

Neutral Assemblies Manual

Neutral Rogowski Current Transformer (CT)

EntelliGuard R Circuit Breaker uses an air-core Rogowski Current sensor to measure current level vs. an iron core style used in the legacy AK, AKR breakers.



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Related Publications

| Publication | Publication Number |
|--|--------------------|
| Brochure | DEA-532 |
| Snapshot | DEE-543 |
| Installation Manual AKD8 | DEH-41549 |
| Installation Manual AKD6 | DEH-41548 |
| Installation Manual AKD5 | DEH-41547 |
| Accessory: Door Interlock (Door Interlock Kit) | DEH-41529 |
| Accessory Retrofill Doors Assembly | DEH-41563 |
| Accessory: Position Switch Plate & Position Switch Assembly & Wiring (Position Switch Kit) | DEH-41530 |
| Accessory: Neutral Rogowski CT Disconnect (Neutral Assemblies) | DEH-41531 |
| Accessory: Programmer Disconnects | DEH-41532 |
| Accessory: Finger Clusters (Cluster Assemblies) | DEH-41533 |
| Accessory: Secondary Disconnects | DEH-41534 |
| FAQ | DEQ-171 |
| Application Guide | DET-753 |
| Guideform Spec | DET-754 |
| Spare/Renewal Parts Guide | DET-755 |

Estimated Time to Complete Tasks

It takes about 20 minutes to install or replace the assembly.

General Description

When a legacy AK breaker is replaced with a retrofitted EntelliGuard ACB, the incoming wires from the neutral CT's need to be routed to the cassette secondary disconnects directly.

AKD-5—Neutral Disconnect Assembly (Breaker—N/A)

When a legacy AK breaker is replaced with a retrofitted EntelliGuard ACB, the incoming wires from the neutral CT's need to be routed to the cassette secondary disconnects directly.

AKD-5—Replace Iron Core Neutral CT with a Rogowski (Compartment)

The **AKD-5** EntelliGuard R Circuit Breaker uses an open-core Rogowski current sensor to measure current level vs. an iron-core style ([Figure 1](#)) used in the legacy AK, AKR breakers. For the retrofill to calculate the current levels on a 4 wire circuit, the neutral iron-core CT in the cable compartment needs to be replaced with a Rogowski style CT.

The current transformer comes with the CT-mounted on copper bars matching the same hole-pattern as the existing neutral bar. The existing wires can be reused. Note, if existing wires need to be replaced, then a continuous wire runs from the CT to the neutral disconnect in the cubicle.

Figure 1. Neutral—AK25/50 Iron Core Current Transformer Assembly



Neutral CT in Cable/Bus Compartment



- Turn off all power to switchgear. Tagout and lockout main source, up-stream or main breaker.
- Failure to comply with these instructions will result in death or serious injury from severe burns caused by arc flashing that has exceedingly high temperatures.
- Always wear personal protection equipment according to OSHA standards and appropriate to the severity of potential burns.

- Ensure only qualified personnel install, operate, service, and maintain all electrical equipment.

Tools required: Wrenches, Wire stripper, wire cutter, continuity tester.

1. Ensure that the LVS has been de-energized and the breaker in the compartment, being retrofitted, are switched off and removed from the LVS.
2. Open the door at the rear of the compartment to access the cable/bus compartment of the LVS.
3. Note that the existing neutral CT assemblies are usually mounted vertically on two copper bus bars placed horizontally.
4. Make a note of the neutral disconnect assembly orientation and the polarity of the wire connections. This is needed so that the same orientation is maintained when the new CT assembly is installed.

5. Disconnect the wires that are attached to the existing CT assemblies and place them in a way that they do not interfere with the replacement of the CT assemblies.
6. Replace the neutral disconnect wiring with a new wire. This should be routed directly to the secondary disconnects of the cassette assembly.
7. Unfasten and remove the bolts that hold the neutral disconnects assemblies to the horizontal bus bars. Keep the hardware in a handy location for reassembling.
8. Care should be taken while handling the CT assemblies such that they do not get damaged or damage other components within the LVS.
9. Replace the old CT assembly with the new Rogowski assembly (*Figure 2* or *Figure 3*, depending if it's AK25 or AK50 switchgear) on the horizontal bus bars and fasten it using the hardware previously removed. The position of the new CT assembly should match that of legacy, noted during Step 4.
10. Connect the wires back to the Rogowski CT assembly leads. Maintain the same polarity as that of the legacy CT connections, noted during Step 4.
11. Check for continuity from the CT leads to the secondary disconnects on the retrofit EntelliGuard ACB.
12. Always verify that the new Rogowski assembly is properly installed before activating it.

Figure 2. AKD-5—AK25 Neutral Bus Rogowski ASM 10108212

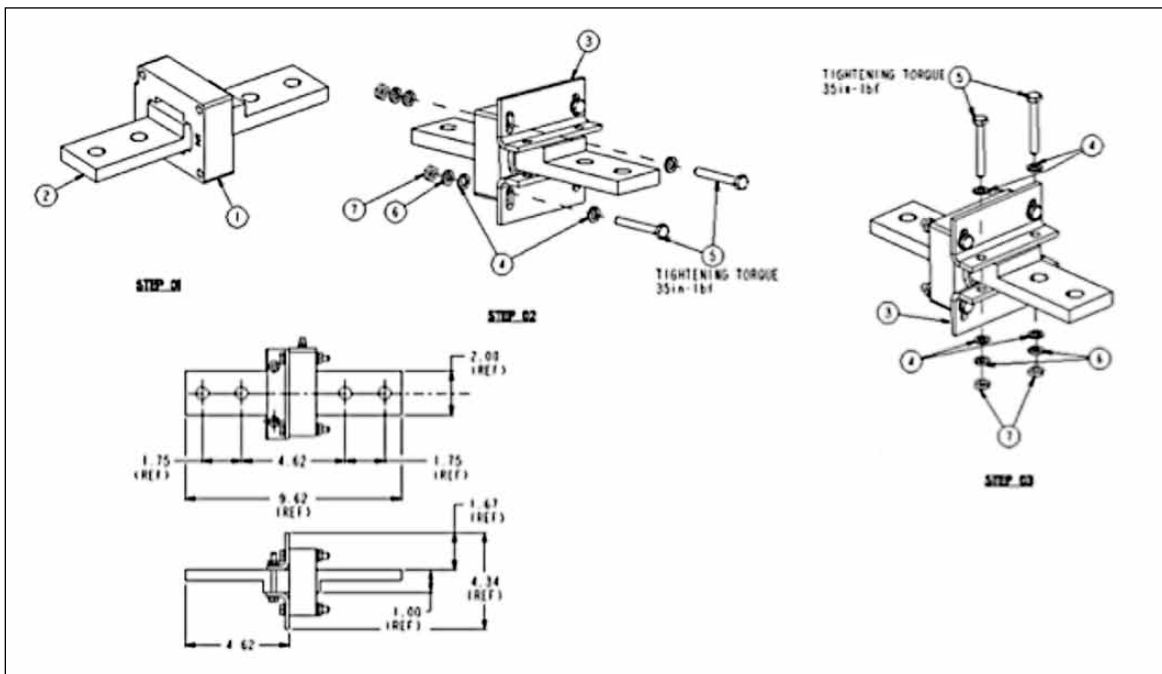
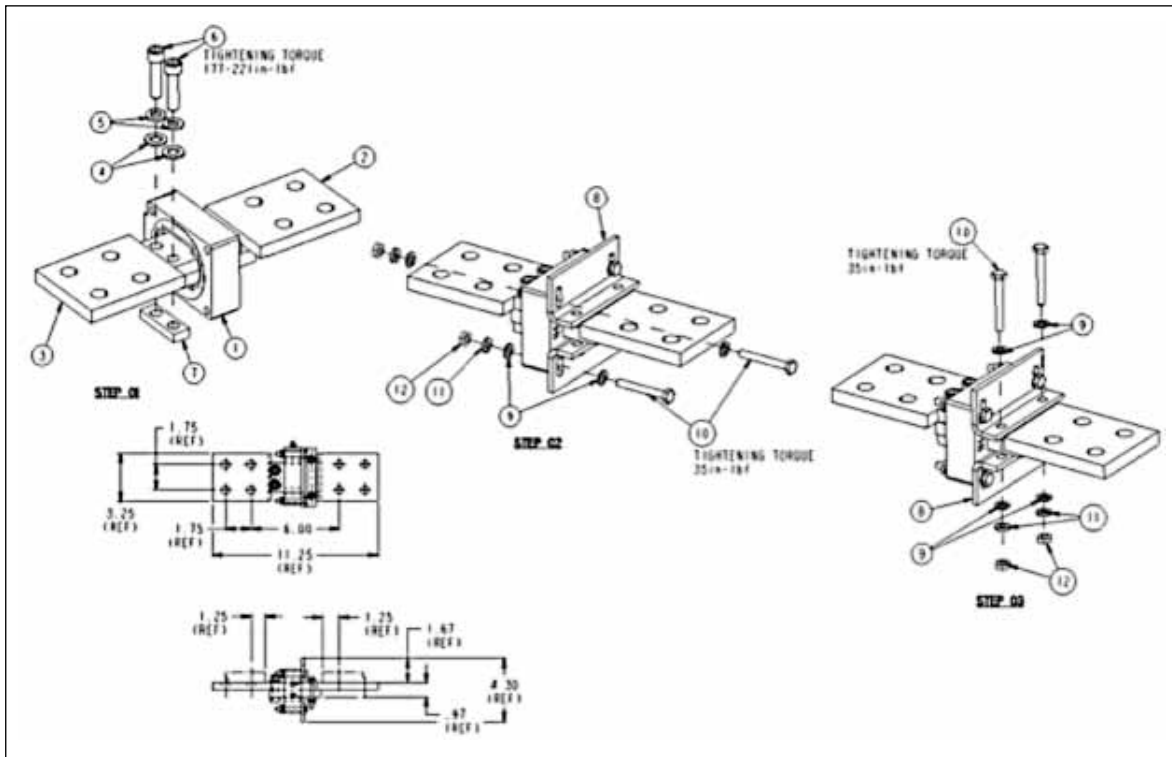


Figure 3. AKD-5—AK50 Neutral Bus Rogowski ASM 10108216



AKD-5—Neutral Sensor Packaging

- The Neutral Sensor is constructed using a phase sensor encapsulated appropriately to meet insulation and durability requirements.
- Lead wires are UL-recognized type 18AWG or larger, rated at 600V.
- Lead wires are 6 feet in length, minimum.
- Lead wires are colored white and black.
- The white wire is connected to the “positive” polarity termination.
- The black wire is connected to the “negative” polarity termination.
- Sensor window cross section conforms to criteria as found in the table below ([Table 1](#)):

Table 1. Frame Ratings and Sensor Areas

| Frame & Rating | Sensor Window minimum area (in ²) |
|-----------------|---|
| Frame 1 / 2000A | 2.0 |
| Frame 2 / 3200A | 3.2 |
| Frame 3 / 6400A | 6.4 |

The Frame 3 neutral sensor is implemented as two separate sensors, similarly to the phase sensors in the circuit breaker. Frame 3 neutral bus assemblies provide two independent parallel conductors in the neutral bus such that the neutral current is divided between the two sensors.

A special neutral bus section is provided within the switchgear to accommodate the specific form factor of each Rogowski—this is not the design responsibility of the Rogowski vendor.

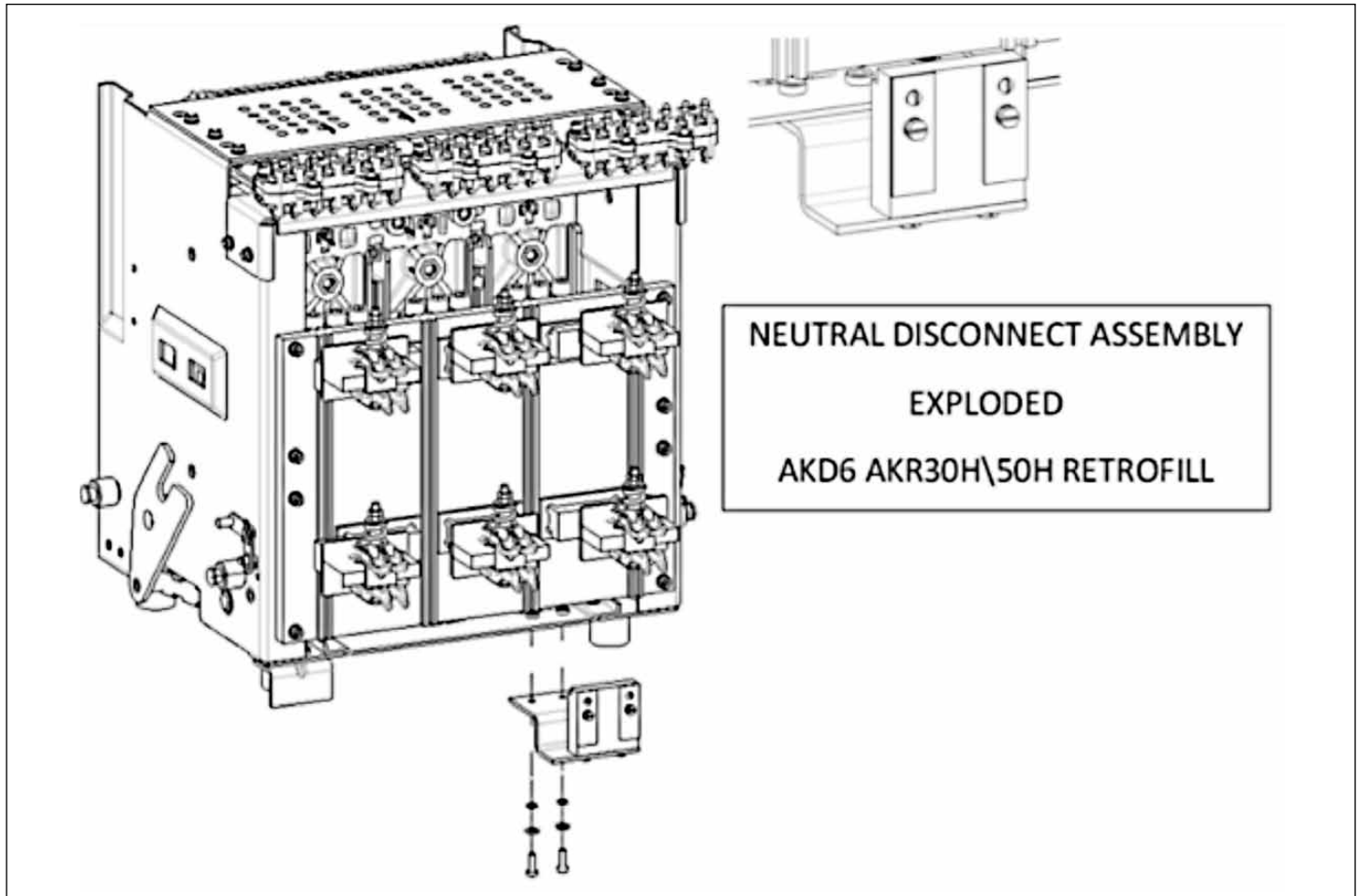
- Encapsulation materials are UL recognized and suitable for operation at 130C.
- Neutral sensors of a given rating match all characteristics of the phase sensors.

AKD-6/8—Neutral Rogowski Current Transformer (CT)

Neutral Disconnect Assembly (AKD-6—Breaker Side)

Figure 4 shows an exploded view of the breaker side neutral disconnect assembly for the AKD-6 AKR30/30H/50/50H retrofills. These are available pre-installed and wired at the factory.

Figure 4. Neutral Disconnect Assembly for the AKD-6 AKR30H\50H Retrofill



| | | | | |
|----------|---------------|----------------|--------------|----------------|
| AKR AKD6 | BREAKER SIDE: | P/N 10105292G1 | COMPARTMENT: | P/N 10108266G1 |
|----------|---------------|----------------|--------------|----------------|

Neutral Disconnect Assembly (Bus Compartment)

The **AKD-6** EntelliGuard R Circuit Breaker uses an air-core Rogowski Current sensor to measure current level vs. an iron core CTs used in the legacy AK, AKR breakers. For the Retrofill to calculate the current levels on a 4-wire circuit, the Neutral Iron Core CT in the cable compartment needs to be replaced with a Rogowski style CT.

The Rogowski CT comes mounted on copper bars matching the same hole-pattern as the existing neutral bar. The existing wires and hardware can be reused if they are not damaged. Note, if existing wires need to be replaced, then a continuous wire runs from the CT to the Neutral Disconnect in the cubicle. If the threads on the hardware have become worn out, they need to be replaced with new ones before installation.

AKD-6/8—Rogowski Assembly Part Numbers

Table 2. AKD-6—Rogowski Assemblies (Neutral Bus Part Numbers)

| Breaker/Switchgear | Rogowski Assembly or Neutral Bus Bar Part Number | Figure References for Assembly Drawings |
|--------------------|--|--|
| AKD6 400A | 10108266G1 | <i>Figure 9.</i> Neutral Bus Rogowski ASM 10108266 |
| AKD6 600A | 10108266G2 | |
| AKD6 800A | 10108266G3 | |
| AKD6 1000A | 10108266G4 | |
| AKD6 1200A | 10108266G5 | |
| AKD6 1600A | 10108266G6 | |

AKD-6/8—Rogowski Assemblies

- *Figure 5* (assembly drawing with photo, *Figure 6*) displays Rogowski **ASM 10108212**.
- *Figure 7* (assembly drawing with photo, *Figure 8*) displays Rogowski **ASM 10108216**.
- *Figure 9* (assembly drawing with photo, *Figure 10*) displays Rogowski **ASM 10108266**.

Figure 5. Neutral Bus Rogowski ASM 10108212

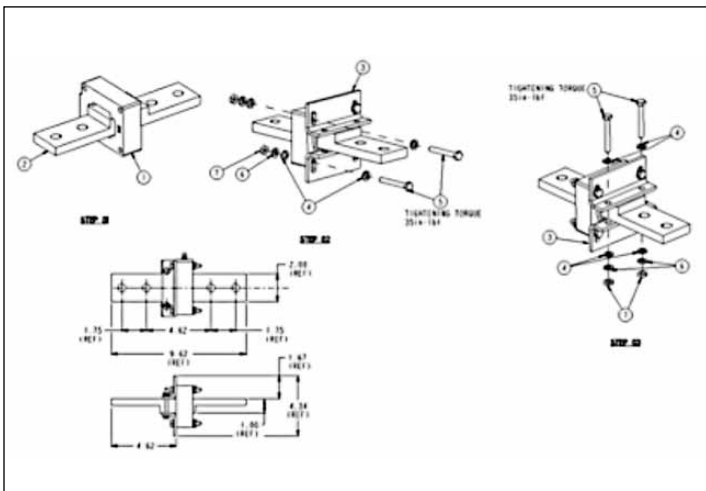


Figure 6. Neutral Bus Rogowski ASM 10108212 Photo

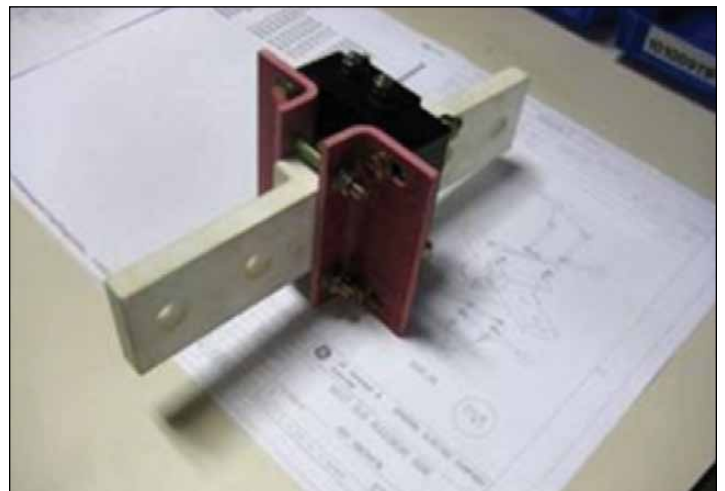


Figure 7. Neutral Bus Rogowski ASM 10108216

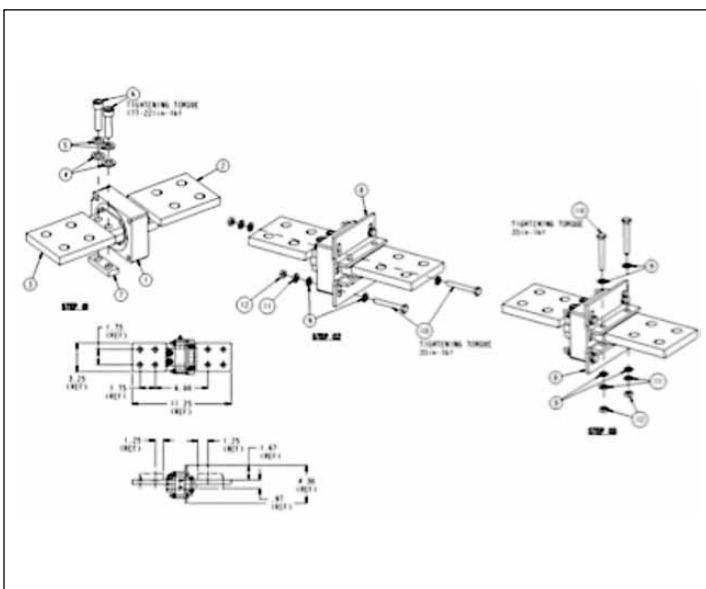


Figure 8. Neutral Bus Rogowski ASM 10108216 Photo



Figure 9. Neutral Bus Rogowski ASM 10108266

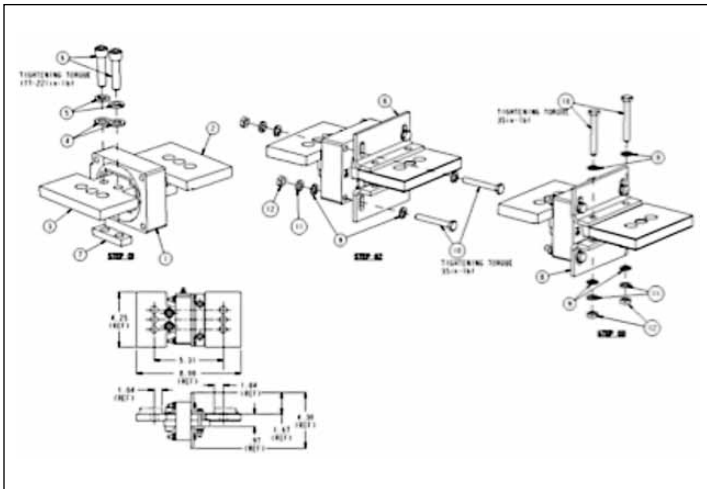


Figure 10. Neutral Bus Rogowski ASM 10108266 Photo

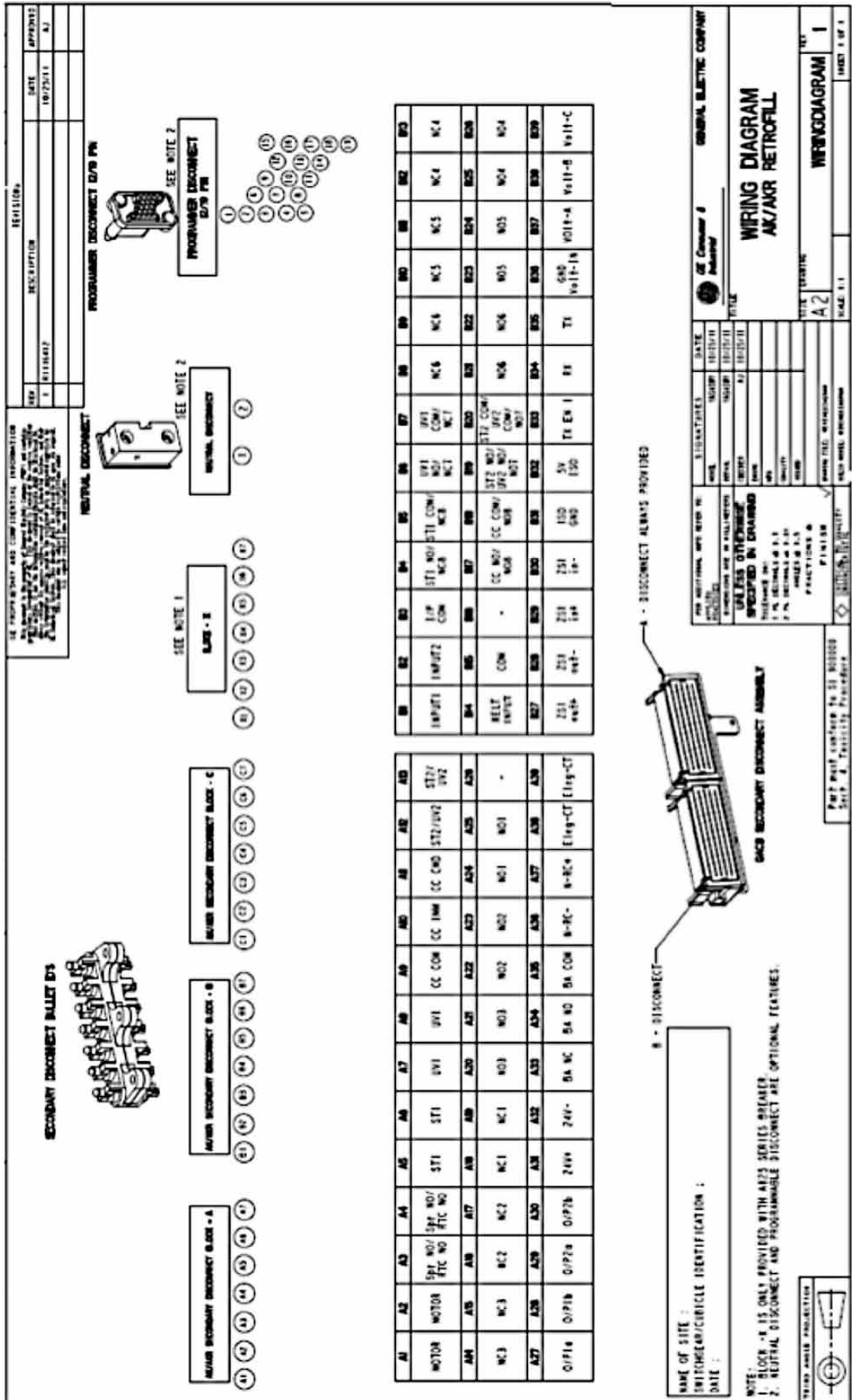


Neutral CT assembly in Cable/Bus Compartment

1. Ensure that the LVS has been de-energized and the breaker in the compartment being retrofit are switched off and removed from the LVS.
2. Open the door on the rear of the compartment to gain access the Cable Bus compartment of the LVS.
3. The existing neutral CT assemblies are usually mounted vertically on two copper bus bars placed horizontally.
4. Disconnect the wires that are attached to the existing CT assemblies and place them such that they do not interfere with the replacement of the CT assemblies.
5. Unfasten and remove the bolts that hold the neutral disconnect assemblies to the horizontal bus bars. Keep the hardware in a secure location for reassembly.
6. Care should be taken while handling the CT assemblies such that they do not fall down or damage other components within the LVS.
7. Replace the old CT assembly by the new Rogowski assembly on the horizontal bus bars and fasten it using the hardware previously removed.
8. Connect the wires back to the Rogowski CT assembly leads. In case of damaged wire, the same must be replaced with new ones as already mentioned.
9. Check for continuity from the CT leads to the plungers located on the neutral-disconnect assemblies in the LVS compartment.
10. Verify that the new Rogowski assembly is installed and ready for use.

Tools required: Wrenches, Wire stripper, wire cutter, continuity tester

Wiring Diagram for the AK/AKR Retrofill



Legacy Specifications

| Available Amperages for Legacy AK - Series Cable compartment CT | | LEGACY PROGRAMMER TYPE | LEGACY OUTLINE DRAWING | Amperage range available for Retrofills | Available Amperages for Retrofill ErtellGuard ACB Cable compartment CT | | | | | Hole pattern Not Applicable | |
|---|--------------------|------------------------|------------------------|---|--|---------------|---------------|---------------|---------------|-----------------------------|---------------|
| LEGACY COMFT CAT NO. | USED IN AMPERAGE | | | | 400 A | 600 A | 800 A | 1000 A | 1200 A | | 1600 A |
| 139C4475G1 | AK-15 70-225 | SST | 139C4476 | Not Available | Not Available | Not Available | Not Available | Not Available | Not Available | 2 - Hole | |
| 139C4475C2 | AK-25 200-600 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| 343L650G13 | 300-800 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| 343L650G14 | AK50 600-1600 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| 343L650G28 | 800-2000 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| 343L671G61 | AK75 1200-3000 | SST | 568B220 | 800A - 1600A | Not Available | Not Available | Not Available | Not Available | Not Available | 4 - Hole | |
| 343L671G62 | AK100 1600-4000 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| | | | | | | | | | | | |
| Available Amperages for Legacy AK - Series Cable compartment CT | | LEGACY PROGRAMMER TYPE | LEGACY OUTLINE DRAWING | Amperage range available for Retrofills | Available Amperages for Retrofill ErtellGuard ACB Cable compartment CT | | | | | Hole pattern Not Applicable | |
| LEGACY COMFT CAT NO. | USED IN AMPERAGE | | | | 400 A | 600 A | 800 A | 1000 A | 1200 A | | 1600 A |
| TSV G228BK | AK-15 70-225 | M/T | 139C4476 | Not Available | Not Available | Not Available | Not Available | Not Available | Not Available | 2 - Hole | |
| TSV G208BK | AK-25 200-600 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| TSV G303BK | AKR30/30H 100-300 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| TSV G508BK | AKR30/30H 300-800 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| TSV G516BK | AKR30/30H 600-1600 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| TSV G620BK | AKRT-50 800-2000 | M/T | 568B220 | 400 - 1600A | Not Available | Not Available | Not Available | Not Available | Not Available | 4 - Hole | |
| TSV G830BK | AK75 1200-3000 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| TSV G832BK | AKR75 1200-3200 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| TSV G940BK | AK100 1600-4000 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| | | | | | | | | | | | |
| Available Amperages for Legacy AK - Series Cable compartment CT | | LEGACY PROGRAMMER TYPE | LEGACY OUTLINE DRAWING | Amperage range available for Retrofills | Available Amperages for Retrofill ErtellGuard ACB Cable compartment CT | | | | | Hole pattern Not Applicable | |
| LEGACY COMFT CAT NO. | USED IN AMPERAGE | | | | 400 A | 600 A | 800 A | 1000 A | 1200 A | | 1600 A |
| TSV G303B | AKR30/30H 100-300 | M/T | 139C5016 9H2 | 400 - 1600A | Not Available | Not Available | Not Available | Not Available | Not Available | 3 - Hole | |
| TSV G508B | AKR30/30H 300-800 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| TSV G516B | AKR30/30H 600-1600 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| TSV G620B | AKRT-50 800-2000 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| TSV G832B | AKR75 1200-3200 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |
| TSV G940B | AK100 1600-4000 | M/T | 139C5016 9H1 | Not Available | Not Available | Not Available | Not Available | Not Available | Not Available | Not Applicable | |
| TSV G940B | AK100 1600-4000 | | | | Not Available | Not Available | Not Available | Not Available | Not Available | | Not Available |

Ordering Rogowski Replacements

| | | | Cable compartment rogowski details | | |
|--------------------|----------------|--------------|------------------------------------|---|--------------|
| Legacy Compartment | Legacy Breaker | Amperage (A) | Legacy Iron Core CT # | Equivalent Retrofil EntelliGuard Rogowski # | Hole Pattern |
| AKD5 | AK25 | 400 | 139C4476 | 10108212G1 | 2 - Hole |
| | AK25 | 600 | | 10108212G2 | |
| | AK50 | 800 | 568B220 | 10108216G3 | 4 - Hole |
| | AK50 | 1000 | | 10108216G4 | |
| | AK50 | 1200 | | 10108216G5 | |
| | AK50 | 1600 | | 10108216G6 | |
| AKD6 | AKR 30/30H | 400 | 139C5016 | 10108266G1 | 3 - Hole |
| | AKR 30/30H | 600 | | 10108266G2 | |
| | AKR 30/30H | 800 | | 10108266G3 | |
| | AKR 50/50H | 800 | | 10108266G3 | |
| | AKR 50/50H | 1000 | | 10108266G4 | |
| | AKR 50/50H | 1200 | | 10108266G5 | |
| | AKR 50/50H | 1600 | | 10108266G6 | |
| AKD8 | AKR 30/30H/30L | 400 | 139C5016 | 10108266G1 | 3 - Hole |
| | AKR 30/30H/30L | 600 | | 10108266G2 | |
| | AKR 30/30H/30L | 800 | | 10108266G3 | |
| | AKR 50/50H | 800 | | 10108266G3 | |
| | AKR 50/50H | 1000 | | 10108266G4 | |
| | AKR 50/50H | 1200 | | 10108266G5 | |
| | AKR 50/50H | 1600 | | 10108266G6 | |
| | AKR30S | 400 | | 10108266G1 | |
| | AKR30S | 600 | | 10108266G2 | |
| | AKR30S | 800 | | 10108266G3 | |

Notes

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