Honeywell CSNV500 Series Current Sensors Instruction Manual

Honeywell

INSTALLATION INSTRUCTIONS FOR THE CURRENT SENSORS CSNV500 SERIES

Contents

CSNV500 Series Current Sensors

3013-2561
Issue A

⚠ **WARNING**
PERSONAL INJURY WARNING
DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.
Failure to comply with these instructions could result in death or serious injury.

PRODUCT DESCRIPTION

The Honeywell CSNV500 current sensor is based on Hall technology, with close loop and CANBUS output. It can be used to measure 500 A rated current using a proprietary Digital Compensation technology.

SCOPE

This document provides installation instructions of CSNV500 for optimal sensor performance. The document will provide recommendations of the primary conductor shapes and clear distances to prevent any disturbances due to external magnetic fields and ferromagnetic material. The busbar used in the document is made of copper, 15 mm width and 3 mm thickness.

INSTALLATION GUIDE

3.1 Primary conductor shapes

When the primary current flows through the conductor, a magnetic field is generated. The CSNV500 can sense the magnetic field and convert to current readings.
The primary conductor can be cable or busbar. If the primary conductor is not properly installed, the sensor's accuracy may be affected. Several recommended installation options are shown as shown in Figure 1.
Figure 1a. CSNV500 with U-shaped Busbar at 180° and 5 mm Distance Position

Figure 1b. CSNV500 with L-shaped Busbar at 90° and 5 mm Distance Position

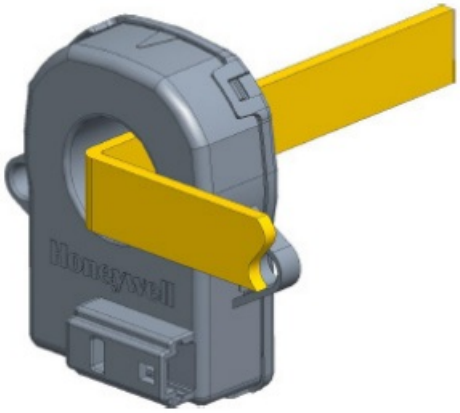
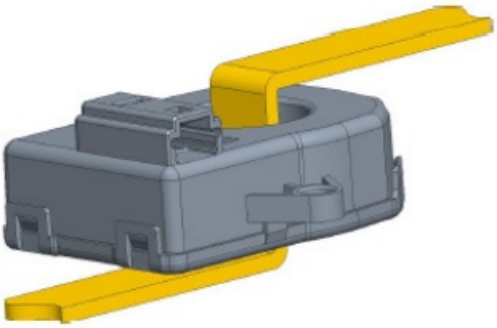
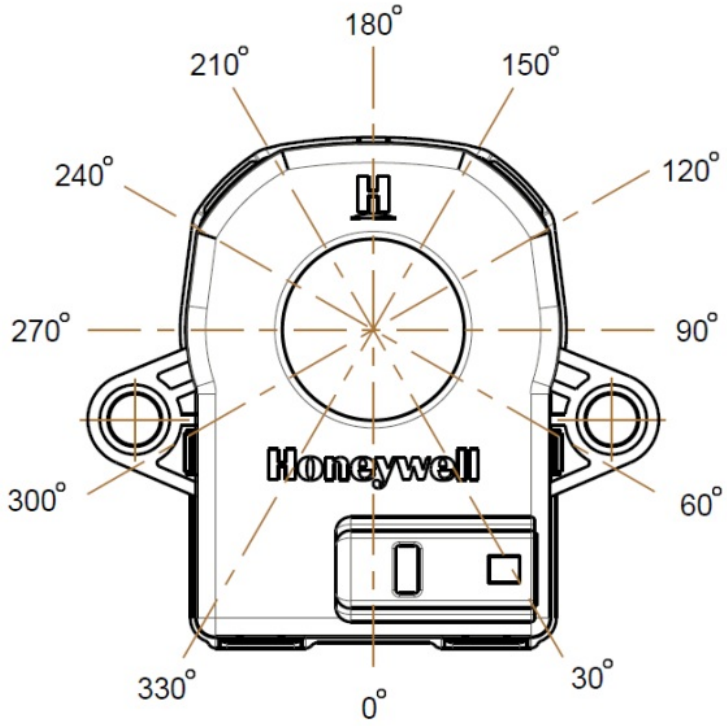


Figure 1c. CSNV500 with Z-shaped Busbar at 180° and 5 mm Distance Position



The angle in test items are defined as below in Figure 2.

Figure 2. Test Angles



3.1.1 U-Shape Conductor

For the U-shape primary conductor, the distance of the U-shape to sensor and the angle related to the current sensor are the two most important parameters. Several angles and distance have been tested and results shown in the figures below.

Figure 3. CSNV500 with U-shaped Busbar Installation at an Angle of 180°

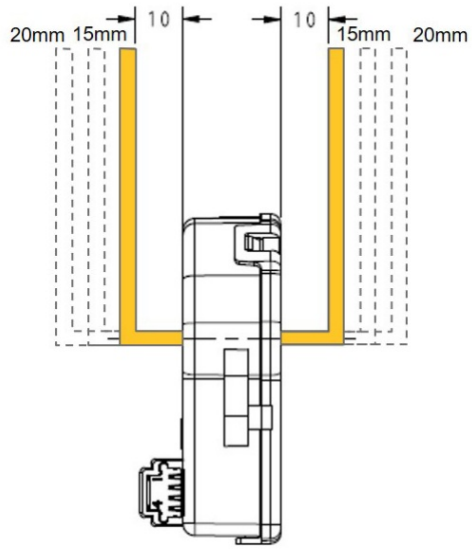


Figure 4. U-shape Busbar - Current Error at 10 mm

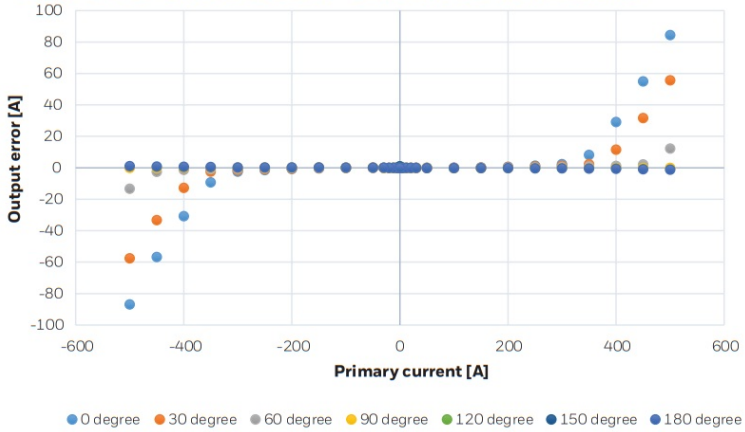


Figure 5. U-shape Busbar - Current Error at 15 mm

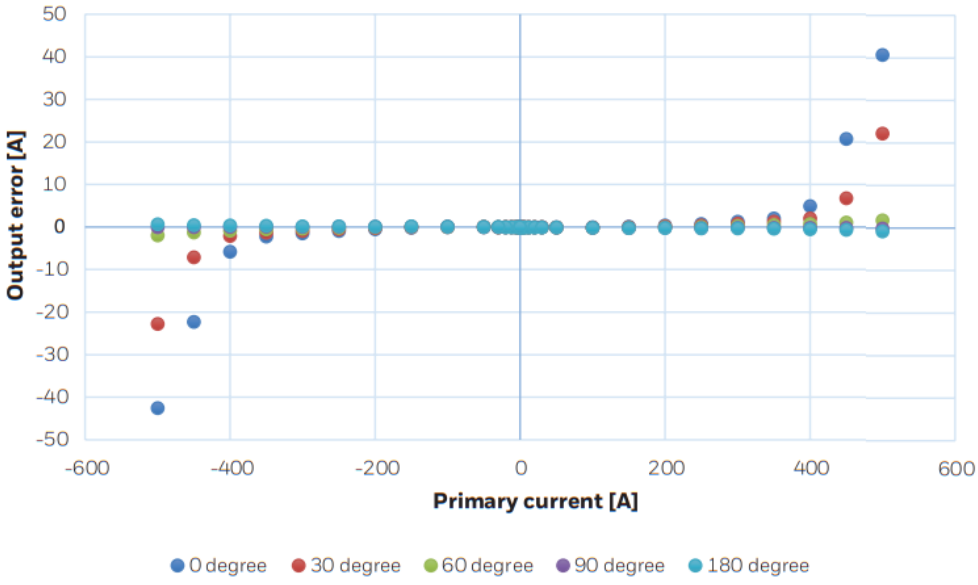
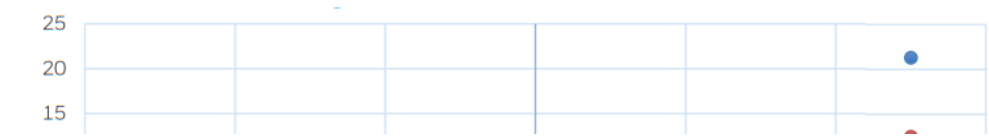


Figure 6. U-shape Busbar - Current Error at 20 mm



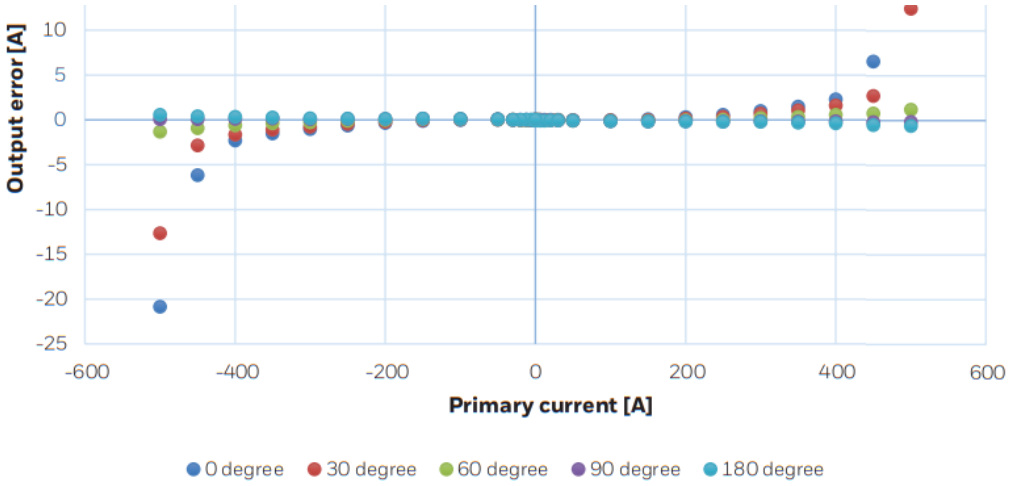
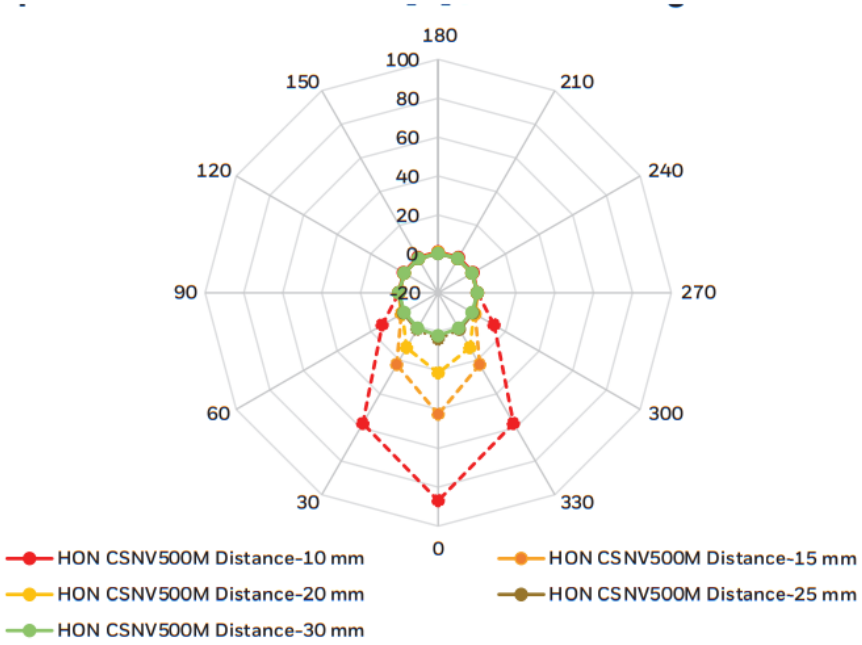
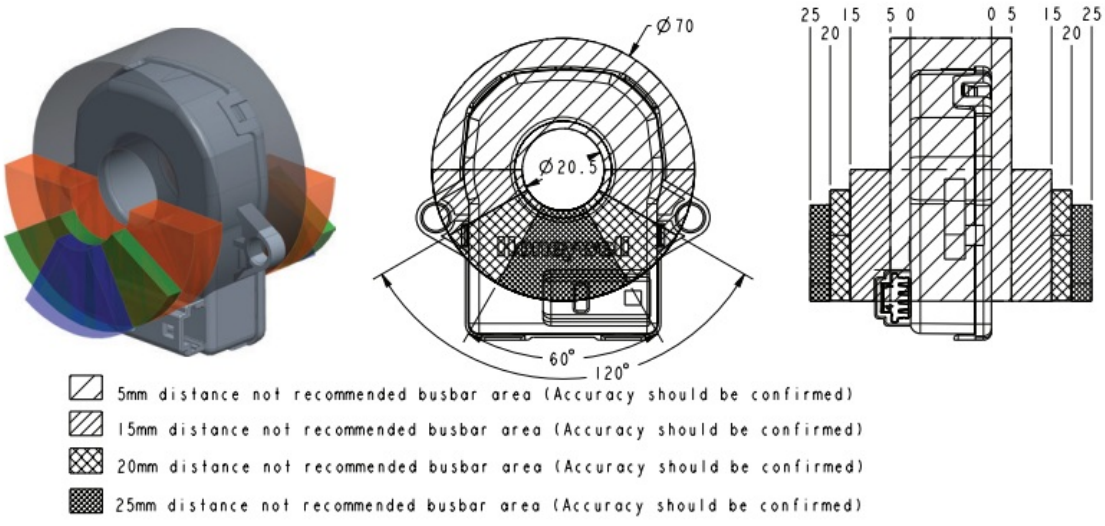


Figure 7. U-shape Busbar – Current Error at Different Angle and Distance



Based on test results of U-shape busbar, Honeywell recommends the primary conductor should not be near the angle of 0°, other angles are shown in Figure 8. For angles near 180°, the sensor can achieve high accuracy at a distance of 5 mm.

Figure 8. U-shape Installation – Not Recommended Area



3.1.2 L-shape conductor

For the L-shape primary conductor, the distance of the L-shape to sensor and the angle related to current sensor are the two most important parameters. It is better than the U-shape. Some angles and distance have been tested and results shown in the figures below.

Figure 9. L-shape Busbar Installation at an Angle of 180°

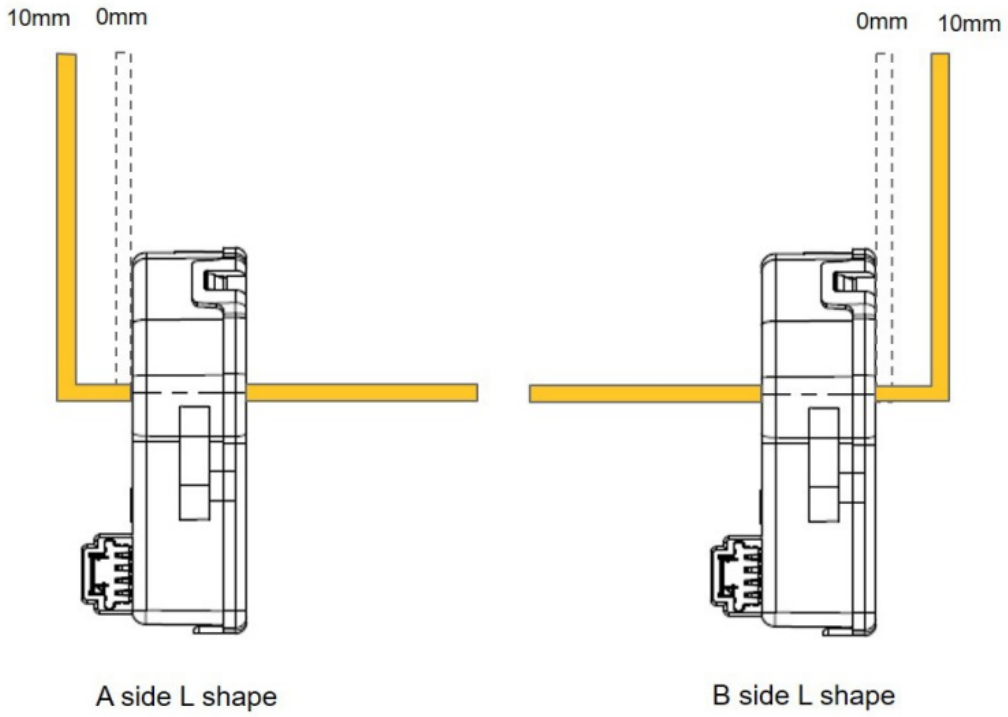


Figure 10. L-shape A Side Busbar - Current Error at 0 mm

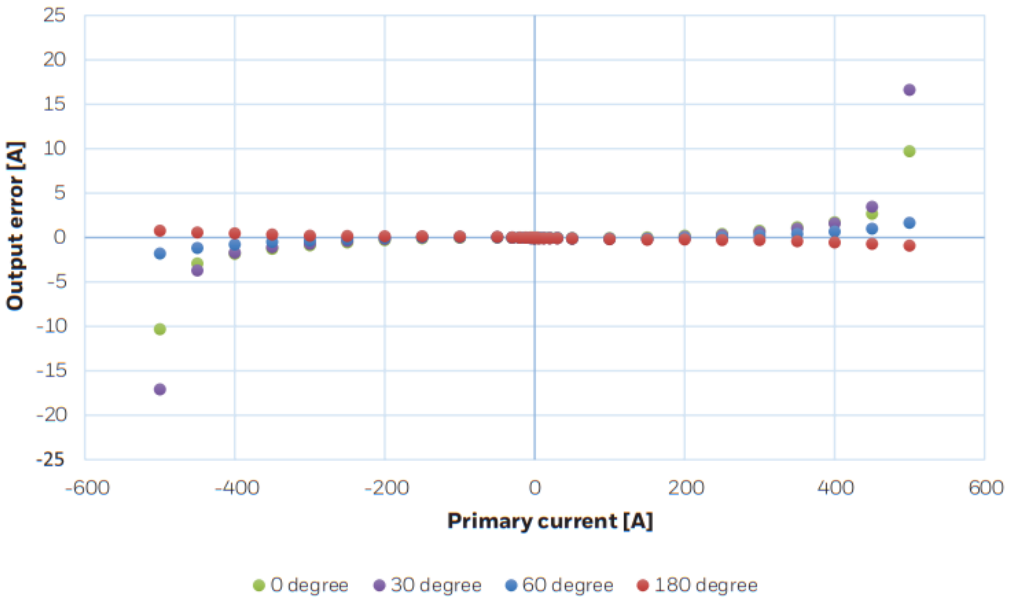
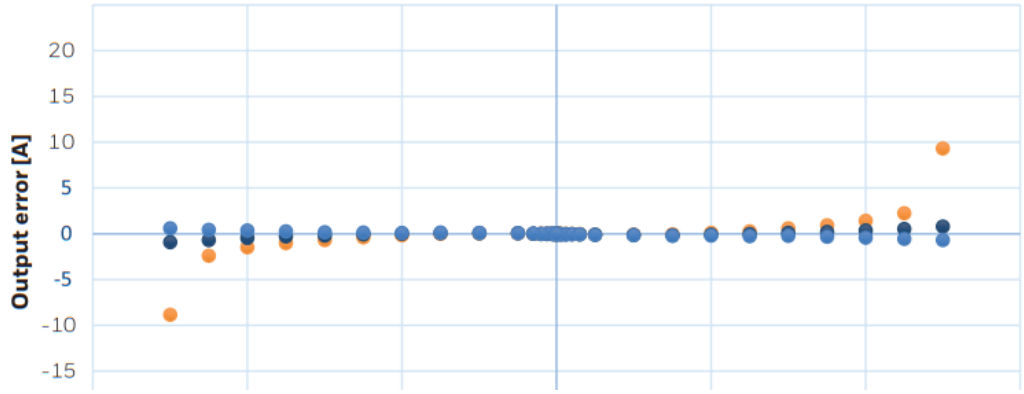


Figure 11. L-shape A Side Busbar - Current Error at 5 mm



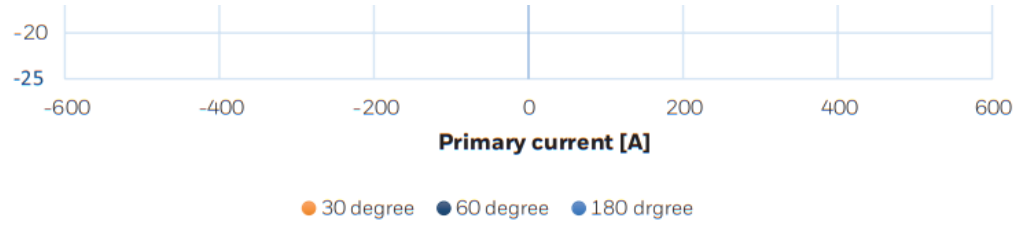


Figure 12. L-shape A Side Busbar - Current Error at 10 mm

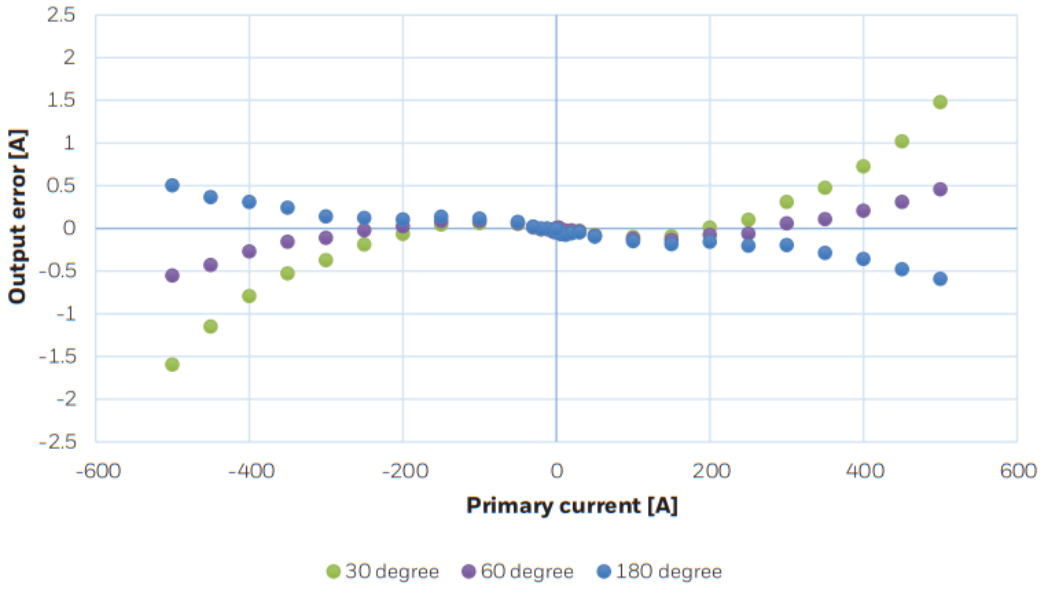


Figure 13. L-shape B Side Busbar - Current Error at 0 mm

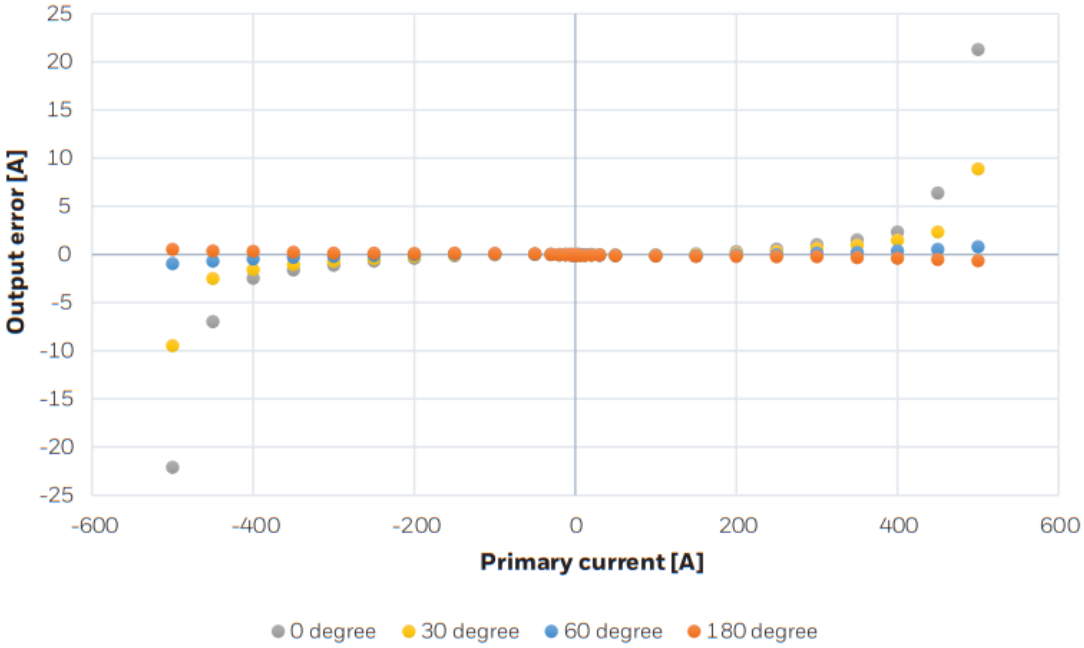
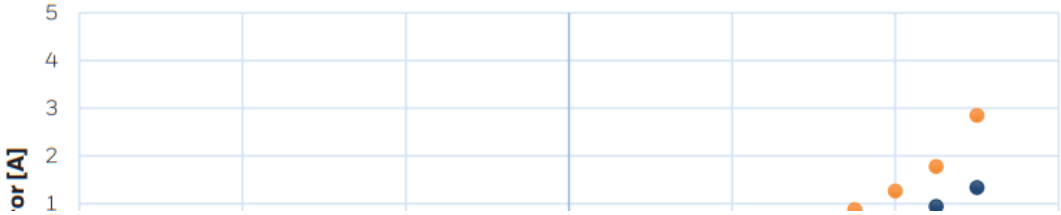


Figure 14. L-shape B Side Busbar - Current Error at 5 mm



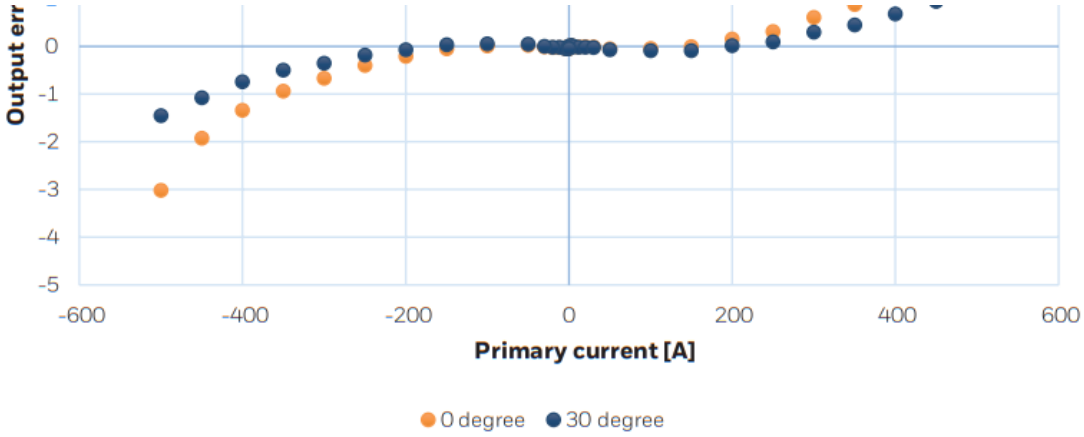


Figure 15. L-shape B Side Busbar – Current Error at 10 mm

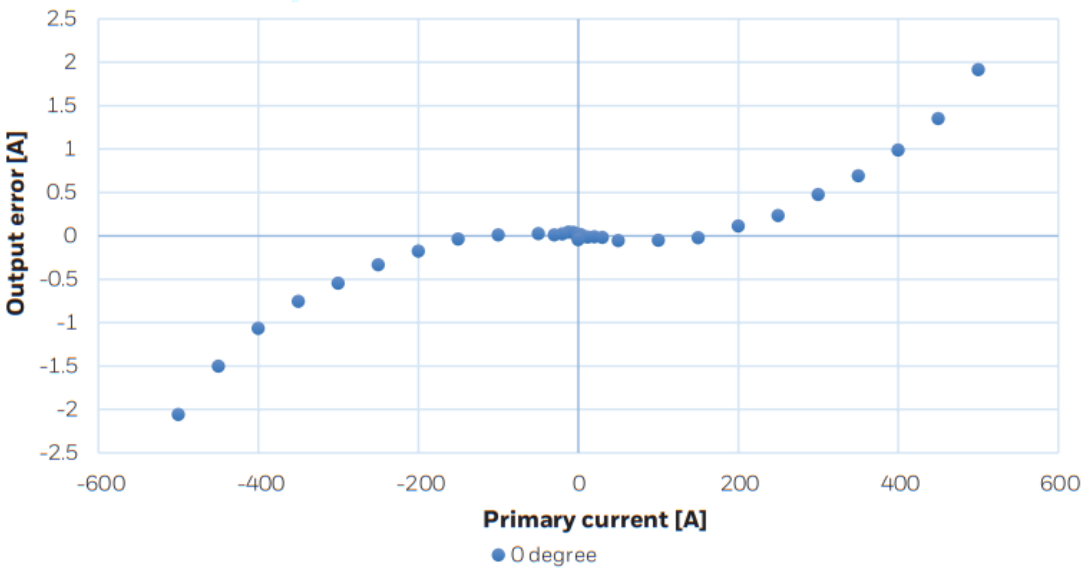
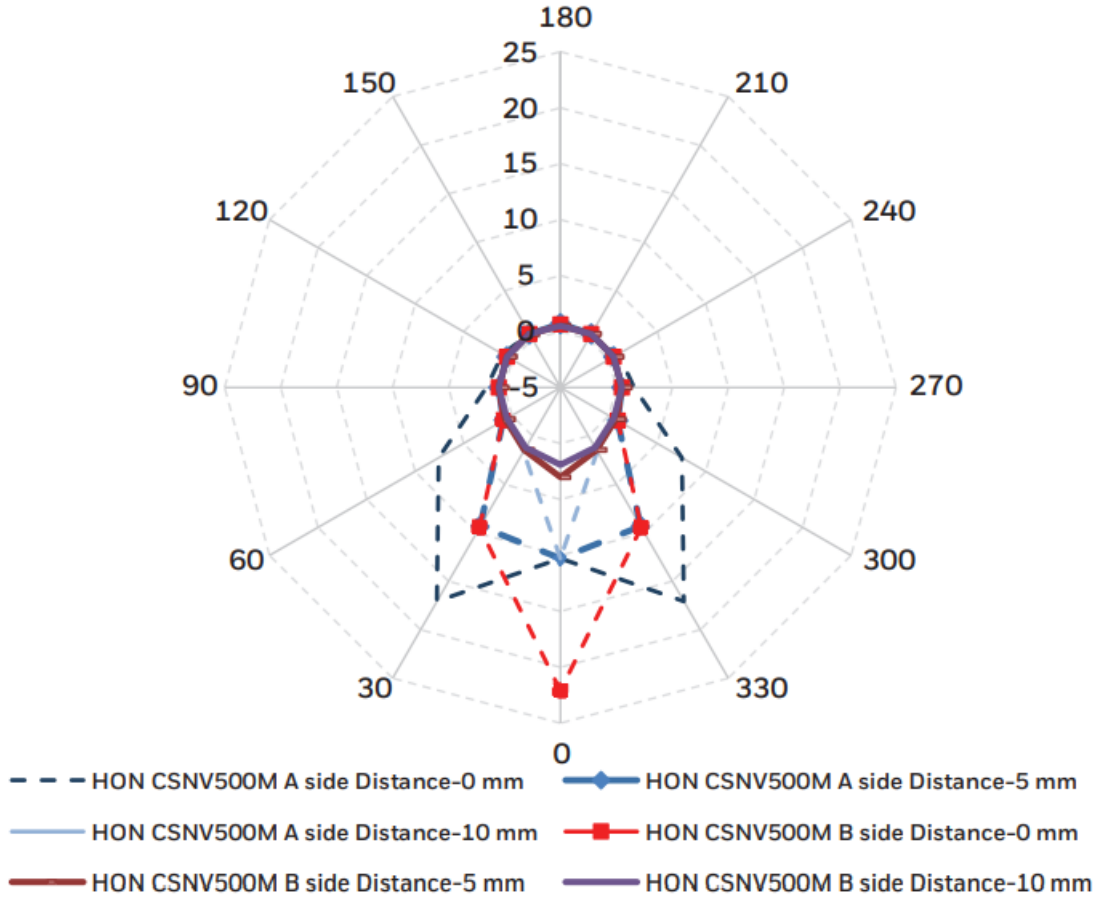
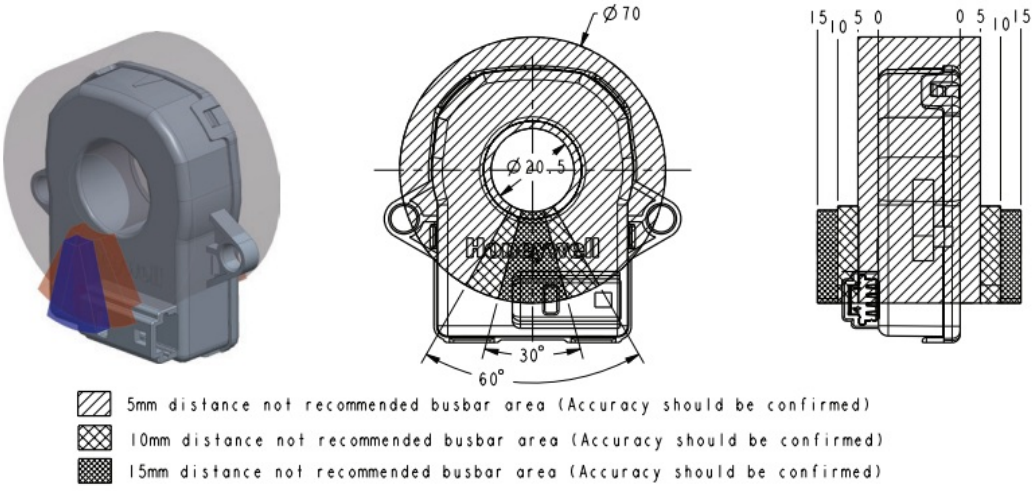


Figure 16. L-shape Busbar – Current Error at Different Angle and Distance



Based on the test results of L-shape busbar, Honeywell recommends the primary conductor should not be near the angle of 0°, other angles are shown in Figure 17. For angles near 180°, the sensor can achieve high accuracy at a distance
of 5 mm.

Figure 17. L-shape Installation - Not Recommended Area



3.1.3 Z-shape conductor

For the Z-shape primary conductor, the reading will still follow the specification requirement, even the distance of conductor and sensor is 0 mm. But considering heat dissipation, Honeywell recommends the distance is 5 mm. Some angles have been tested and results shown in the figures below.

Figure 18. Z-shape Busbar Installation at an Angle of 180°, 5 mm [0.20 in] Separation Distance

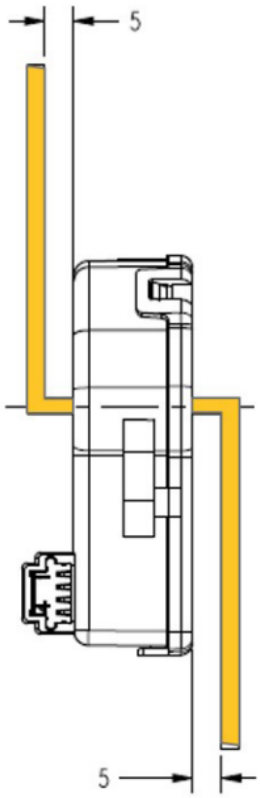


Figure 19. Z-shape Busbar – Current Error at 0 mm

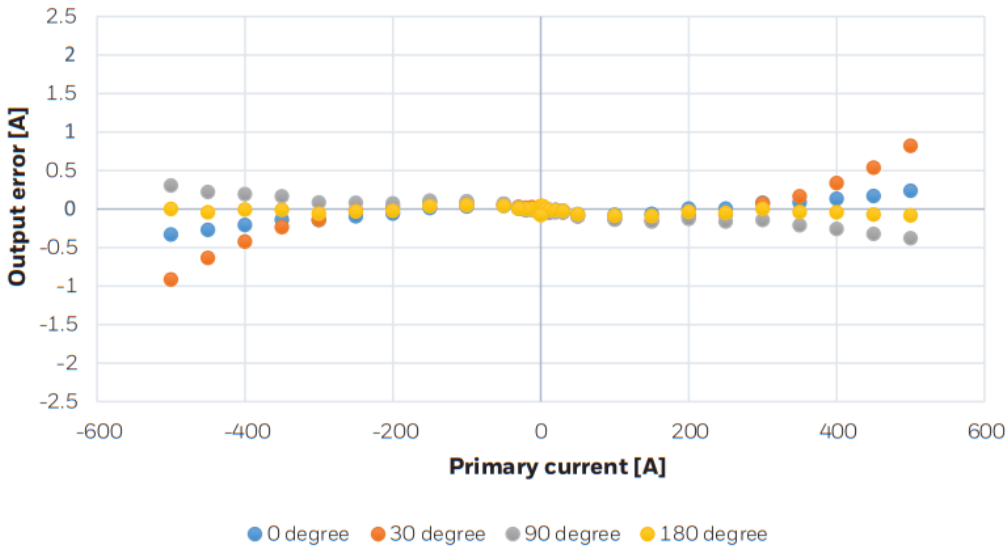
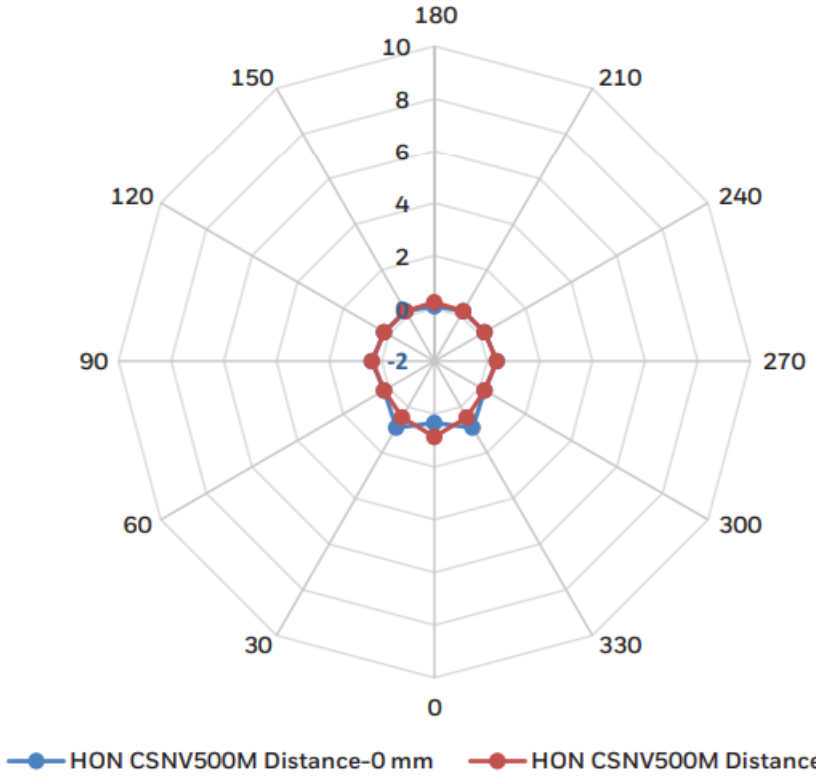
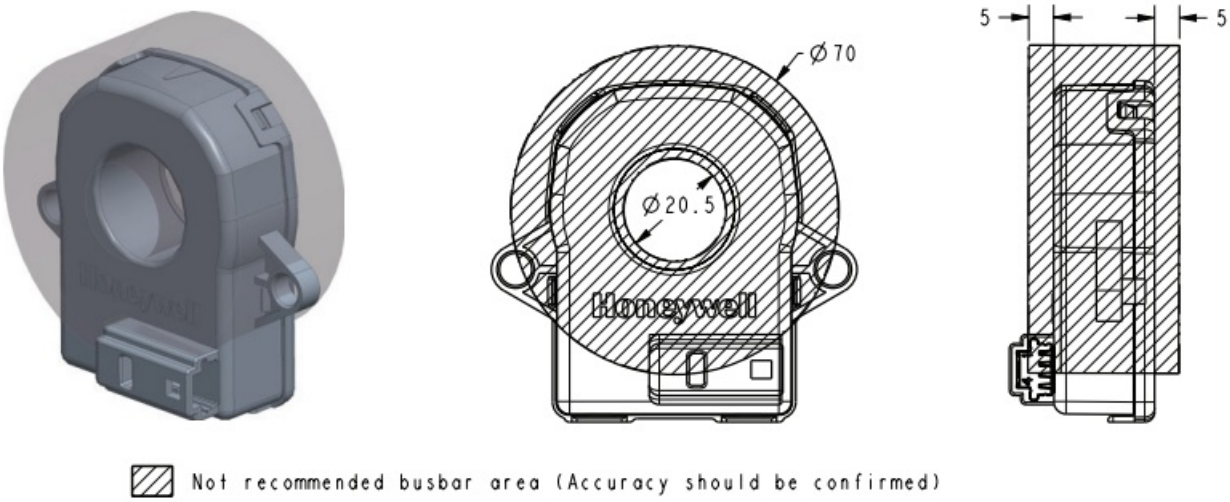


Figure 20. Z-shape Busbar – Current Error at Different Angle and Distance



Based on the test results of Z-shape installation, the distance and the angle of the busbar can hardly influence the sensor's output. To eliminate the thermal effect of the busbar, a 5 mm distance between the sensor and busbar is recommend, as shown in Figure 21.

Figure 21. Z-shape Installation – Not Recommended Area



3.2 Primary Conductor Centering

If primary conductor is at the bottom location of sensor's primary through-hole, the sensor's accuracy will be interfered with. Some angles and locations have been tested and results described in the figures below.

Figure 22. Busbar Installation Position

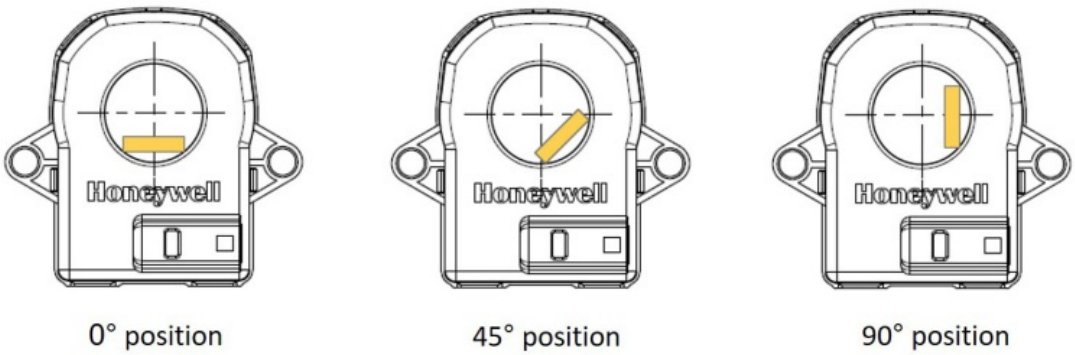


Figure 23. Current Error in Horizontal Direction

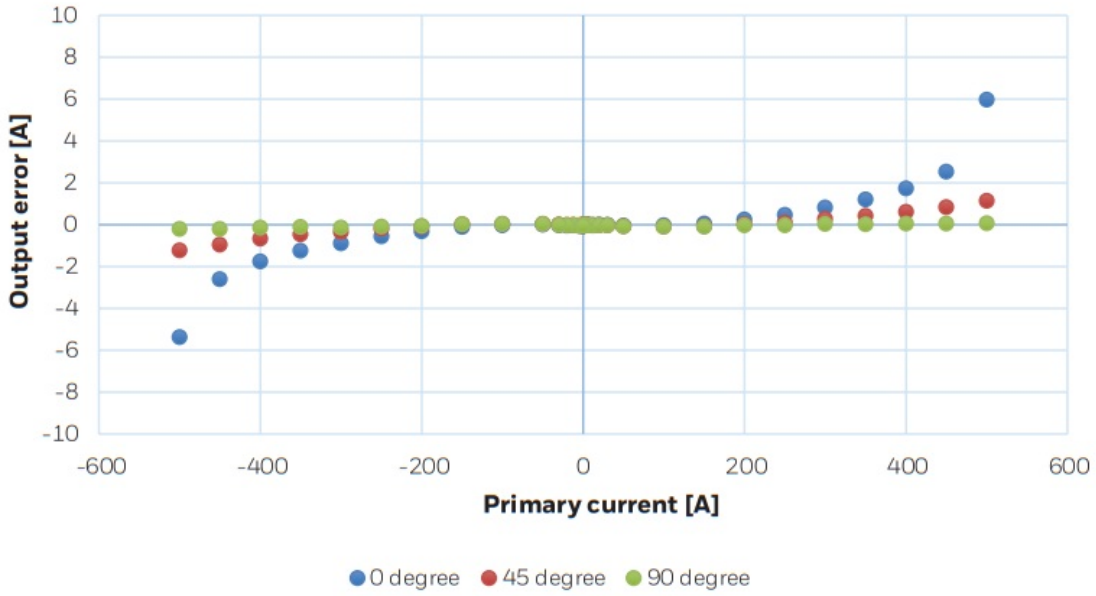


Figure 24. Busbar Installation Position

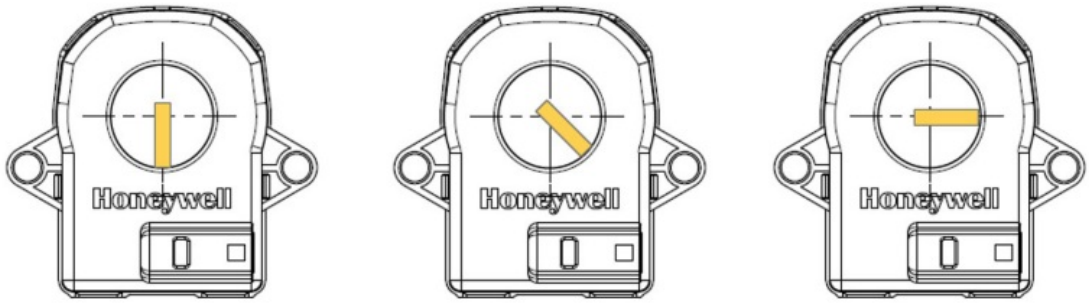
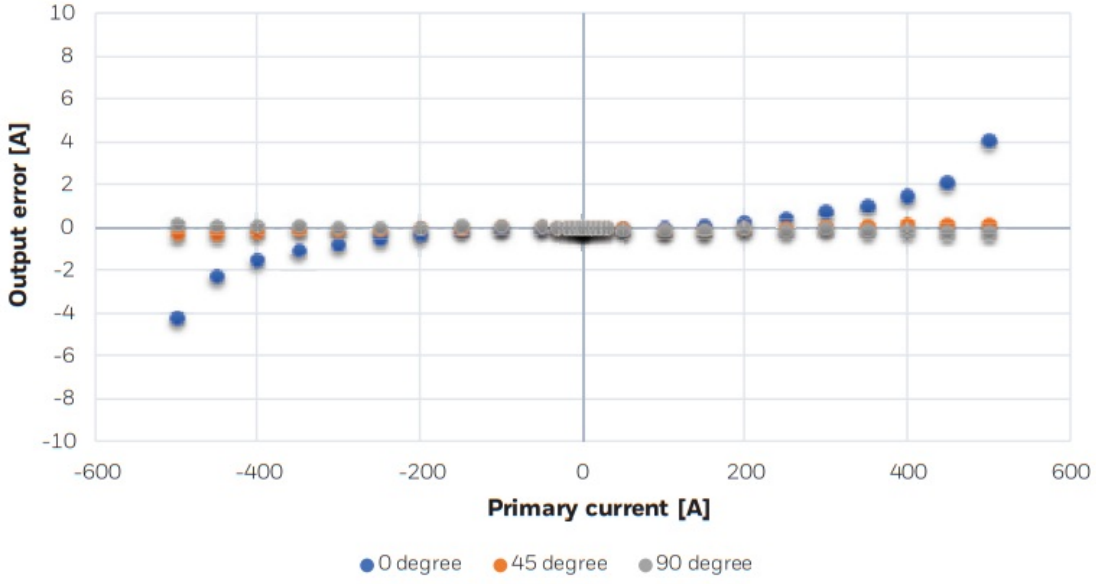
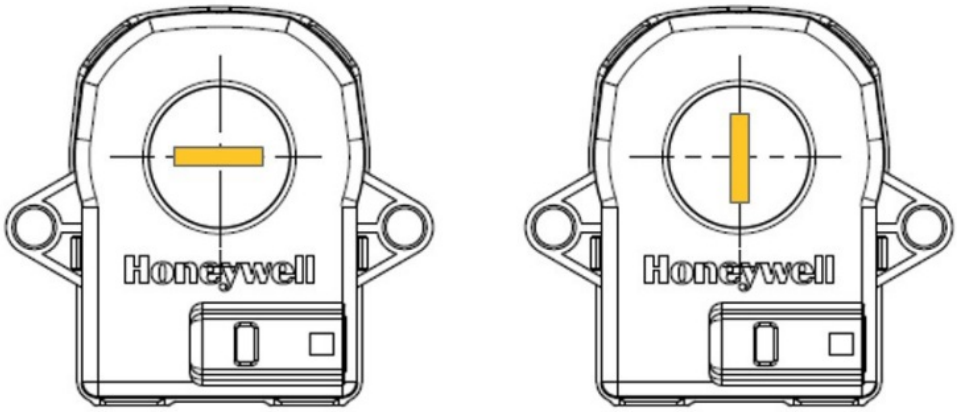


Figure 25. Current Error in Vertical Direction



Based on the test results, recommend conductor to be put in the center area of the sensor aperture as shown in Figure 26.

Figure 26. Busbar Suggested Installation Position



3.3 Nearby Ferromagnetic Material

The nearby ferromagnetic material can change the magnetic field distribution, which may have an impact on accuracy. There may be ferromagnetic material component(s) installed near the current sensor, including iron mounting bracket, iron screw, etc. To evaluate the effect of them, Honeywell tested several kinds of brackets which are shown in Figure 27.

Figure 27. Installation with Different Bracket – Suggested Bracket Installation

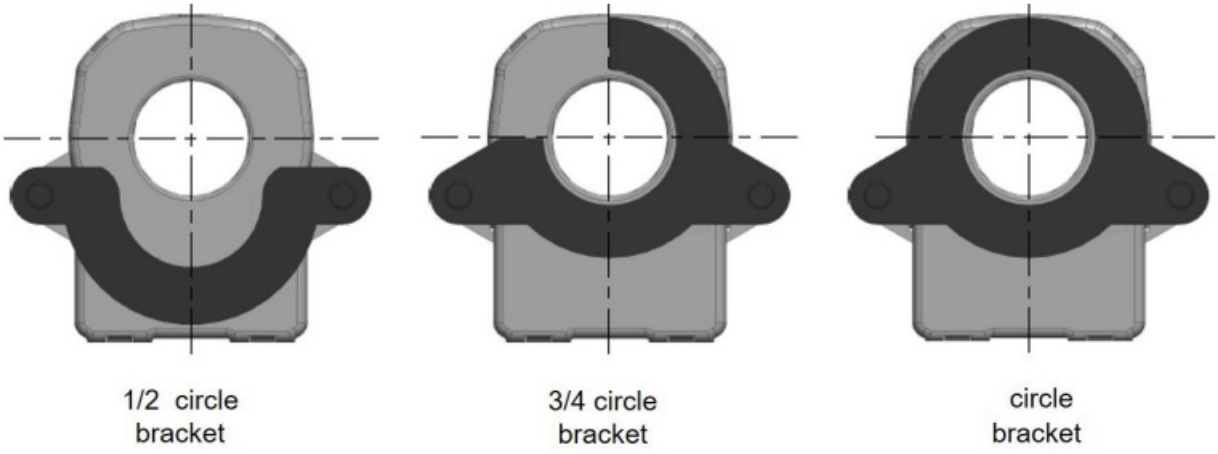


Figure 28. Installation with Different Bracket – NOT Suggested Bracket Installation

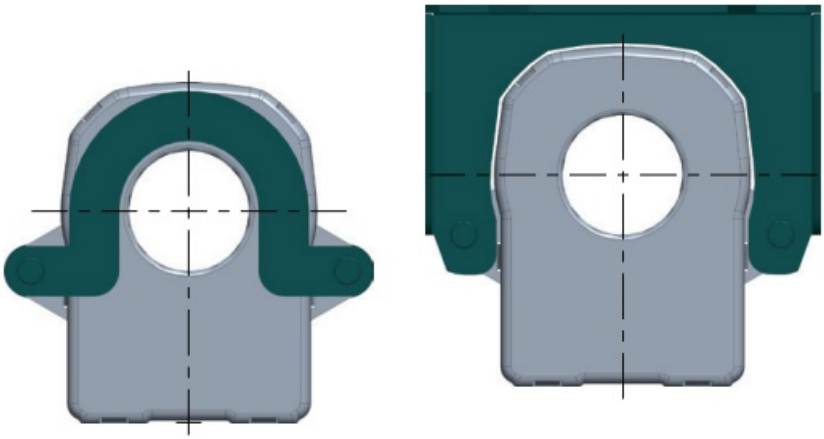
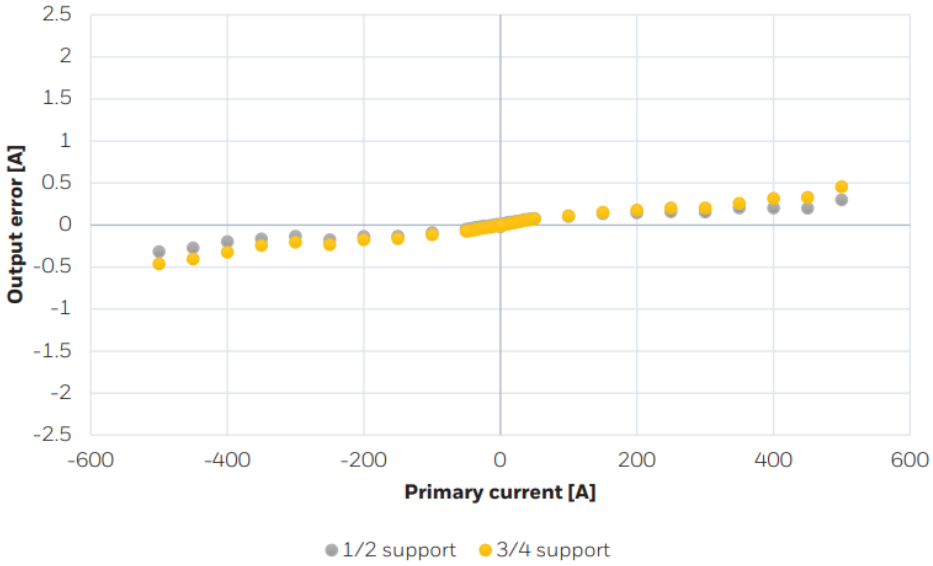
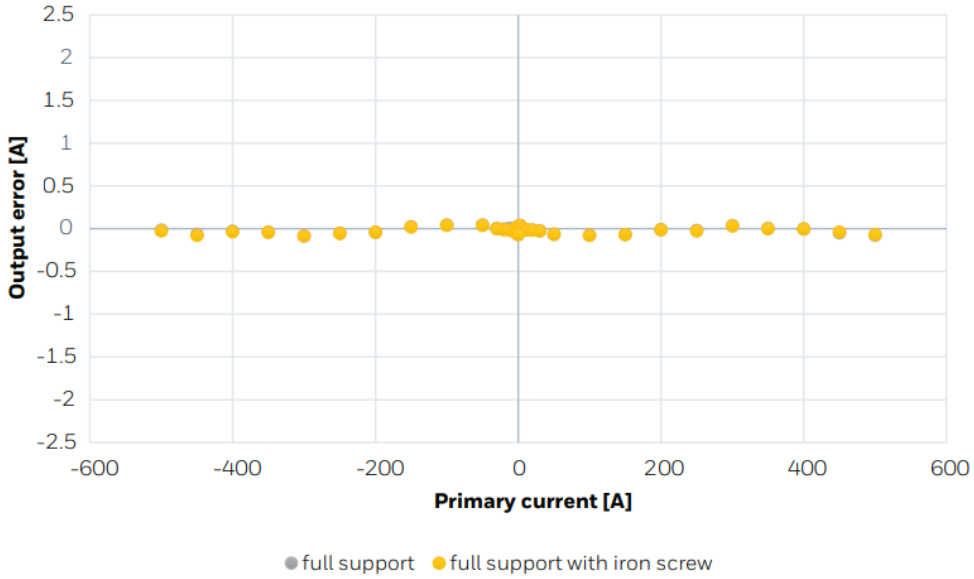


Figure 29. Current Error with 1/2 and 3/4 Circle Iron Bracket



Note:1/2 and 3/4 bracket test result is from previous report. Not a same DUT with other test items.

Figure 30. Current Error with Full Circle Iron Bracket



3.4 Installation Position of Relay

If a relay is installed near the current sensor, there will be little effect on the sensor output. It is strongly suggested that customers install the relay as far as possible from sensor. Even though the CSNV500 has very good anti-interference
performance, there is a very big difference of the magnetic flux leakage between different sizes of relays. The magnetic flux leakage of some relays is high, so choose recommended positioning so that the relay not aligned to the sensor, as
shown in Figure 31. But if the relay has to be placed aligned to sensor, as shown in Figure 32, the distance between the sensor and relay d should be evaluated. For the relay that Honeywell evaluated, the value of d is greater than 20 mm. Not recommended installation area is shown in Figure 33.

Figure 31. Recommend Relay and Sensor Position Example

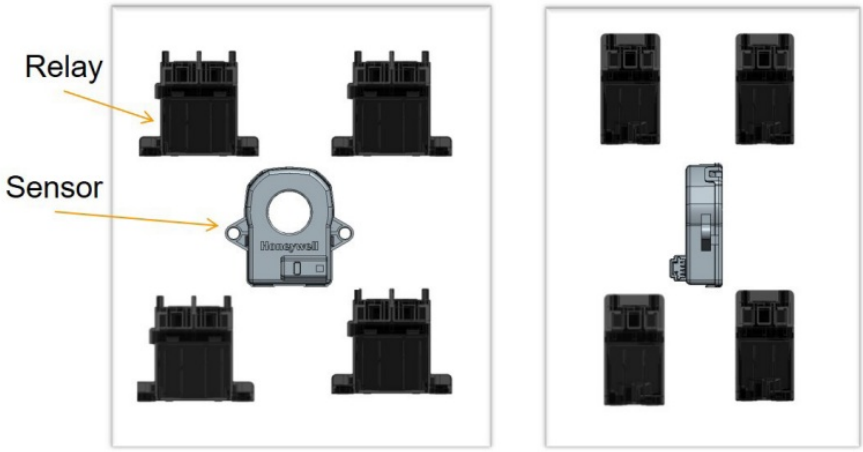


Figure 32. Not Recommend Relay and Sensor Position Example

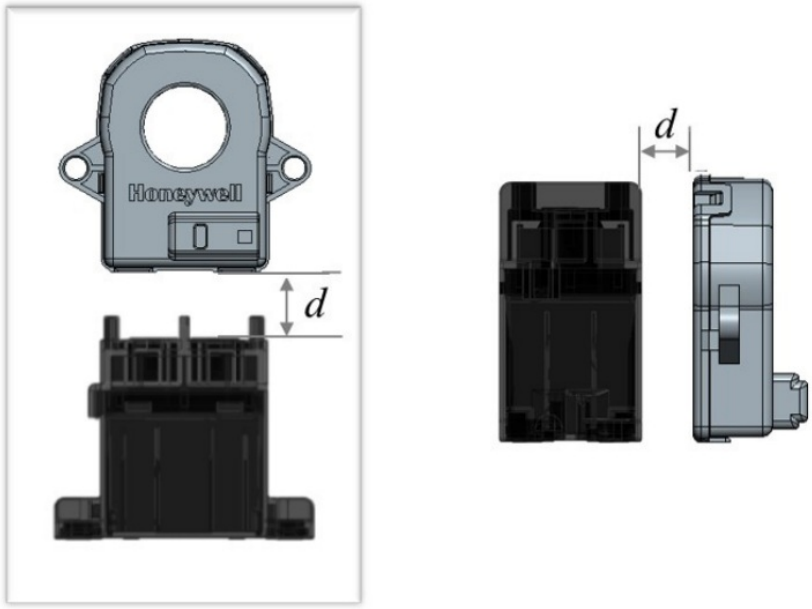
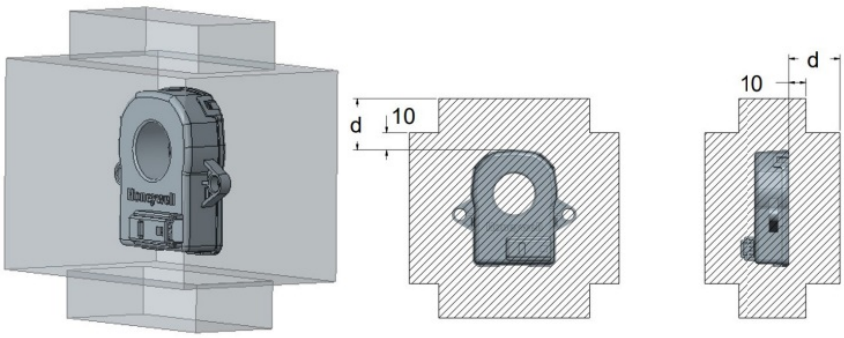


Figure 33. Relay installation – Not Recommended Area



⚠ **WARNING**
PERSONAL INJURY
DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury. **Failure to comply with these instructions could result in death or serious injury.**
WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship during the applicable warranty period. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items that Honeywell, in its sole discretion, finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

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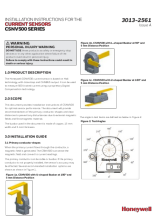
Documents / Resources

	Honeywell CSNV500 Series Current Sensors [pdf] Instruction Manual CSNV500 Series Current Sensors, CSNV500 Series, Current Sensors, Sensors

References

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- Honeywell - The Future Is What We Make It
- User Manual