TFSR-02-03

# Quick investigation of BA15 cap-holder systems

IEC

# Mechanical Keying (Cap/holder) 15 mm Bayonet family

## B15d/s, BA15d/s, BA15d/s-3(100°/130°) BAU 15d/s, BAWd/s, BAX15d/s, BAY15d/s, BAZ15d/s

The cap/holder family **B(A)(AU)(AW)(AX)(AY)(AZ)15d/s** , exists in the following combinations:
(categories for automotive **and** lamps for general lighting):

| | |
|---|---|
| B15d | General lighting services |
| BA15d | = equal to B15d / not used in Automotive |
| BA15s | P21W (6V, 12V & 24V)<br>R5W (6V, 12V & 24V)<br>R10W (6V, 12V & 24V) |
| BAX15d | S4 (6V & 12V) |
| BAX15s | (reserved) |
| BAY15d | P21/5W (6V, 12V & 24V) |
| BAY15s | (reserved) |
| BAZ15d | P21/4W (6V, 12V & 24V) |
| BAZ15s | (reserved) |
| BAU15d | PR21/4W (12V & 24V) |
| BAU15s | PY21W (12V & 24V)<br>RY10W (6V, 12V & 24V) |
| BA15d/s-3(100°/130°) | PY21/5W (12V) |
| BAW15d | PR21/5 (12V & 24V) |
| BAW15s | PR21W (12V & 24V)<br>RR10W (6V, 12V & 24V)<br>RR5W (6V, 12V & 24V) |

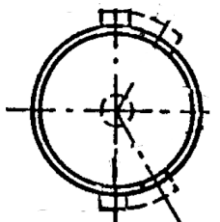
**Mis-insertion (mis-use) is prevented by:**

- Information on the package (category and voltage)
- Information on the light source (category and voltage)
- Information on the luminaire (category and voltage)
- Information in the car manual (category and voltage)

# 15 mm Bayonet Fit family *(Main key daimensions)*

(dimensions: cap ∅15,175mm ± 0,125; holder ∅ 15,40 ± 0,07

| Fit (IEC 60061) | Cap Sheet (7004-..) | Holder Sheet (7005-..) | Ref pin Axial position | 2nd (/ 3rd) pin Angle *(clockwise)* | 2nd (3rd) pin (delta) Axial position | 1st / 2nd pin Lengths |
|---|---|---|---|---|---|---|
| B15d | 11 | 16 | 0° / 0 mm | +180° | 0,0 ±0,1 mm | 1,0 ±0,1 |
| BA15d/s | 11A | 13 | 0° / 0 mm | +180° | 0,0 ±0,1 mm | 1,0 ±0,1 |
| BA15d/s-3(100°/130°) | 11D | | 0° / 0 mm | +130° / -130° | 0,0 ±0,1 mm | 1,0 ±0,1 |
| BAU15d/s | 19 | 13(d) / 19(s) | 0° / 0 mm | -150° | 0,0 ±0,1 mm | 1,0 ±0,1 |
| BAW15d/s | 11E | 13 | 0° / 0 mm | +150° | +3,2 ±0,1 mm | 1,0 ±0,1 |
| BAX15d(/s) | 18 | - | 0° / 0 mm | +180° | 0,0 ±0,1 mm | 2,00 ±0,15<br>0,78 ±0,08 |
| BAY15d(/s) | 11B | 13 | 0° / 0 mm | 180° | +3,2 ±0,1 mm | 1,0 ±0,1 |
| BAZ15d(/s) | 11C | 13 | 0° / 0 mm | -150° | +3,2 ±0,1 mm | 1,0 ±0,1 |

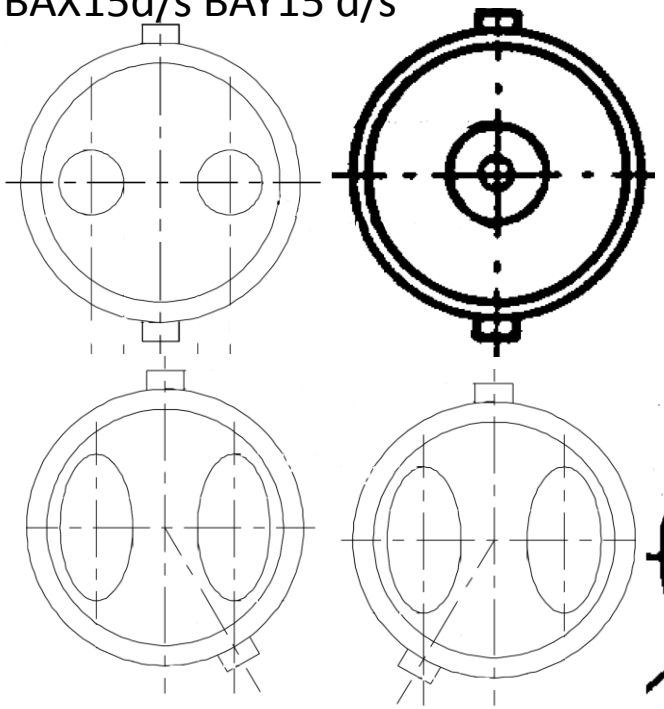


# The Bayonet 15 mm fit system visualized (IEC 60061)

Caps (bottom view)

B15d & BA15d
BAX15d/s BAY15 d/s

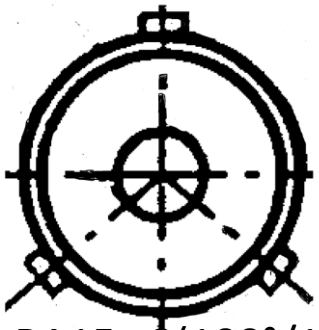
B15s & BA 15s











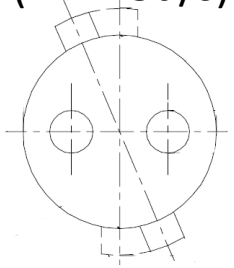
BAZ15 / BAU15

BAW15

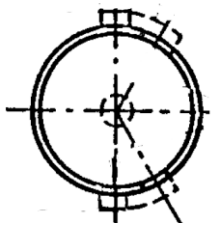
BA15s-3(100°/130°)

Holders (top & side view)

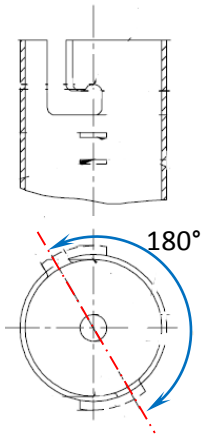
B15d & BA15d
(BAX15d/s)



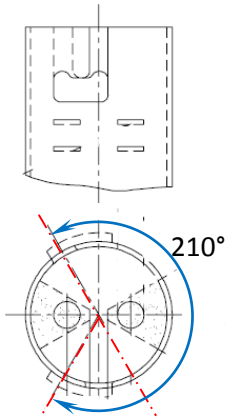
BAU15s



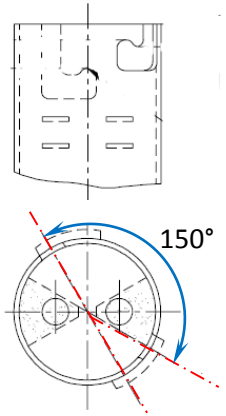
**BA15s***



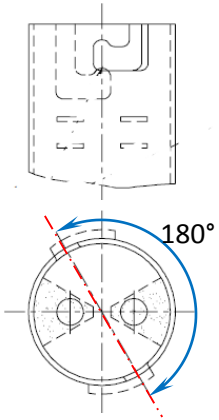

**BAU15d****



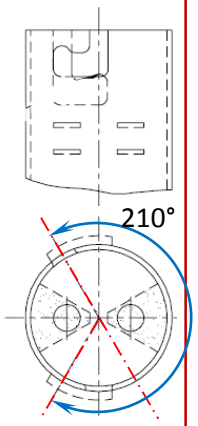

**BAW15d****




**BAY15d****




**BAZ15d****

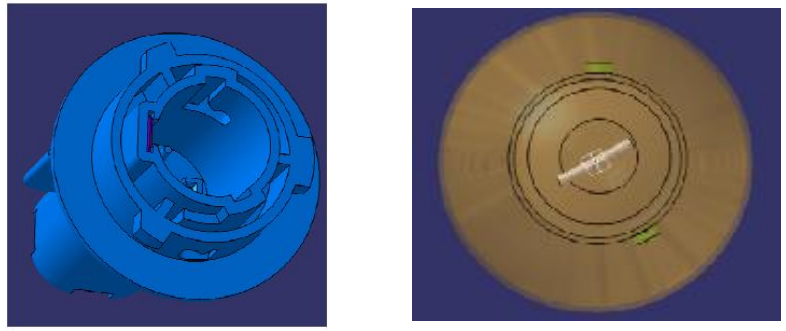



Family of key functions:

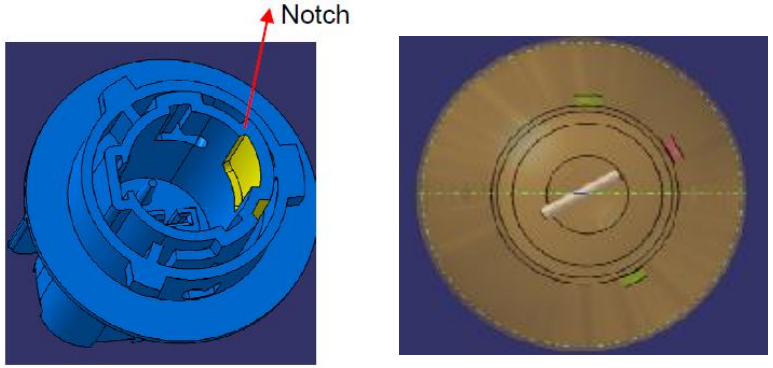
- Single contact / double contact
- 2nd pin on 180° (B15, BA15, BAX 15)
- 2nd pin on +150° (BAZ 15)
- 2nd pin on -150° (BAW15)
- 2nd pin on +130° **&** 3rd pin on -130° (BA15s-3…)
- BAX 15d has deviating pin-lengths; holder not defined in IEC

# Evaluation proposal Valeo (reference TFSR-01-10)

**Existing PY21W**
**Bulb holder** BAU15s



**Proposed PY21/LED**
**bulb holder** BAU15*s



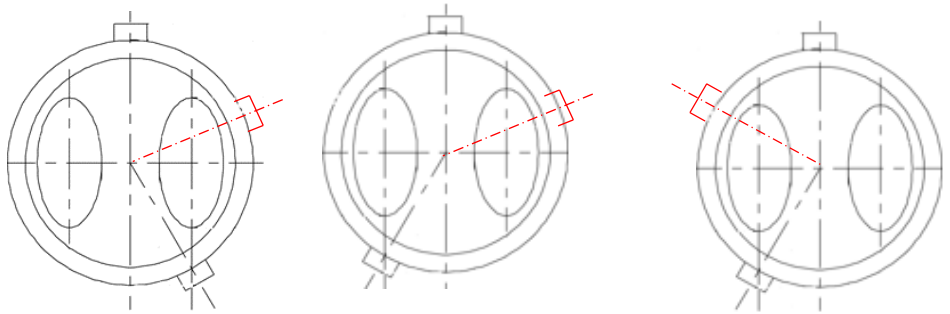

BAU15*s

**Extending the 3rd pin option for Existing cap** BAW15d/s in a similar direction as proposed doe the BAU15s cap result in two options:

*(view "b" holder-top)*

BAU15d BAW15

3rd pin for also for BAU15, and BAW 15?



BAU15*d/s ---- BAW15*d/s ---- BAW15*d/s (alternative)

AS PROPOSED ---- copied as proposed for 3rd pin in BAY15 ---- mirrored as proposed ---- for 3rd pin in BAY15

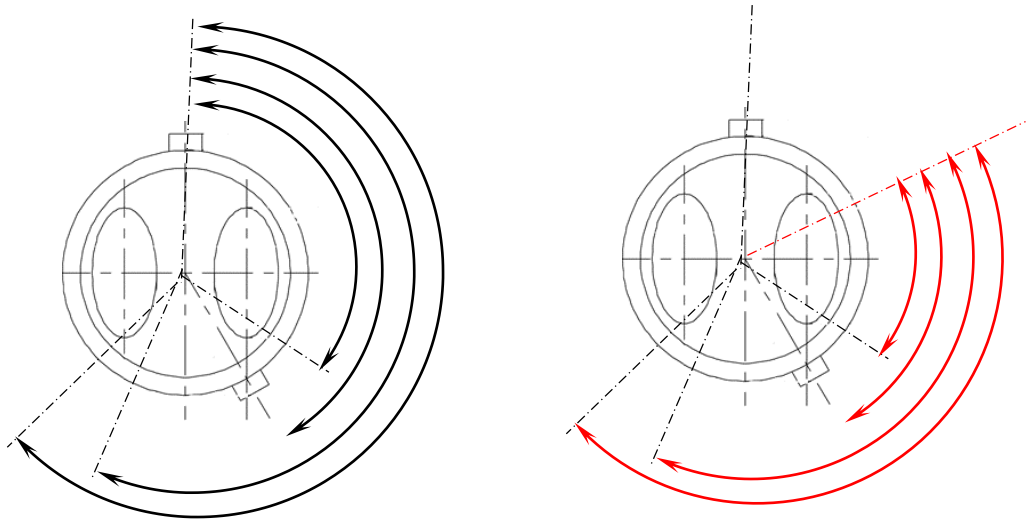
# Examination Valeo Proposal:

- Angular offset from Reference pin (estimated from input:)
  - A slot at +70°, 80°, 90° 100° or 110° clockwise holder top-view (see next slide)
- All* current Automotive 15 mm Bayonet fits with this 3rd pin added,
- All* “Non-LED” automotive fit-types to be checked:
  - “reference” Cap-pin in “new Holder-Slot”
  - “non-reference” Cap-pin in “new Holder-Slot”
  - Some fits use a different “height” for the 2nd pin than the reference pin.
- Some executions appeared close fit (see following pages),
  (tolerances are expected not to prevent a Non-intended-Fit)
- Basic difference in “angular step” for the pins in this system should be 20° to enable a clear discrimination in the system

* the BAX system is not taken into account for it’s different pin lengths is not a real discriminator in the BA15; it just fit’s and there is no adequate holder definition in IEC

# Alternative angles (potential options)

## verification 20° offset requirement



New position – conditions:

- Discrimination to existing systems >10° (20° preferred to cover tolerances and effective discrimination)

→ From 100° to 110° a solution seems possible.

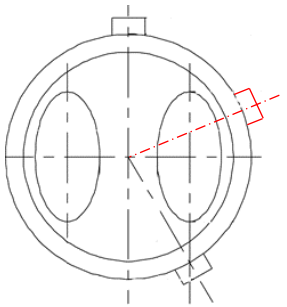
| current positions | Optional New positions (Delta angle) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 40° | 50° | 60° | 70° | 80° | 90° | 100° | 110° | 120° |
| 130° | 90° | 80° | 70° | 60° | 50° | 40° | 30° | 20° | 10° |
| 150° | 110° | 100° | 90° | 80° | 70° | 60° | 50° | 40° | 30° |
| 180° | 140° | 130° | 120° | 110° | 100° | 90° | 80° | 70° | 60° |
| 210° | 170° | 160° | 150° | 140° | 130° | 120° | 110° | 100° | 90° |

# Evaluation proposal Valeo (reference TFSR-01-10)

## Review angular positions between the pins for a 3rd slot between 70° or 80°

**Extending the 3rd pin option for Existing cap** BA15s, BAW15d/s, BAY15d and in a similar direction as proposed for the BAU15s cap result basically in two options:

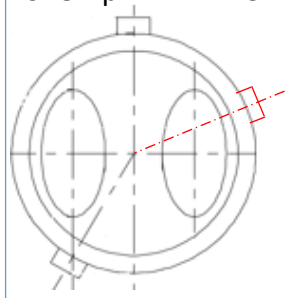
BAU15*d/s
AS PROPOSED



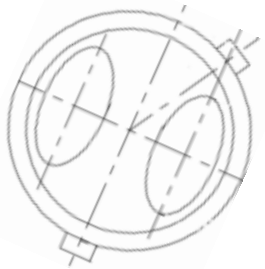
Alternative orientation to show 3rd pin position with potential conflict / "near fit"

BAW15*d/s

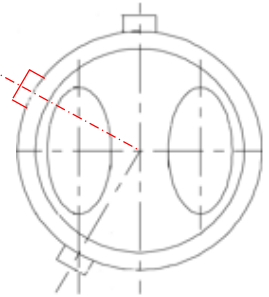
option 1
copied as proposed for 3rd pin in BAY15



Potential fit BAU15

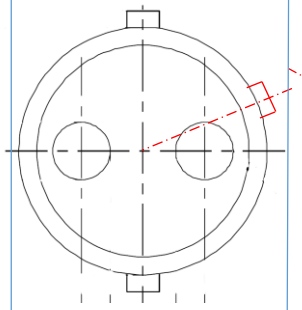


Option 2
mirrored as proposed for 3rd pin in BAY15

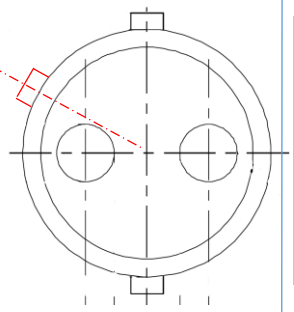


BAY15*d/s

option 1
copied as proposed for 3rd pin in BAY15

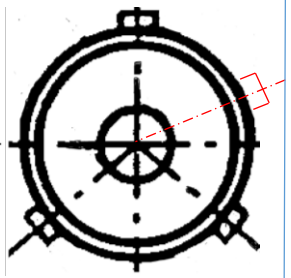


Option 2
mirrored as proposed for 3rd pin in BAY15

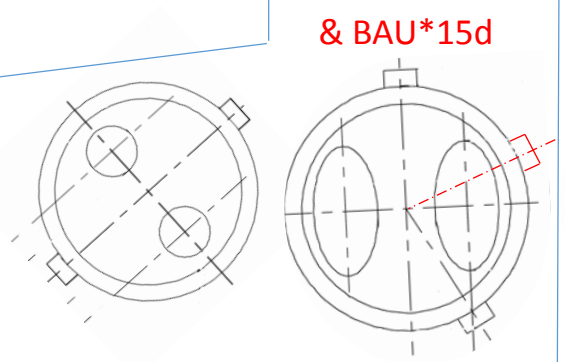


BA15*d/s-3(100°/130°)

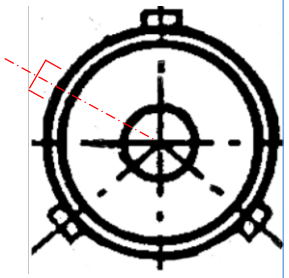
option 1
copied as proposed



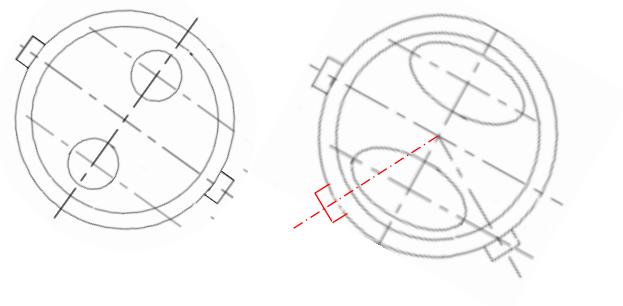
Potential fit BA15 & BAU*15d



Option 2
mirrored as propose



Potential fit BA15 & BAW*15(2)

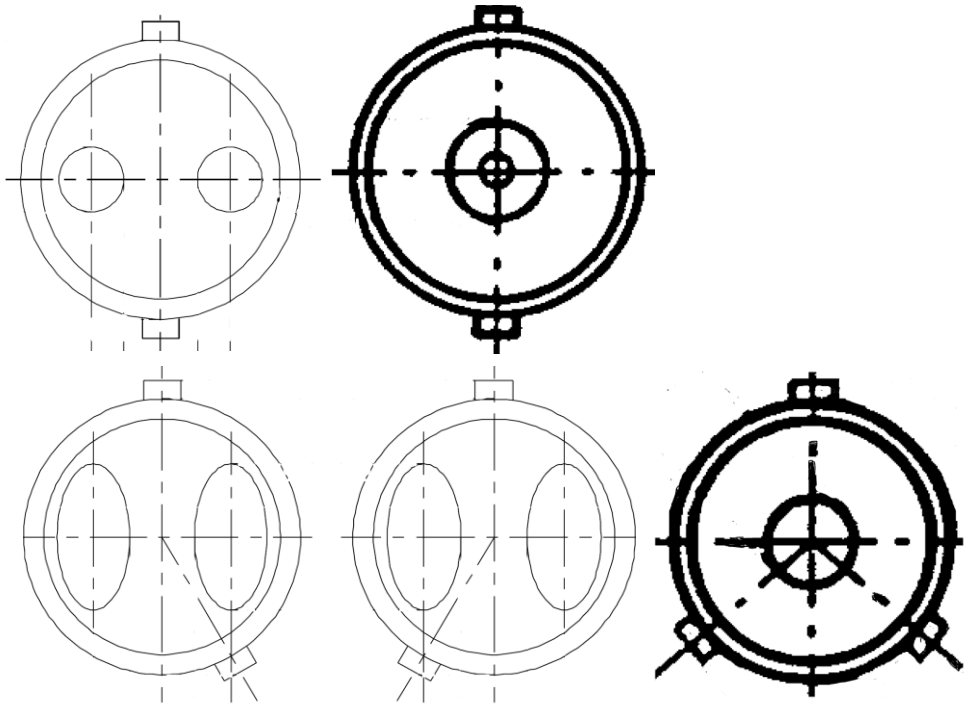


# To facilitate the Full 15 mm bayonet Family,

## All automotive fits need a substitute option

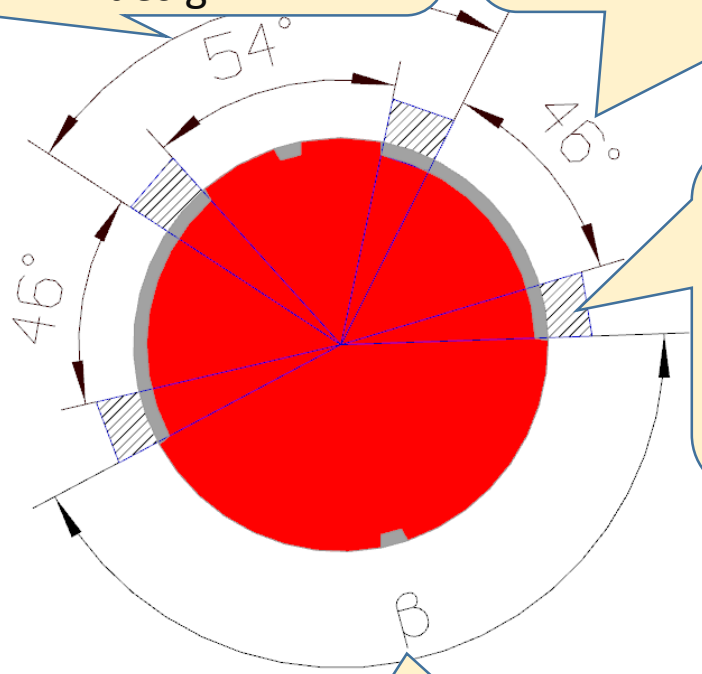
| Fit Substitute* (IEC "60061") | Ref pin Axial position | 2nd (/ 3rd) pin Angle *(clockwise)* | 2nd (3rd) pin (delta) Axial position | 1st / 2nd pin Lengths | Extra pin Angle *(clockwise)* | Extra Pin Hight /Length? |
|---|---|---|---|---|---|---|
| B15*d | 0° / 0 mm | +180° | 0,0 ±0,1 mm | 1,0 ±0,1 | No need | No need |
| BA15*d/s | 0° / 0 mm | +180° | 0,0 ±0,1 mm | 1,0 ±0,1 | +??° | ? |
| BA15*d/s-3(100°/130°) | 0° / 0 mm | +130° / -130° | 0,0 ±0,1 mm | 1,0 ±0,1 | +??° | |
| BAU15*d/s *(Valeo proposal)* | 0° / 0 mm | -150° | 0,0 ±0,1 mm | 1,0 ±0,1 | ~70° ? | Full height (open section in holder) |
| BAW15*d/s | 0° / 0 mm | +150° | +3,2 ±0,1 mm | 1,0 ±0,1 | +??° | |
| BAX15*d(/s) | 0° / 0 mm | +180° | 0,0 ±0,1 mm | 2,00 ±0,15<br>0,78 ±0,08 | +??° | |
| BAY15*d(/s) | 0° / 0 mm | 180° | +3,2 ±0,1 mm | 1,0 ±0,1 | +??° | |
| BAZ15*d(/s) | 0° / 0 mm | -150° | +3,2 ±0,1 mm | 1,0 ±0,1 | +??° | |

# The BA(…)15 Cap holder system; Used area by the current family



54° is used by a single pin including the movement in the holder design

**Remaining area 2 x 46° for an "extra pin" is to small:**
**Minimum 54° is required for a single pin, including it's movement.**




Hatched area's represent the holder material required for the holder construction (enabling movement stop position for the cap)

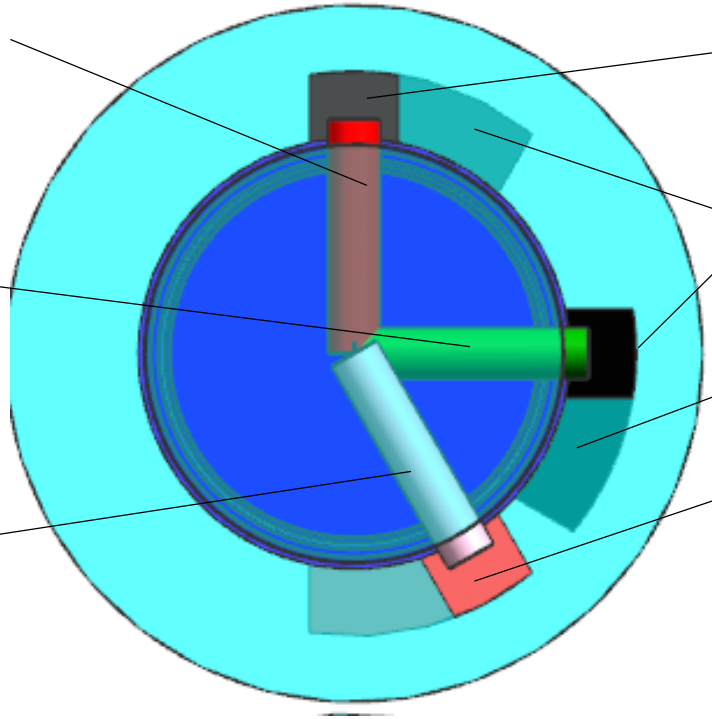
Family of key functions:

- Single contact / double contact
- 2nd pin on 180°
- 2nd pin on +150°
- 2nd pin on -150°
- 2nd pin on +130° **&** 3rd pin on -130°

Resulting occupied space in angular positions

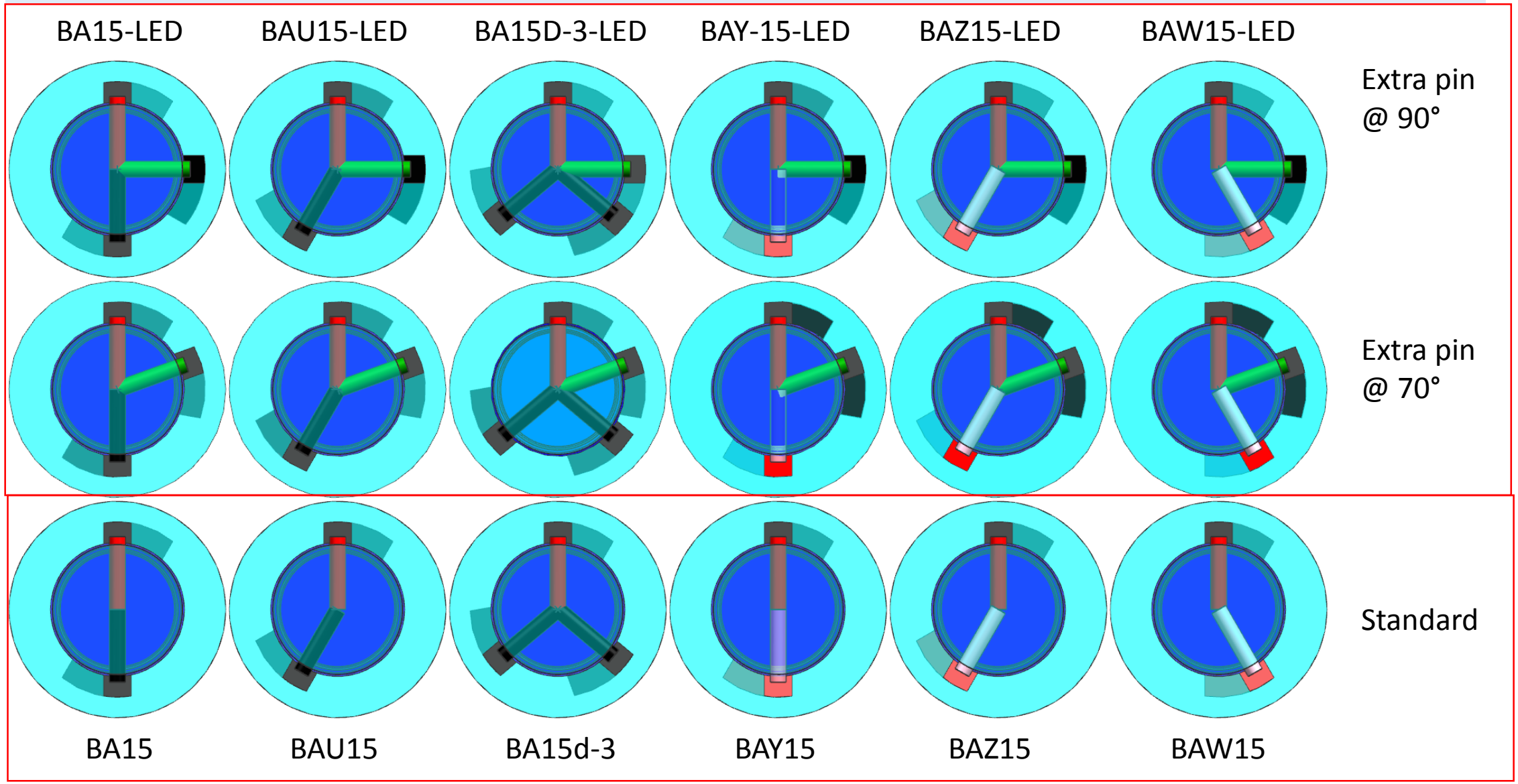
β is occupied by bayonet15 mm family by:
- 2nd and 3rd pin
- movement of the pin in the holder design

# Explanation images for the following pages

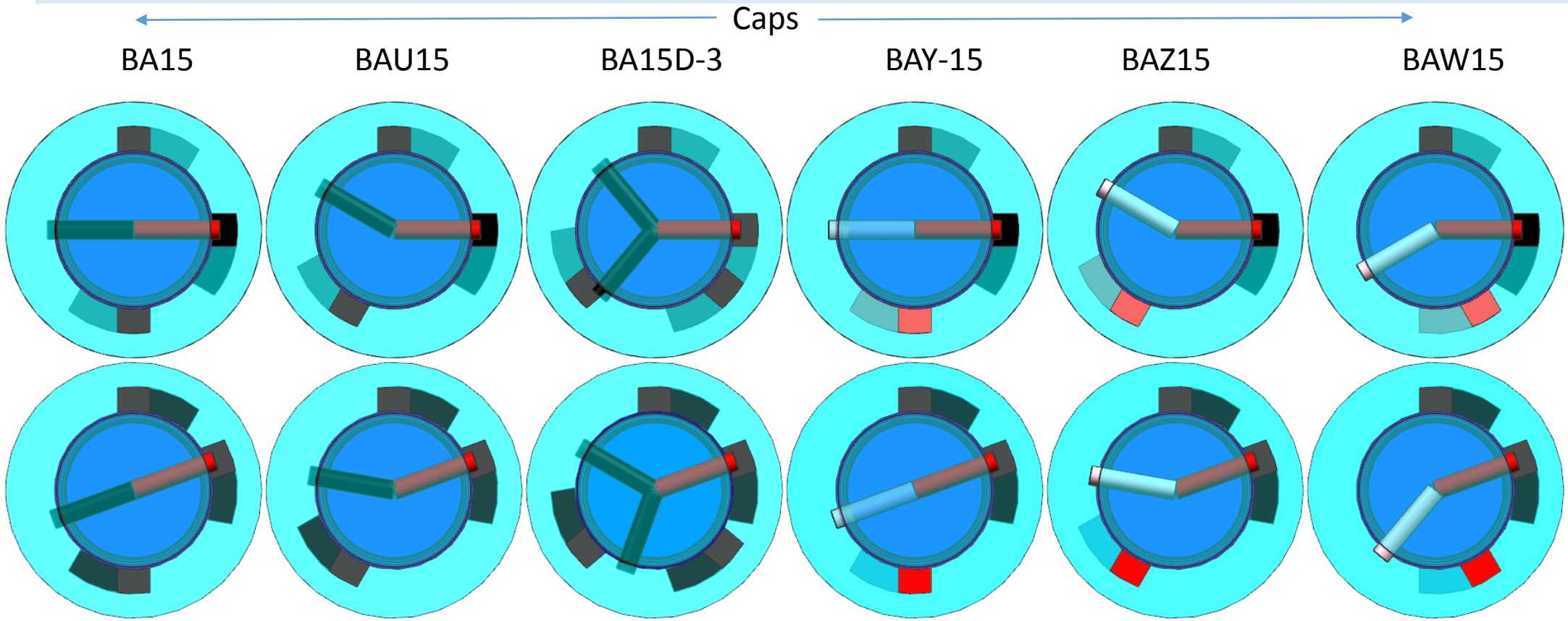



*Note: images build on Least Material Condition = maximum play acc. IEC 60061*

# 70° and 90° versions (based on Valeo proposal)



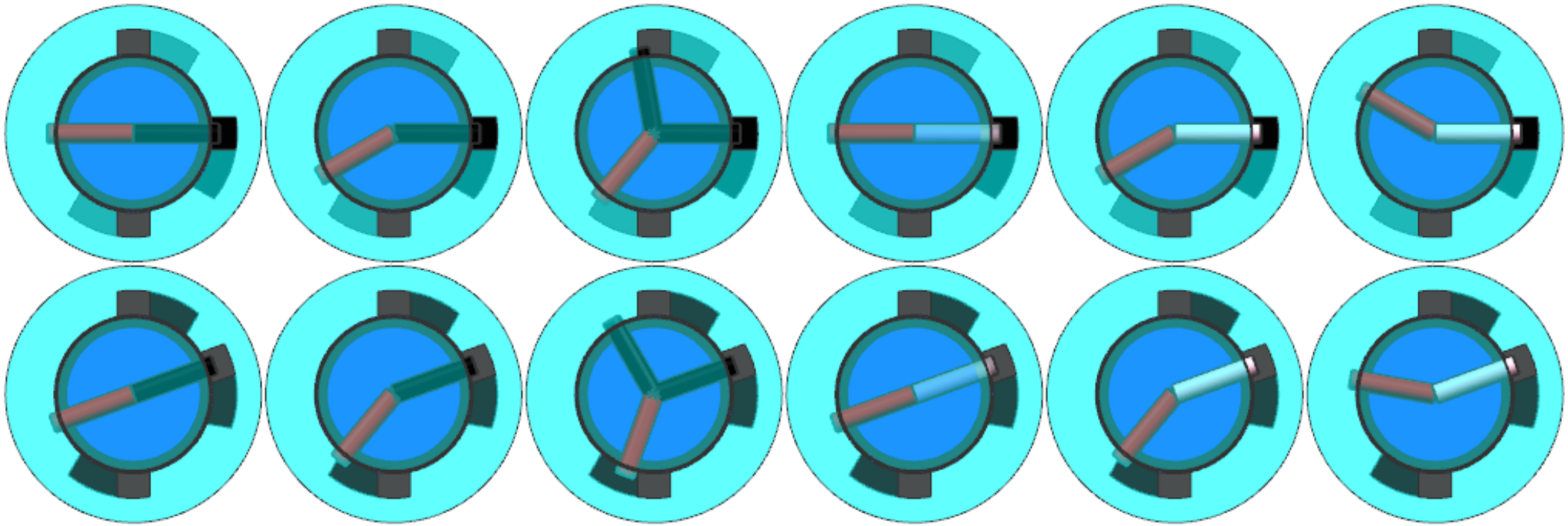
# Check: **BA15**-**LED**-Holder $^{v}/_{s}$ non-LED caps
# Ref pin – in new slot



# Check: **BA15-LED-**Holder $^{v}/_{s}$ non-LED caps
# Non-Ref pin – in new slot

Caps

BA15 BAU15 BA15D-3 BAY-15 BAZ15 BAW15

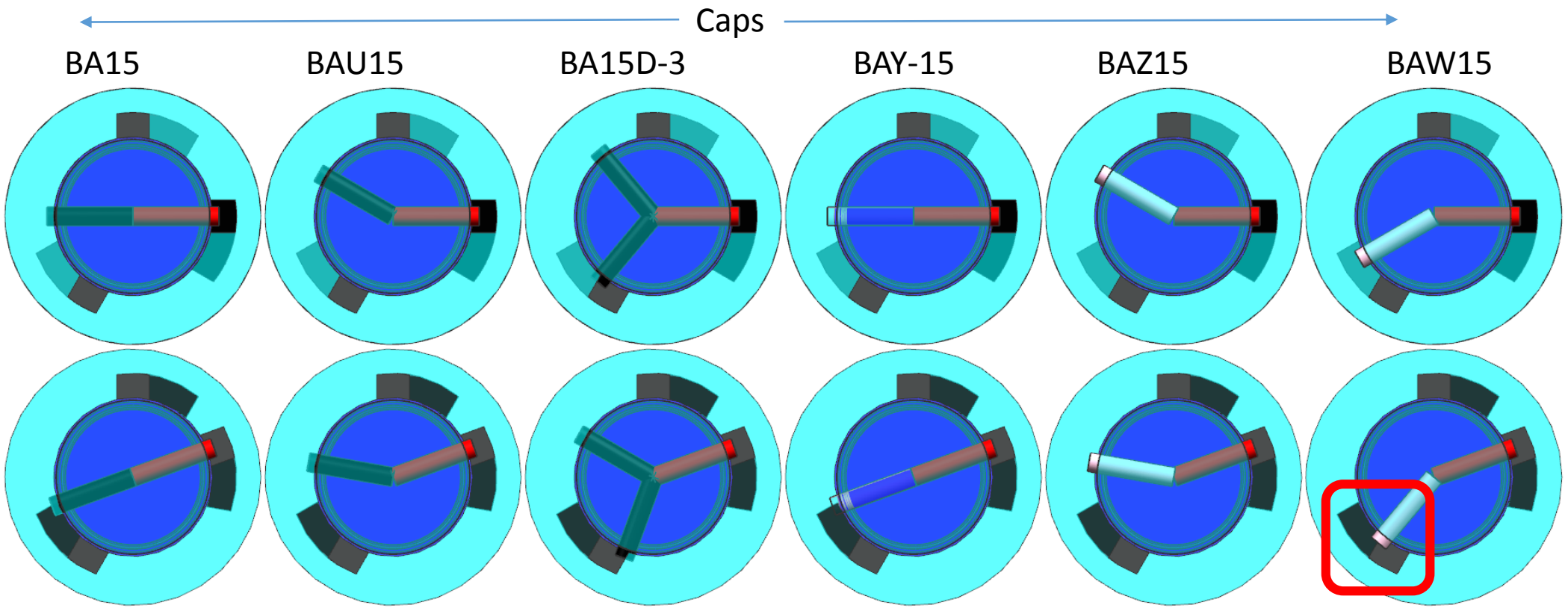


BA15-LED holders

Extra pin @ 90°

Extra pin @ 70°

# Check: BAU15-LED Holder-$^{v}/_{s}$ non-LED caps
# Ref pin in new slot



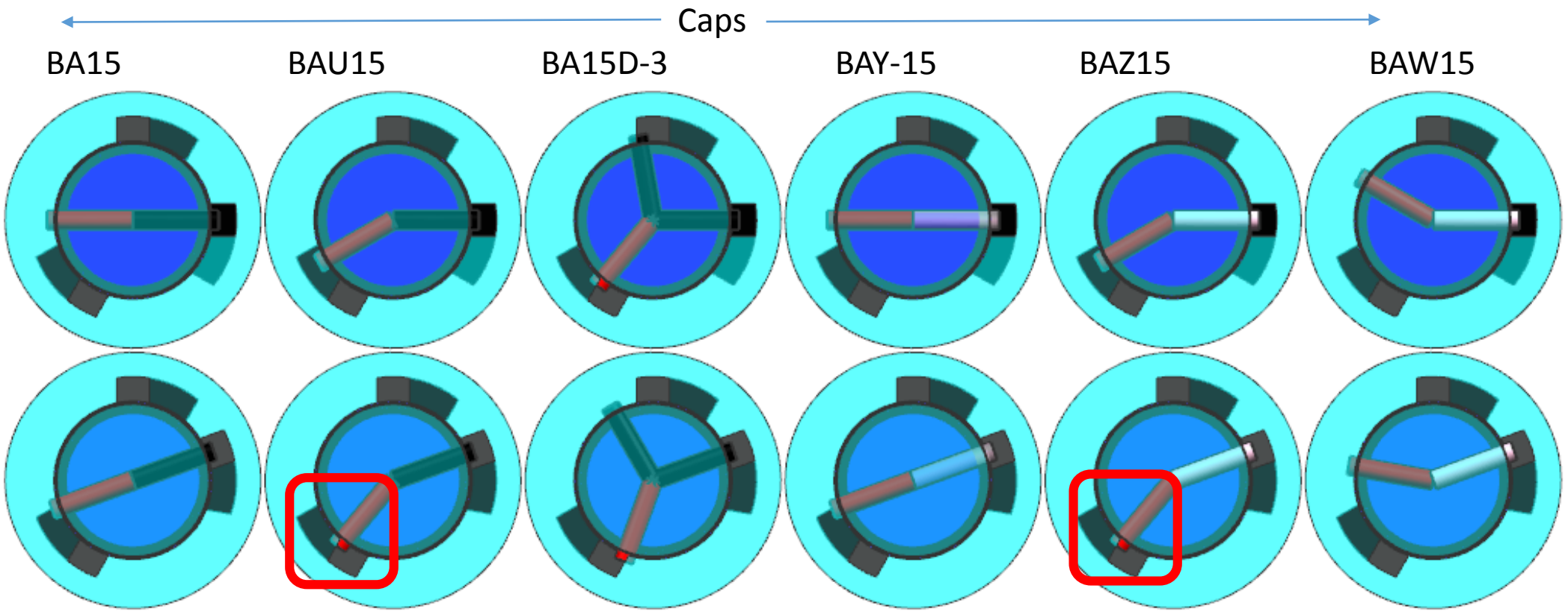

BAU15-LED holders

Extra pin @ 90°

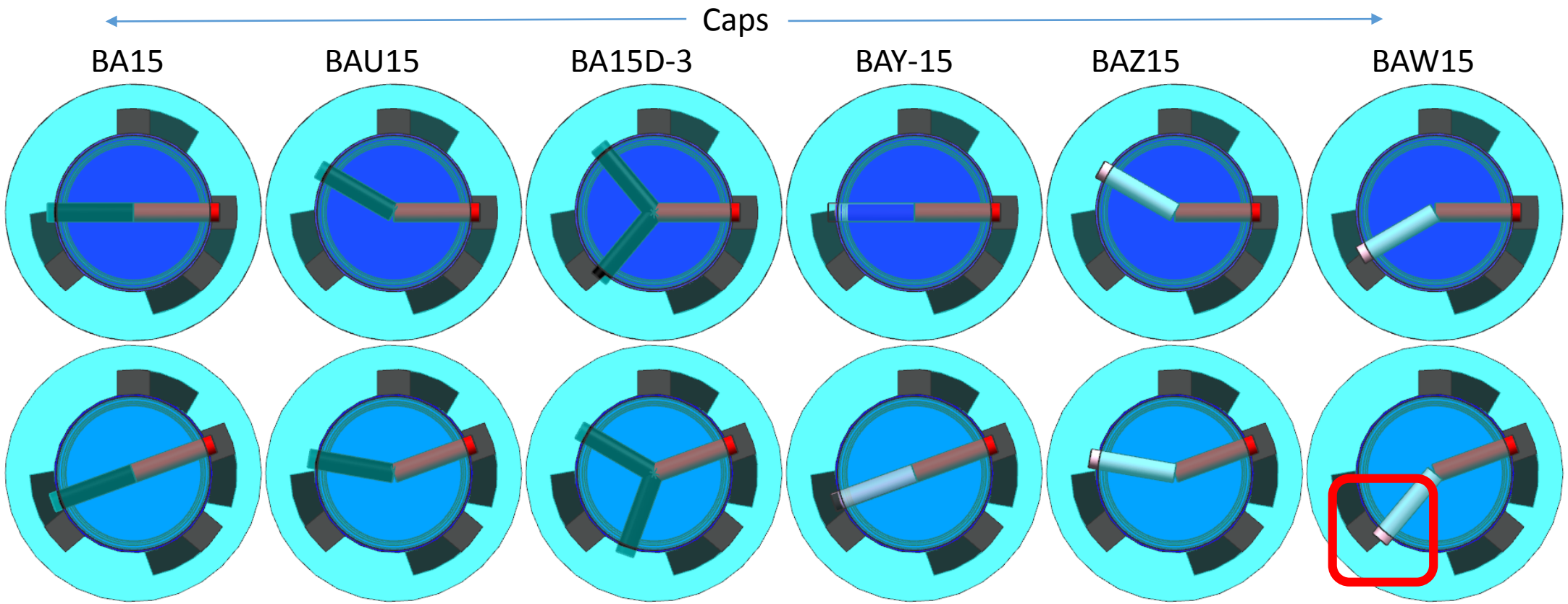
Extra pin @ 70°

Close insert,
elevated 2nd pin => ok

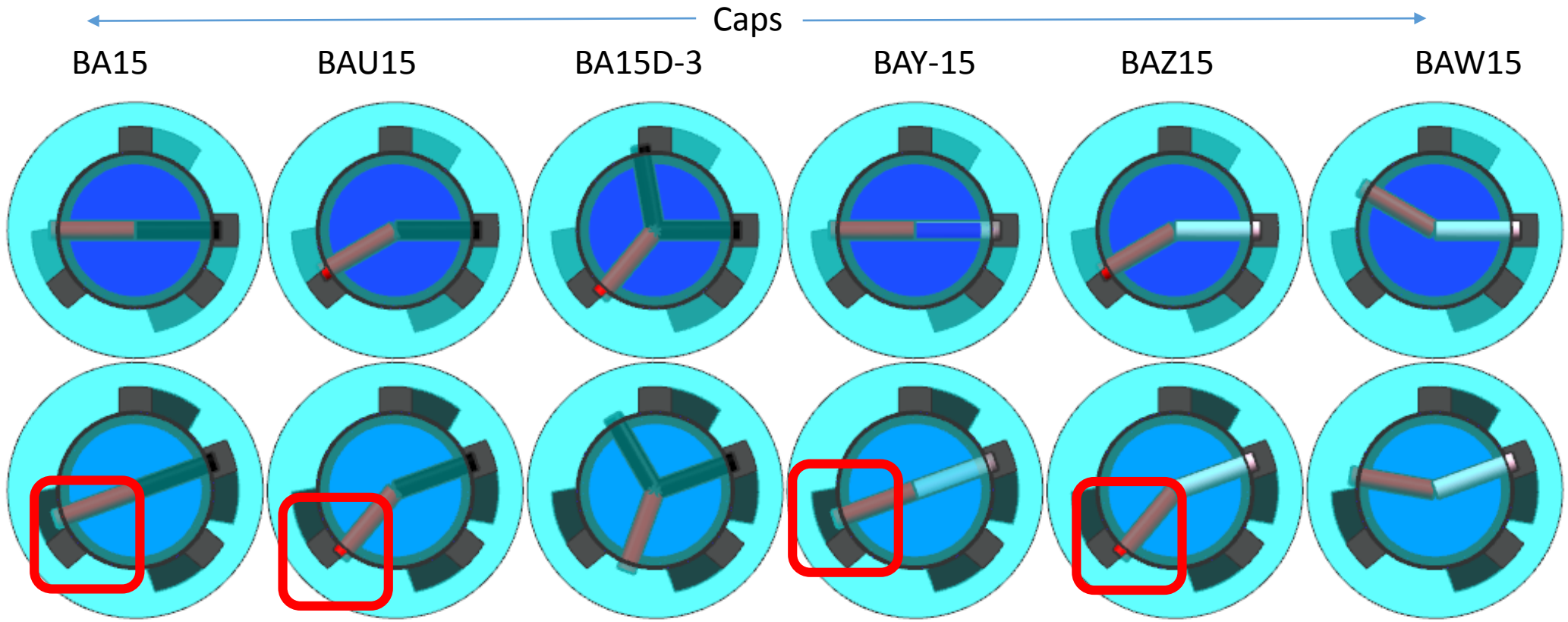
# Check: BAU15-LED Holder-v/s non-LED caps
# Non-Ref pin in new slot



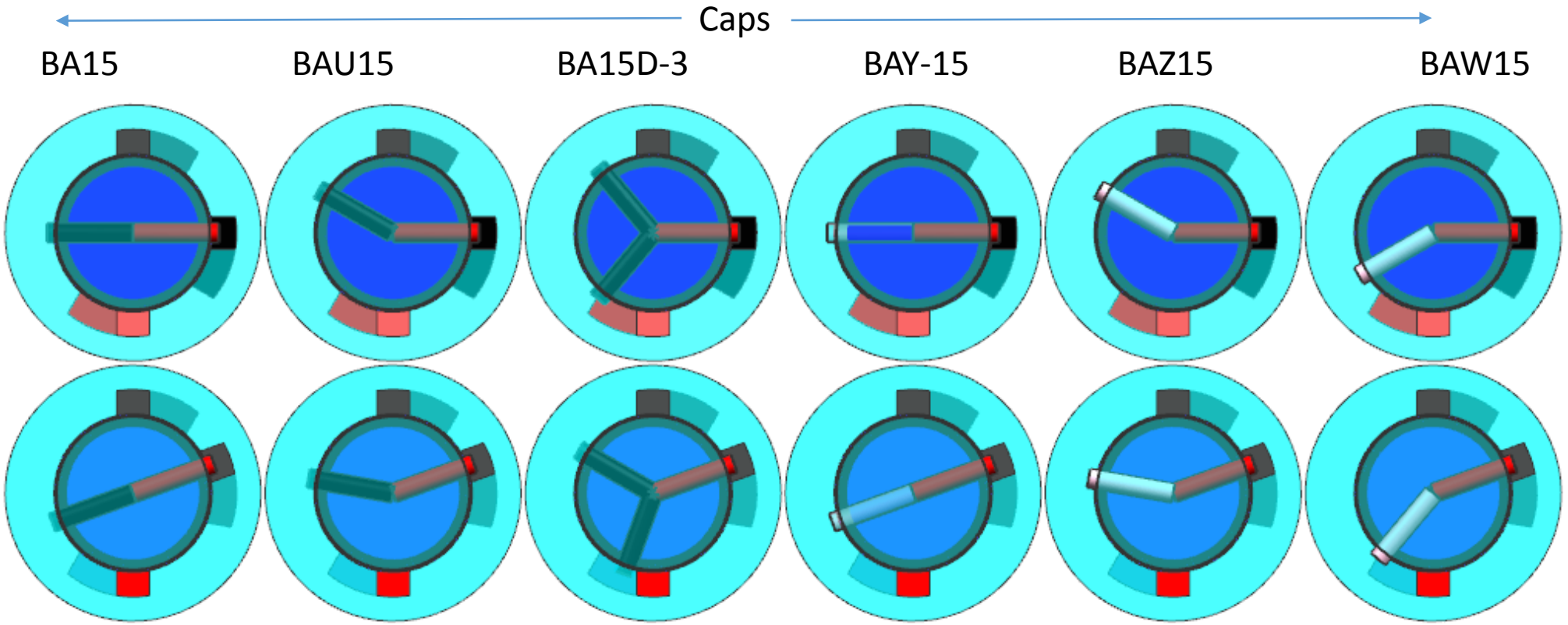
# Check: BA15**d-3**-LED Holder-$^{v}/_{s}$ non-LED caps
# Ref pin in new slot



# Check: BA15**d-3**-LED Holder-$^{v}/_{s}$ non-LED caps
# Non-Ref pin in new slot



# Check: BA**Y**15-LED Holder-$^{v}/_{s}$ non-LED caps
# Ref pin in new slot

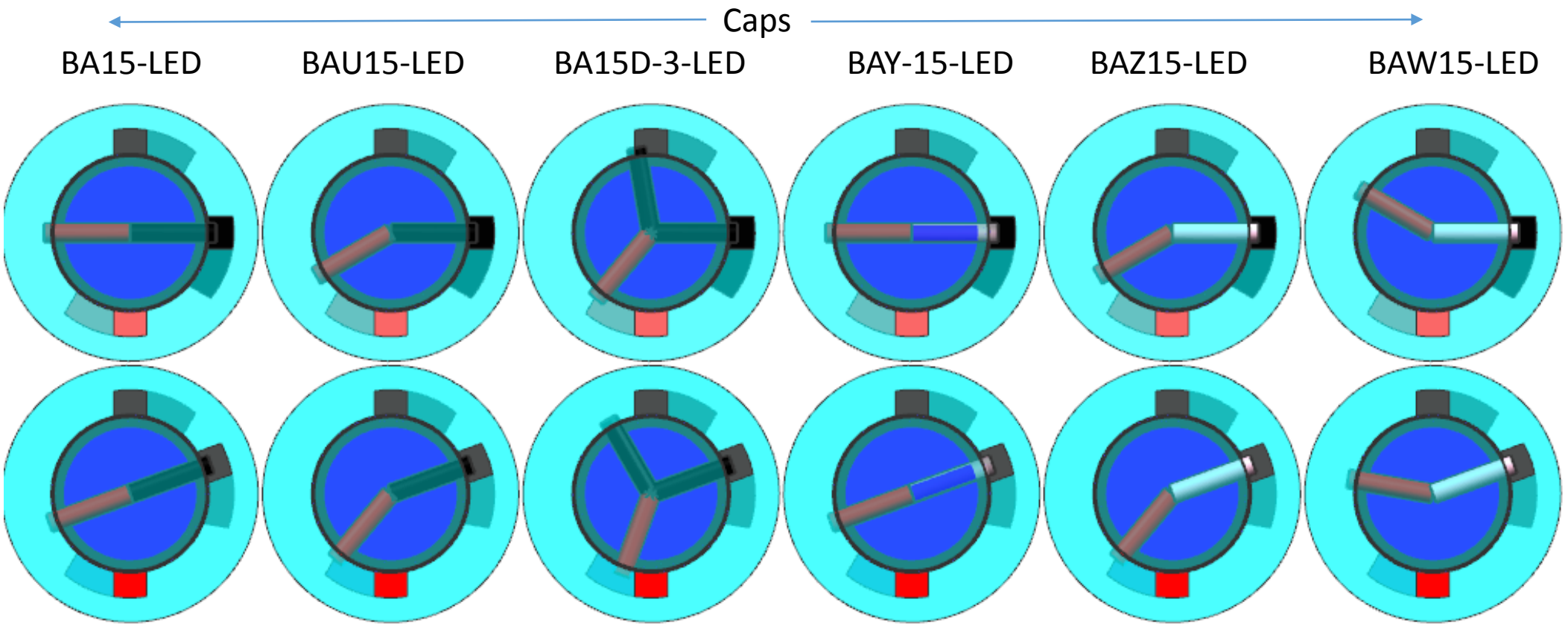



BA15d-3-LED holders

Extra pin @ 90°

Extra pin @ 70°

# Check: BA**Y**15-LED Holder-$^{v}/_{s}$ non-LED caps
# Non-Ref pin in new slot

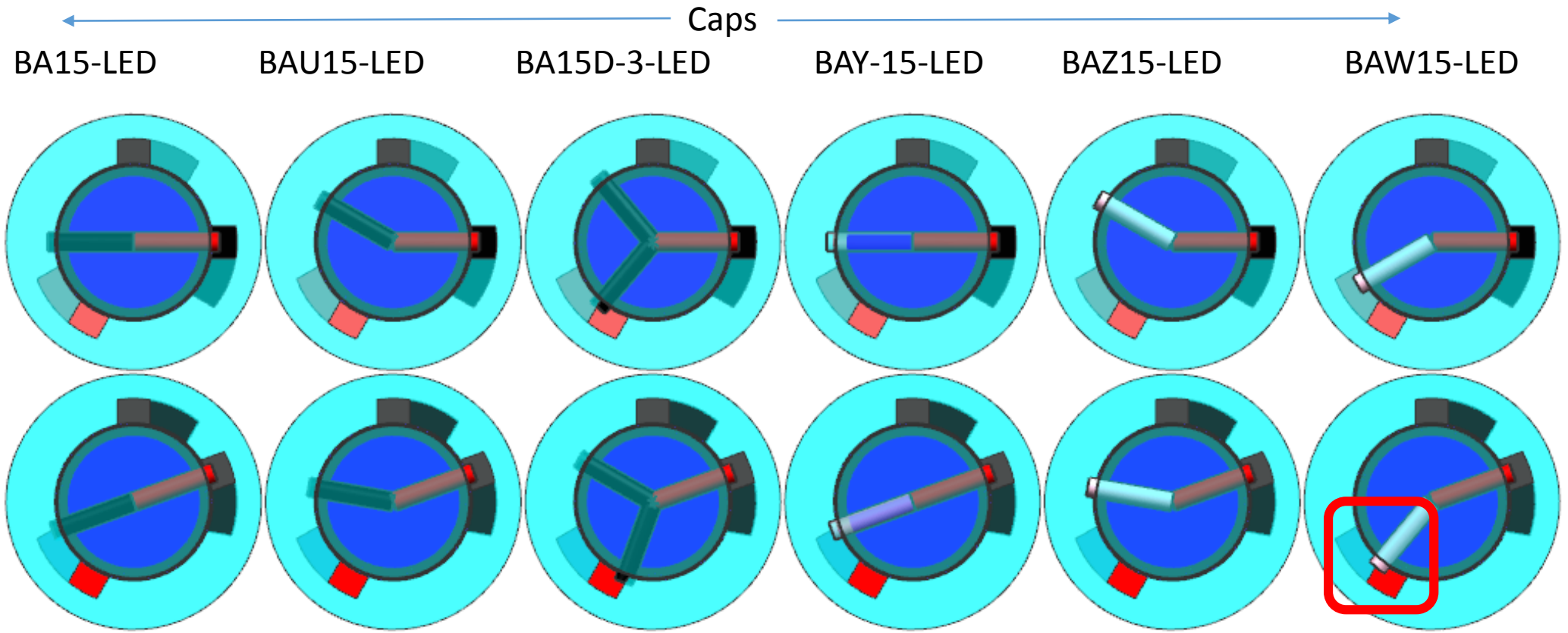



BA15Y-LED holders

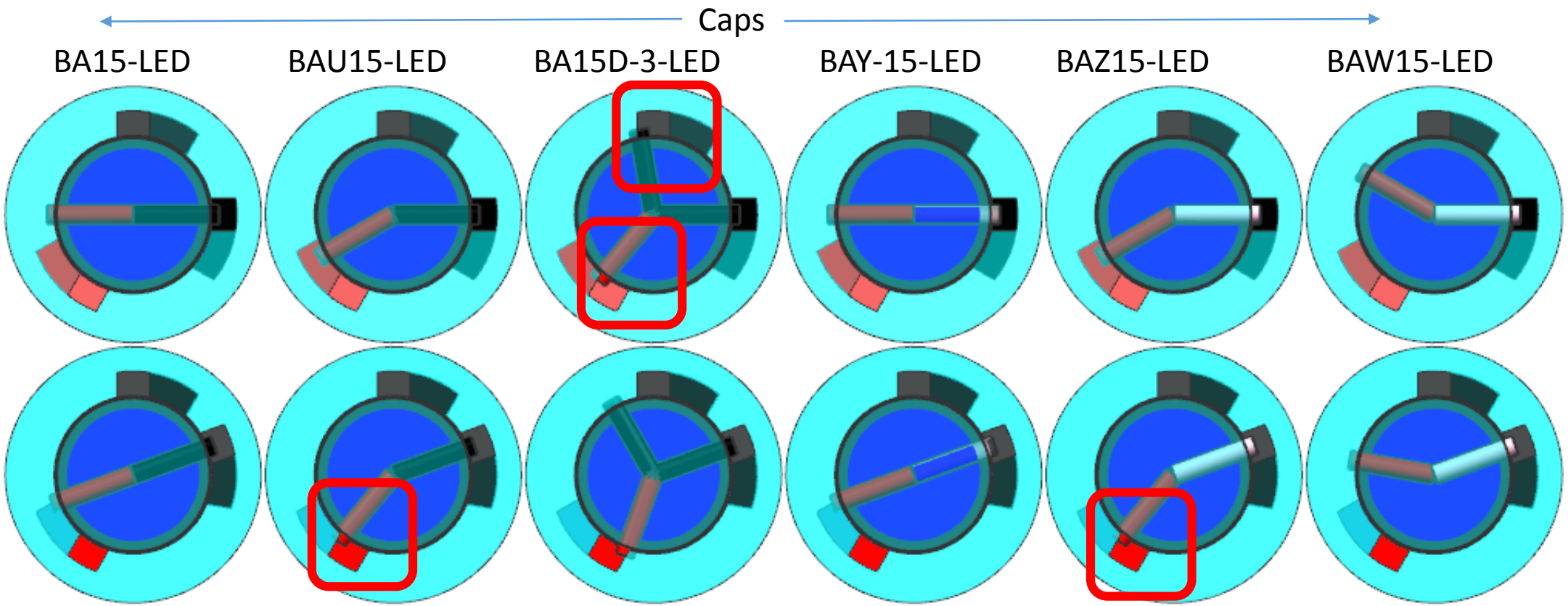
Extra pin @ 90°

Extra pin @ 70°

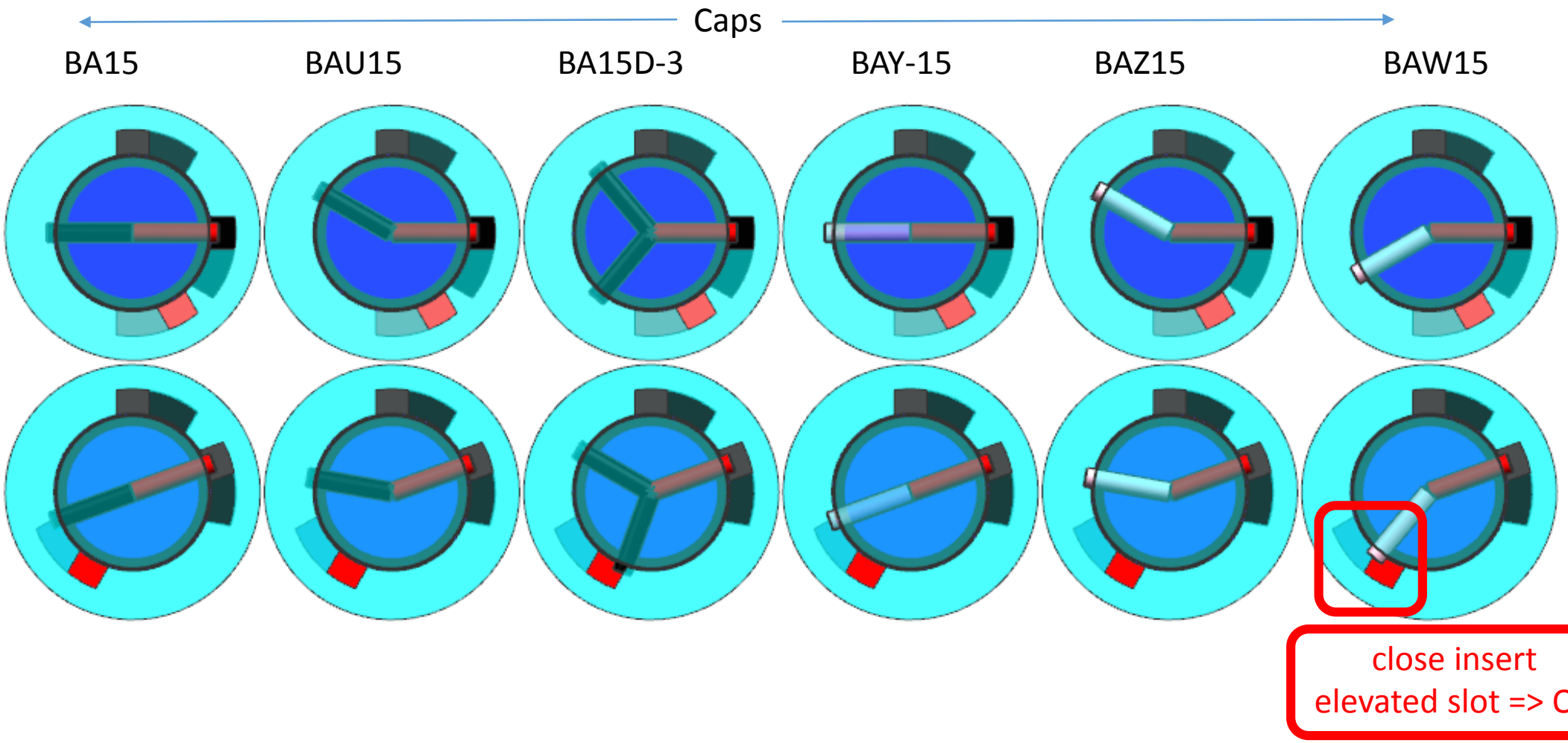
# Check: BAZ15-LED Holder-$^{v}/_{s}$ non-LED caps
# Ref pin in new slot



# Check: BAZ15-LED Holder-v/s non-LED caps
# Non-Ref pin in new slot



# Check: BA**W**15-LED Holder-$^{v}/_{s}$ non-LED caps
# Ref pin in new slot



# Check: BA**W**15-LED Holder-$^{v}/_{s}$ non-LED caps
# Non-Ref pin in new slot