange
- **Bolt circle diameter:** the center distance across two bolts on opposite sides
- **Inner diameter:** the small circle diameter of a flange
- **Thickness:** the distance between the top and bottom flange planes



APP Use Steps



Interface Functions



Procedure

I. Open the APP

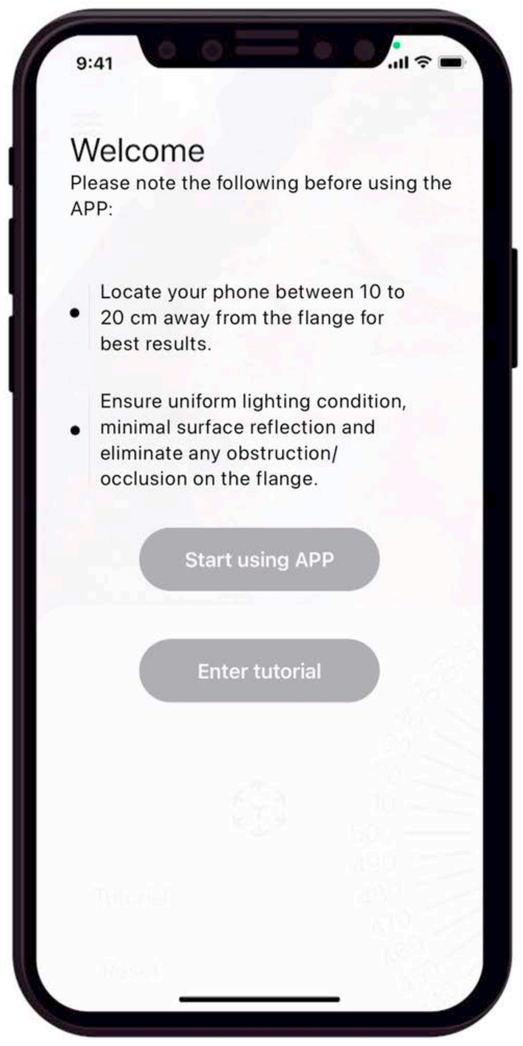
Click on “Flange AR” icon to start using the APP.

II. Understand Use Instructions

1. Please note the following before using the APP:

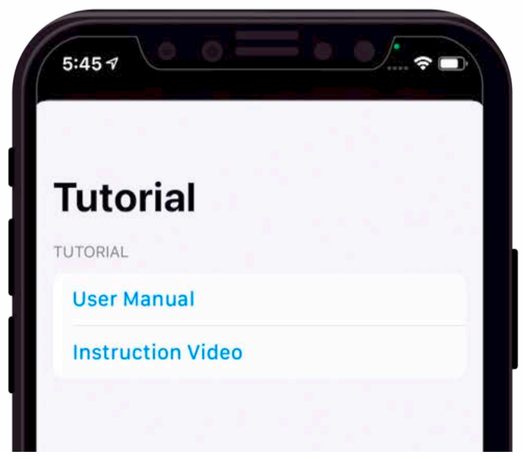
   - Locate your phone between 10 to 20 cm away from the flange for best results.
   - Ensure uniform lighting condition, minimal surface reflection and eliminate any obstruction/occlusion on the flange.

2. Should you be already familiar with the process, please click on “Start using APP” to begin.
3. For first-time users or if you are unfamiliar with the process, we strongly recommend you to begin with the tutorial page and read this user manual carefully.



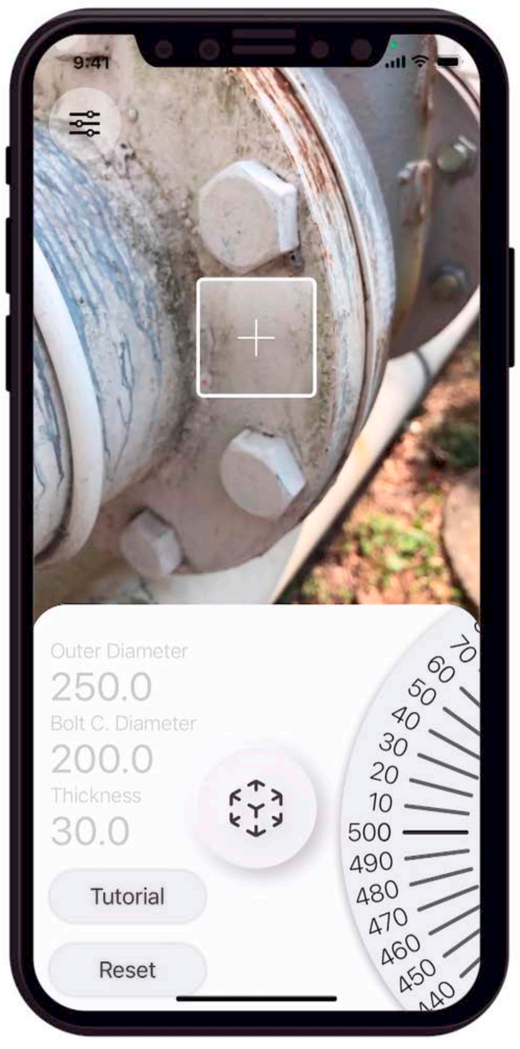
III. Tutorial Page

1. Click on “User Manual” for detailed information about how to use this APP.
2. Click on “Instruction Video” to watch a simple demonstration.



IV. Constructing a Flange Plane

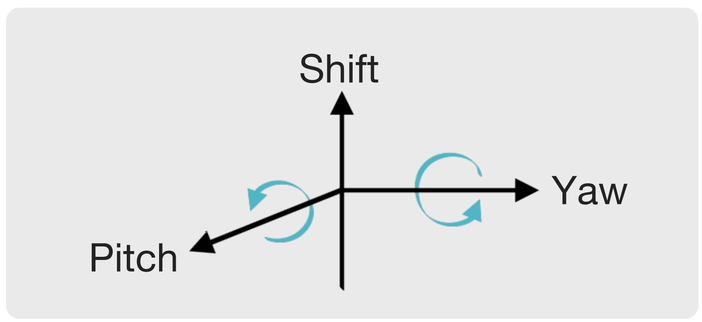
1. Hold your smartphone with the rear camera being approximately 15 cm away from the flange plane.
2. Aim the Placement Cursor + of the AR Interface between two neighboring bolts on the flange plane.
3. Long press the Main Button in the Control Panel. Move your smartphone laterally while still aiming at the same location between the two neighboring bolts until a yellow virtual plane shows up. The Main Button changes to + at this instance.



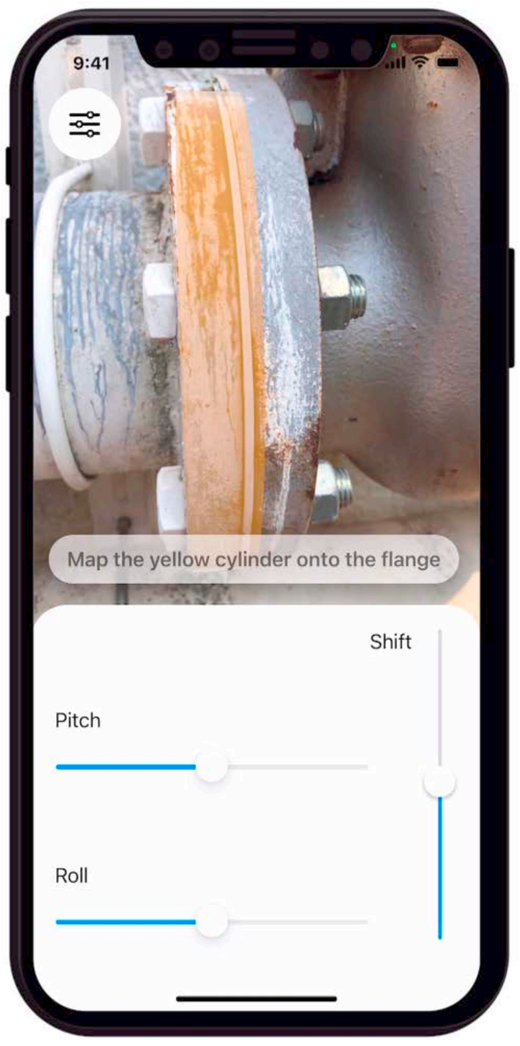
- The flashing placement cursor represents an internal process collecting feature points for constructing the environment.
- The flashing white square that moves together with the smartphone simply simulates reflection of light projection only for display purpose and has no real measurement function.

V. Adjusting a Flange Plane

1. Precisely match the yellow virtual plane with a real flange plane to increase the accuracy of dimensions measured and the corresponding enquired result.
2. Click on the Adjust Button at the top left corner of the AR Interface. This enables you to adjust the yellow plane in three degrees of freedom as shown in the following figure.

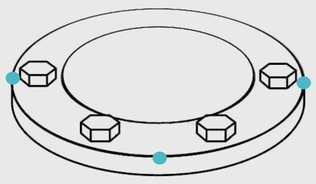


3. Once adjustment is complete, select the Adjust Button to return to the Control Panel's menu.



VI. Selecting Points on Flange's Circumference

1. Position the Placement Cursor ┼ in the AR Interface along the outer circumference of the real flange.
2. Confirm point selection by clicking on the Main Button ⊕ in the Control Panel. A blue dot will be added onto the cursor location.

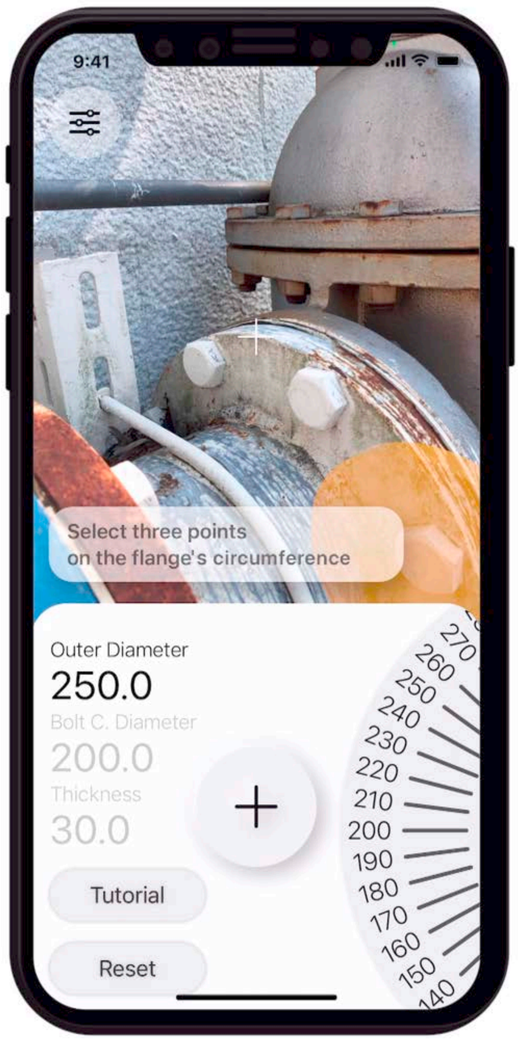


Select three points on the flange's circumference.

3. Repeat steps 1 and 2 for the second and third points along the outer circumference of the real flange.

- The three points should form an arc of at least 180°.
- Select the Undo Button (→) Undo to restart the process if the selection result is poor.

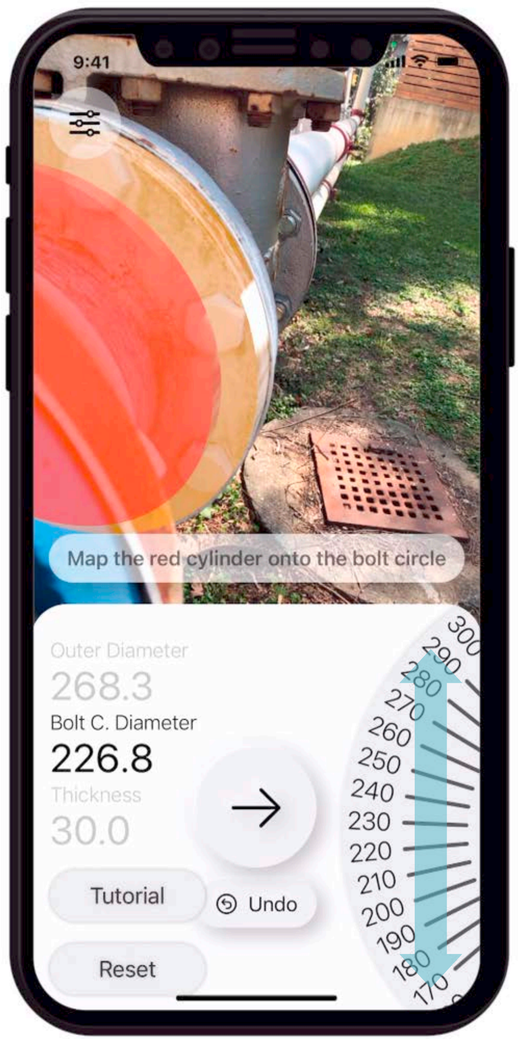
4. Upon selecting three points, two virtual cylinders in red and yellow will be displayed to match the actual flange in the AR Interface. The Main Button then turns into (→) Undo.



VII. Adjusting Bolt Circle Diameter

1. Adjust the bolt circle diameter by sliding the dial of Control Panel.
2. Ensure the bottom circumference of the red cylinder goes through all the bolt centers during this adjustment process.
3. Confirm the adjustment completion by selecting the Main Button (→).
4. The red cylinder instantly disappears after the confirmation.

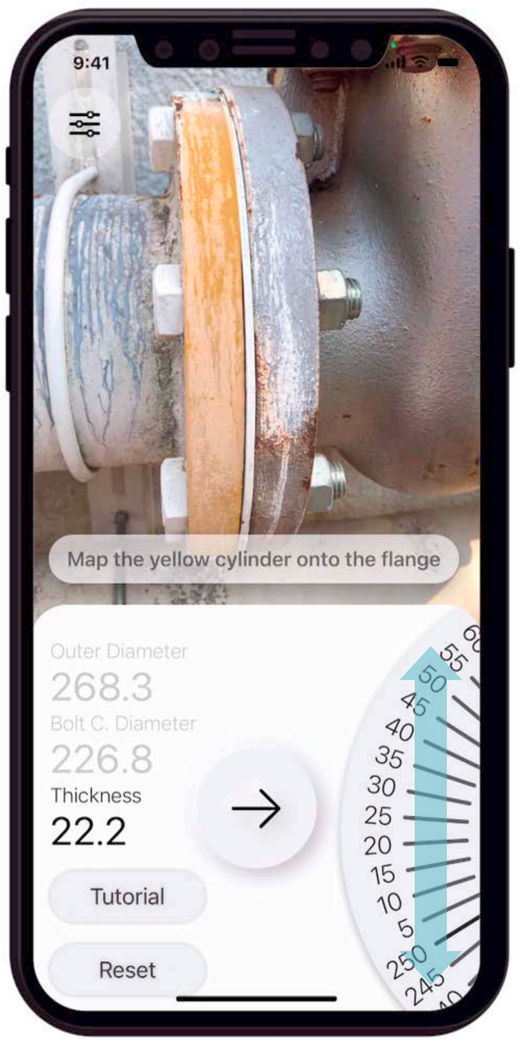
- If you cannot ensure the circumference of the red cylinder precisely goes through all the bolt centers, please reselect three new points by clicking on the Undo Button Undo.



VIII. Adjusting Flange Thickness

1. Move your smartphone slowly and steadily to the side of the flange.
2. Adjust the thickness of the yellow cylinder by sliding the dial in the Control Panel.
3. Match the bottom of the virtual yellow cylinder with that of the real flange.
4. Confirm the matching result by selecting the Main Button → .
5. Subsequently, an interface that allows you to select the bolt numbers is displayed. The Control Panel's Main Button changes from → to 🔍 .

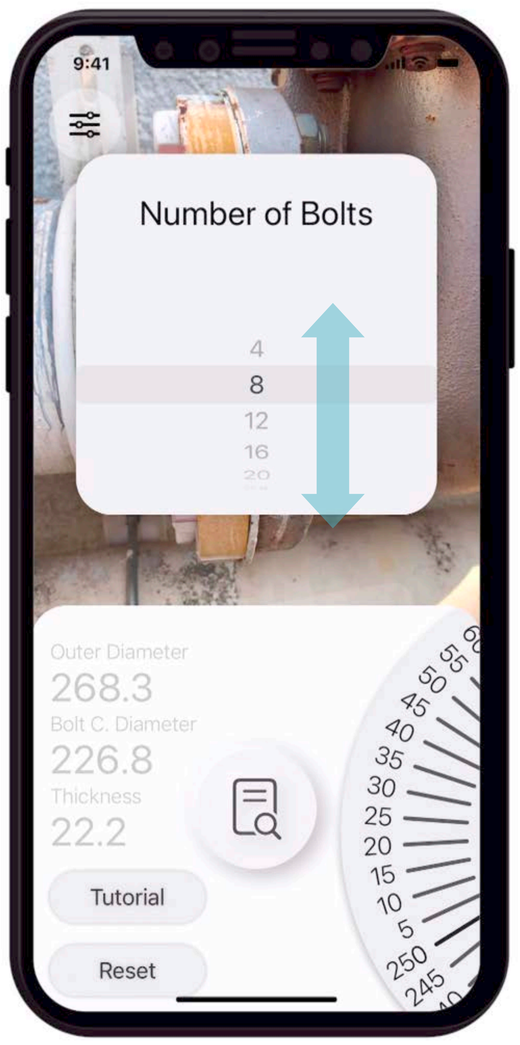
> If you are not able to precisely match the yellow cylinder with the real flange, please redo the adjustment step by selecting the Adjust Button at the top left corner of the AR Interface.



IX. Selecting the Number of Bolts and Query Specs

1. Select the correct bolt number by sliding the dial of the AR Interface.
2. Query/retrieve the flange specs from the database by selecting the Control Panel's Main Button 🔍 .

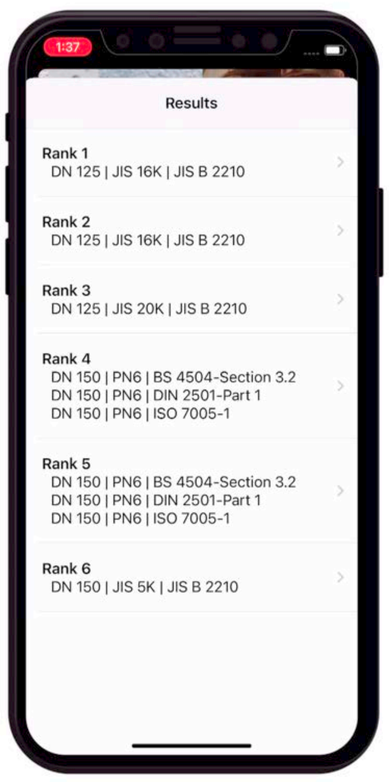
> If the bolt number is incorrect, please scroll to the bottom of the result page. Select the correct bolt number and query the database by repeating step 2.

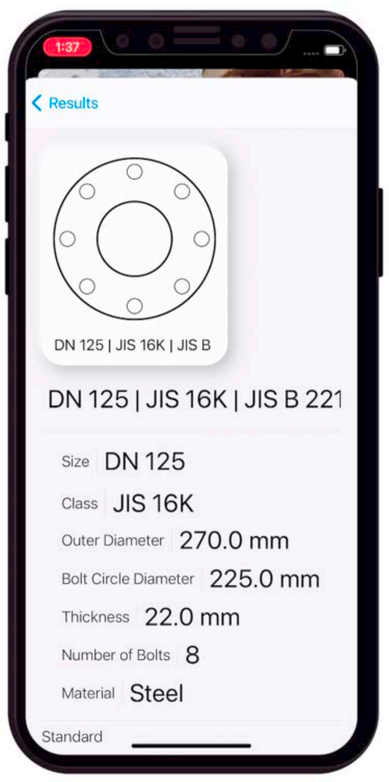


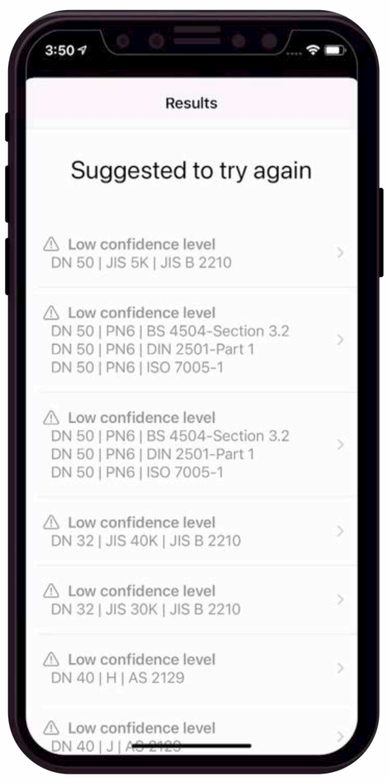
X. Display Result

1. The result is sequentially displayed from the highest to lowest dimensional accuracy for outer diameter, bolt circle diameter, thickness, and the number of bolts.
2. Retrieve other detailed information (e.g. inner diameter, pressure class, material, and specs code) by selecting any specs in the result.

> In case of a Low Confidence level, please repeat the entire process to obtain improved flange specifications.



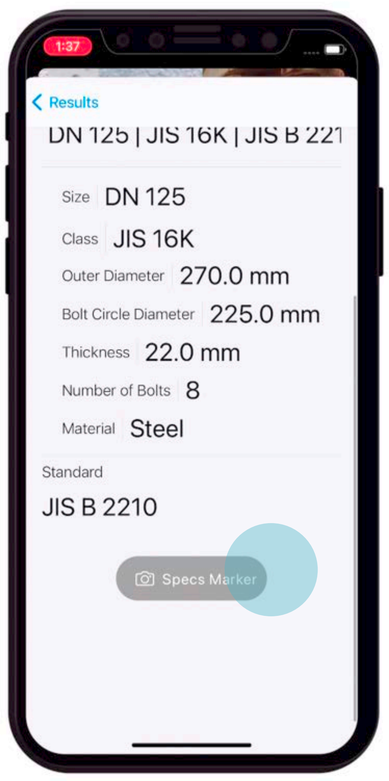


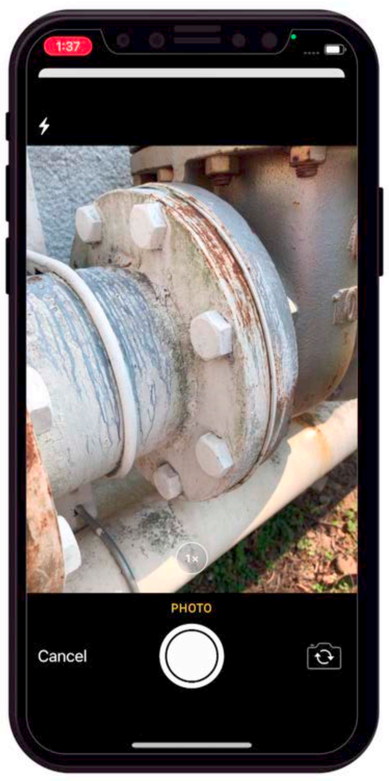


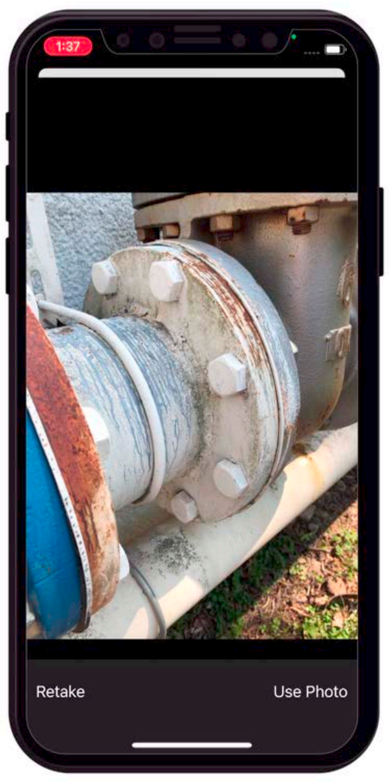
XI. Snapshot & Marker Attachment

1. Scroll to the bottom of the result page and select the “Specs Marker” Button to initialize the camera.
2. Take a snapshot, then select “Use Photo” to record the shot. A “Success!” message indicates the shot has been recorded.
3. Go to “Photos” or “Image Gallery” to view the recorded shot with annexed specs.

> Select “Results” button to revisit query results.

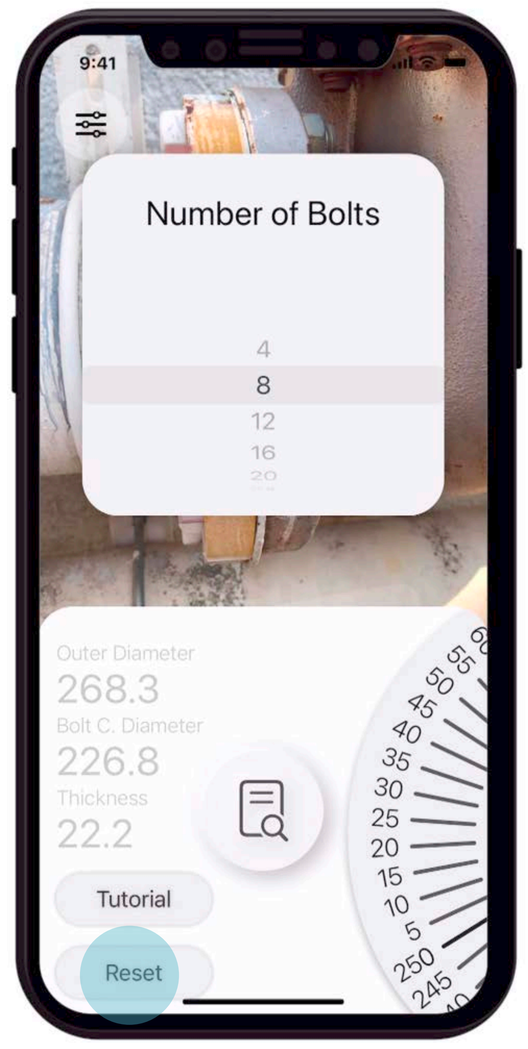






XII. Reset

1. Scroll down the results query page to switch back to the Control Panel.
2. Click on the “Reset” Button at the bottom left corner of the Control Panel to begin a new measurement process.



FAQ

- **What is the range of the flange specs measurable using the APP?**

  Inner diameter within 1/2"~24" (DN-15 ~ DN-600).

- **Can slanted flanges (non-vertical or horizontal) be measured using the APP?**

  Yes, as long as you correctly follow the listed steps.

- **How can one avoid the oscillation or shifting of the displayed virtual flange?**

  Move your smartphone slowly and steadily during measurement.

- **In the flange plane construction step, why does the yellow virtual plane fail to show up after long-pressing the main button (Instead, the Placement Cursor keeps flashing while displaying “In process”)?**

  This problem occurs due to two main reasons: ① Environmental issues (e.g. the flange plane is too glossy to provide sufficient feature points, too dark, or generating significant reflection) and ② Improper APP usage (e.g. smartphone is too close or too far from the flange or smartphone is immobile while constructing the flange plane).

  - With regard to environmental issues:
    - Select the Adjust Button at the top left corner of the AR Interface to initiate a special “Parallel Placing” functionality. You must hold your smartphone parallel to the real flange plane at a 20-cm distance. Note that the plane to be constructed is determined by the orientation of the phone in space.
    - Draw a few “×” signs randomly on the flange plane using a black marker pen,
    - Attach a few patterned stickers randomly on the flange plane.
  - With regard to improper APP usage:
    - Restart a new measurement process by selecting the “Reset” Button.

- **What if constructing a flange plane using three degrees of freedom (shift, yaw, pitch) always produces a poor matching result?**

  This function is designed for limited adjustment of the constructed flange plane (shift: ±10cm and yaw/pitch: ±30°). Please restart a new measurement by selecting the “Reset” Button when the match result is still unacceptable after several trials.

- **What is the purpose of the flashing white square that moves with respect to a smartphone?**

  The square simply simulates reflection of light projection only for display purpose and has no real measurement function.

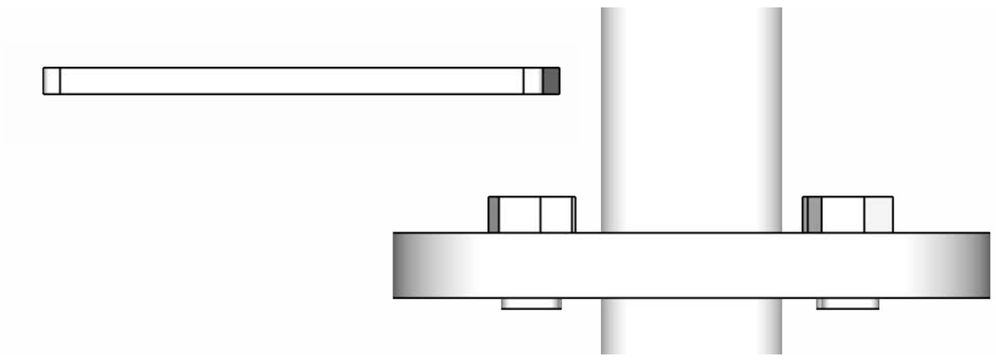
- **Can we select flange’s circumference points beyond the yellow virtual plane?**

  Yes, the point selection is not restricted to the virtual plane.

FAQ

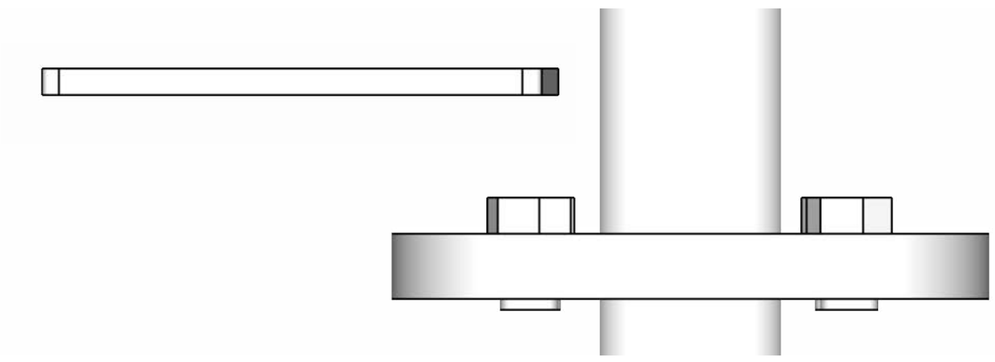
How does one increase the measurement accuracy of the outer diameter?

Try to aim the Placement Cursor precisely on the circumference of the real flange. The smartphone must remain stationary while clicking on the Accept Button. The three points to be selected should form an arc of at least 180º. Maintain the smartphone parallel to the flange plane to reduce the deviation arising from the viewing angle.



How does one increase the measurement accuracy of the bolt circle diameter?

Ensure the bottom circumference of the red cylinder precisely passes through all the bolt centers on the flange. In addition, maintain the smartphone parallel to the flange plane to reduce the deviation arising from the viewing angle.



How does one increase the measurement accuracy of the flange thickness?

Try to precisely match the yellow cylinder with the real flange. Hold your smartphone perpendicular to the flange plane to reduce the deviation induced by the viewing angle.