

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





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 (in²)
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

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

Breaker/Switchgear	Rogowski Assembly or Neutral Bus Bar Part Number	Figure References for Assembly Drawings
AKD6 400A	10108266G1	
AKD6 600A	10108266G2	
AKD6 800A	10108266G3	Figure 0. Neutral Due Degewali ACM 10100266
AKD6 1000A	10108266G4	Figure 9. Neutral bus Rogowski ASM 10108266
AKD6 1200A	10108266G5	
AKD6 1600A	10108266G6	

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

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 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

Av	allable Am	perages for Le	gacy AK - Series Cable comp	atment CT	Amperage range	Available	Amperages fo	or Retrofil Ert	elliQuard ACE	Cable compa	tment CT	
LEGACY COMPT CAT N		AMPERACE	LECACY PROCRAMMER TYP	ELECACY OUTUNE DRAWING	tavailable for Retrofils	400 A	600 A	800 A	1000 A	1200 A	1600 A	Hole pattern
139C4475G1	AK-15	70-225		1200-0476	Not Available			Not Ava	al able			Not Applicable
139C4475C2	AK-25	200-600			400A - 600A	10108212G1	1010821202		Not Av	ailable		2-Hole
343L650G13		300-800										
343L650C14 343L650C28	AK50	600-1600 800-2000	ম	5688220	800A - 1600A	Not Available	Not Available	10108216C3	10108216C4	10108216G5	1010821605	4-Hole
343.671061	AK75	1200-3000		26-9077				-				
343.671062	AK 100	1600-4000		1779000								
		т т										
A	ailable Am	perages for Le	gacy AK - Series Cable comp	atment CT	Amperage range	Available	Amperages fo	or Retrofil Ert	elliQuard AC	Cable compa	tment CT	
LEGACY COMPT CAT NO	NI CEBO IN	AMPERACE	LECACY PROGRAMMER TYP	ELECACY OUTUNE DRAWING	tavailable for Retrofils	400A	600 A	800 A	1000 A	1200 A	1600 A	Hole pattern
TSVC2298K	AK-15	70-225		1207.4736	Not Available			Not Ava	ulable			Not Applicable
TSVC206BK	AK-25	200-600			400A - 600A	10108212G1	1010821202		Not Av	ailable		2-Hdie
TSVCB03BK	AKR30/30 AKR50/50	100-300										
TSVCSO8EK	AKR30/30 AKR50/50	300-800		5638220	400 - 1600A	10108216G1	1010621602	10106216C3	1010821664	10108216G5	1010821606	4-Hole
TSVC516BK	AKR30/30	600-1600										
TSVC620BK	AKRT-50	800-2000										
TSVC830BK	AK73	1200-3000										
TSVC832BK	AKR75	1200-3200		5688227				Adiable				Not Applicable
TSVC940BK	AK 100	1600-4000										
A	ailable Amp	perages for Le	gacy AK - Series Cable comp	artment CT	Amperage range	Available	Amperages fo	or Retrofil Ert	elli Quard ACE	Cable compa	tment CT	
LEGACY COMPT CAT N	NICESON (AMPERACE	LECACY PROGRAMMER TYR	ELECACY OUTLINE DRAWING	tavallable for Retrofils	400 A	600 A	800 A	1000 A	1200 A	1600 A	Hole pattern
TSVC303B	AKR30/30 AKR50/50	100-300										
TSVCSOB	AKR30/30 AKR50/50	300-800		139C5016 5H2	400-1600A	10108266C1	10108266C2	10108266C3	1010826664	10108266C5	10108266C6	3-Hde
TSVC516B	AKR30/30 AKR50/50	600-1600	MT									
TSVG6208	AKRT-50	800-2000										
TSVC832B	AKR75	1200-3200		130/E016 CL1			Not A	wailable				Not Applicable
TSVC9408	AK100	1600-4000		THE OTHER STREET								

Ordering Rogowski Replacements

			Cable cor	npartment rogowski details	
Legacy Compartment	Legacy Breaker	Amperage (A)	Legacy Iron Core CT #	Equavalent Retrofil EntelliQuard Rogowksi 🗍	Hole Pattern
	AK25	400	1200/1/76	10108212G1	2_44
	AK25	600	15904470	1010821202	2-nue
	AK50	800		10108216G3	
ANDS	AK50	1000	5692220	10108216G4	
	AK50	1200	JUODZZU	10108216G5	4-100
	AK50	1600		1010821666	
	AKR 30/30H	400		10108266G1	
	AKR 30/30H	600		10108266G2	
	AKR 30/30H	800		10108266G3	
AKD6	AKR 50/50H	800	139C5016	10108266G3	3-Hole
	AKR 50/50H	1000		10108266C4	
	AKR 50/50H	1200		10108266G5	
	AKR 50/50H	1600		10108266G6	
	AKR 30/30H/30	- 400		10108266G1	
	AKR 30/30H/30	- 600		10108266G2	
	AKR 30/30H/30	- 800		10108266G3	
	AKR 50/50H	800		10108266G3	
	AKR 50/50H	1000	13905016	10108266G4	3-400
ANDO	AKR 50/50H	1200		10108266G5	5.2
	AKR 50/50H	1600		10108266G6	
	AKR30S	400		10108266G1	
	AKR30S	600		10108266G2	
	AKR30S	800		10108266G3	

Notes

These instructions do not cover all details or variations in equipment nor do they provide for every possible contingency that may be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise that are not covered sufficiently for the purchaser's purposes, the matter should be referred to the ABB Inc.

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