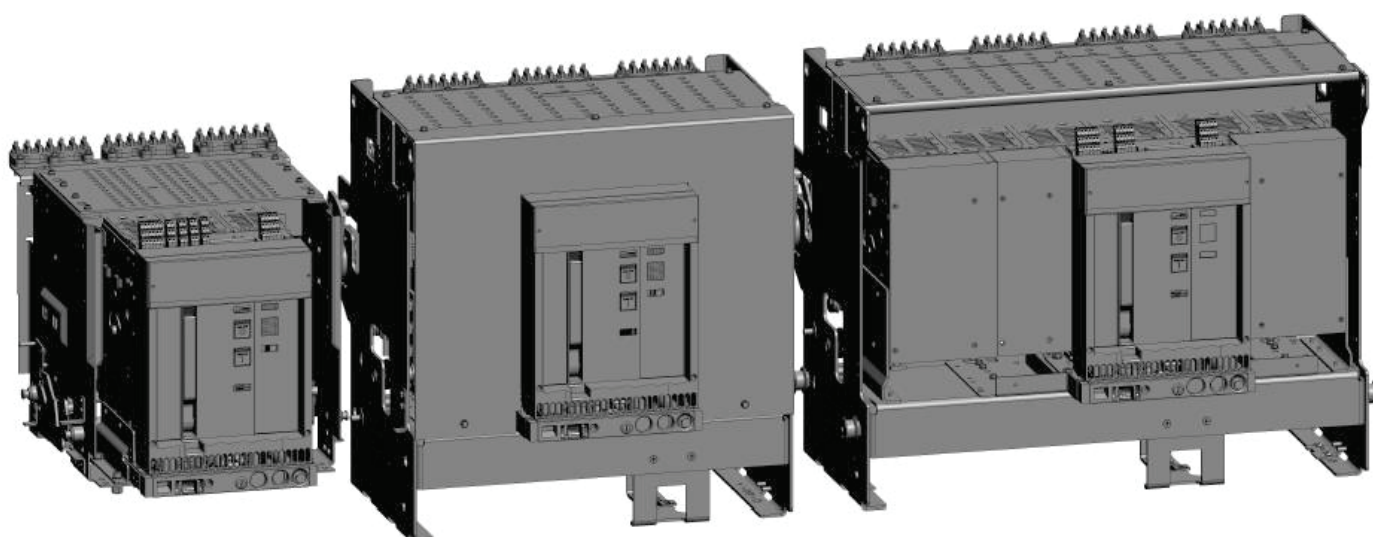


Installation and maintenance guide

Emax 2 Retrofill Circuit Breakers

Direct Replacement Replacing legacy GE AKR 800A - 5000A Circuit Breakers, AKRU 800A -1600A integrally fused circuit breakers used in AKD-8 & Substructures



- General Electric AKD-8 Low Voltage Switchgear is a free-standing assembly of metal enclosed power circuit breakers. It may also be a part of a single-ended or double-ended load center unit substation.
- This manual applies to Emax 2 Retrofill circuit breakers to be used in AKD-8 Switchgear & substructures found in GE Switchboards & OEM Substructures/Equipment using legacy AKR circuit breakers of the following types: 800-2000A, AKR-#D-30/50/T50 circuit breakers and 800A -1600A AKRU-30/50 integrally fused circuit breakers in all equipment types. 3200, 4000 & 5000A, AKR-#D-75/100/125 for AKD-8 switchgear, AKR-#B-75/100/125 types in OEM Substructures/Equipment and AKR-#F-75/100/125 types in GE switchboards.
- (#is shown in place of a number which designates the trip unit type & U indicates to integrally fused circuit breakers)

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Preface

1 - Hazards

Overview The following important highlighted information appears throughout this document to warn of potential hazards or to call attention to information that clarifies a procedure. Carefully read all instructions and become familiar with the devices before trying to install, operate, service, or maintain this equipment.


Danger This indicates a hazardous situation which, if not avoided, results in death or serious injury. A variety of electrical hazards warnings are displayed here and are applied to installation manuals. These are standard or generic alerts and labels that must be taken quite seriously when installing Retrofill circuit breakers in GE & OEM switchgear and when working with potentially dangerous electrical equipment (Table 1).

Table 1

Generic Danger Alerts	
	


Warning This indicates a hazardous situation, which, if not avoided, would result in death or serious injury. A variety of electrical hazards warnings are displayed here and are applied to installation manuals. These are standard or generic alerts and labels that must be taken quite seriously when installing Retrofill circuit breakers in GE & OEM switchgear and when working equipment that can cause injury, but may not be necessarily fatal (Table 2).

Table 2

Generic Warning Alerts	
	

Caution This pertains to a hazard that has a low level of risk, which means that if not avoided, it could result in minor or moderate injury. It also indicates that failure to comply with instructions may result in product damage. (Table 3).

Table 3

Custom Caution Alerts	
<div><div> CAUTION</div><div><div>Symbol Panel</div><div>Word message _____ _____ _____ _____ _____</div></div></div>	

Notice or Note This indicates important information in that it aids in job performance, that is, a notice or note is used to notify practices not related to personal injury (Table 4).

Table 4

Custom Notice Alerts
<div>Not considered a safety label</div> <div><div>NOTICE</div><div>Word message _____ _____ _____ _____ _____</div></div>

2 - Warranty

Warranty requirements This document is based on information available at the time of its publication. While efforts requirements have been made to ensure accuracy, the information contained herein does not cover all details or variations in hardware and software, nor does it provide for every possible contingency in connection with installation, operation, and maintenance.

Features may be described herein that are not present in all hardware and software systems. ABB Inc USA assumes no obligation of notice to holders of this document with respect to changes subsequently made. ABB Inc USA makes no representation or warranty, expressed, implied, or statutory, with respect to, and assumes no responsibility for the accuracy, completeness, sufficiency, or usefulness of the information contained herein. No warranties of merchantability or fitness for purpose shall apply.

Contact your local sales office if further information is required concerning any aspect of Emax 2 Retrofill Circuit Breaker operation or maintenance.

3 - Trademarks and Patents

- Details**
- Emax 2 Retrofill
 - Emax 2 Retrofill TU, Ekip DIP, Ekip Touch, Ekip Hi-Touch, Ekip G Touch, Ekip G Hi-Touch, Kip Measuring, Ekip Measuring Pro
 - Emax 2 Retrofill Trip Unit
 - Emax2

4 - Standards

Agency Certification	Standard Number	Title
	ANSI C37.13,16,17,20.1,50,51,59	Low-Voltage AC Power Circuit Breakers & switchgears
	NEMA SG 3,5	Low-Voltage Power Circuit Breakers
	NEMA AB1	--
	UL 1066	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures

5 - Document Conventions

Details Topics and text are divided into primary, secondary, and tertiary paragraph headings.

6 - Related Publications

Publication	Publication Number
Installation Manual AKD 10	2TSA451010P0000
Installation Manual AKD 8	2TSA451009P0000
Installation Manual AKD 6	2TSA451014P0000
Installation Manual AKD 5	2TSA451011P0000
Accessory: Door Interlock (Door Interlock Kit)	2TSA451017P0000
Accessory: Kirk Key installation Manual	2TSA451013P0000
Accessory Retrofill Direct Replacement / CiC Full Door Kits AKD-5, 6, 8 & 10	2TSA451007P0000
Accessory Retrofill Direct Replacement / CiC Door AdaptorsKits AKD-5, 6, 8 & 10	2TSA451008P0000
Accessory OEM Direct Replacement Adaptor kits AKD8 & 10	2TSA431967R1000
Accessory OEM Direct Replacement Adaptor kits, AKD8 & 10, AKR 75/100, B&F TYPE	2TSA431968R1000
Accessory OEM Direct Replacement Adaptor kits, AKD8 & 10, only for AKR30S	2TSA431996R1000
Accessory: Position Switch Plate, Assembly & Wiring	2TSA451019P0000
Accessory: Neutral CT Adapters Installation Instructions	2TSA451018P0000
Accessory: Programmer Disconnects Installation Instructions	2TSA451012P0000
Accessory: Primary Disconnects Installation Instructions	2TSA451015P0000
Accessory: Secondary Disconnects, Installation Instructions	2TSA451016P0000
E2.2, 4.2, 6.2 Breakers Installation, Operation & Maintenance Manual	1SDH001000R0002
Instructions for using Ekip touch protection releases & accessories	1SDH001316R0002
Emax 2 Family Trip units Engineering manual	1SDH001330R0002

7 - Service and Support

Service and support are available from ABB Inc USA.

Email: eppc.support@us.abb.com

Phone: 888-385-1221

8 - Estimated Time to Complete Tasks

Verify the secondary disconnects and match the switchgear cubicle which may take up to 1Hr depending on the complexity of the original breaker. Once the retrofill breaker is fully prepared, it should take about 20 minutes to swap out the old breaker and rack in the new Emax 2 Retrofill circuit breaker if the proper lifting bar and hoist are available, it may take an additional 30 min to replace the door.

The Emax 2 Retrofill, when ordered with 4 wire ground fault, will be equipped with a Neutral CT adapter. The adapter will modify the GE MicroVersaTrip type Neutral CT output to a Rogowski sensor output compatible with the Emax 2 Retrofill Trip Unit. With this device, it will not be necessary to change the neutral CT in the switchgear to a Rogowski sensor.

9- Product Specs

Weight (lbs.)

Retrofill Breaker, which replaces:	Weight	Box Wt	Pallet Wt	Accessories Wt	Total Wt
AKR30S-800A	184	11	24	2	221
AKR-30/30H-800A	230	11	24	2	267
AKR-30L-800A AKR-50/50H-1600A	270	11	24	2	307
AKRT-50H-2000A	270	11	24	2	307
AKR75/AKR75H-3200A	600	15	30	2	647
AKR100-4000A w/o Fans (3600A)	625	15	30	2	672
AKR100-4000A w/Fans	626	15	30	2	673
AKR125-5000A	700	19	38	2	759

Views

Typical Emax 2 Retrofill circuit breakers for GE AKD-8 & OEM switchgear are shown below. All circuit breakers are drawout types. Each Retrofill is constructed by permanently joining an Emax 2 circuit breaker in a steel frame, installing primary and secondary disconnects and driving drawout racking cams thru what look the Emax 2 Cassette's front dashboard. With least modifications to be made to existing switchgear, Emax 2 Retrofill breakers are cost effective solution to upgrade the existing electrical system. Direct Replacement is the solution where the moving part of circuit breaker is removed and a new circuit breaker is provided, which racks into the existing switchgear compartment. The direct replacement retrofitting kit allows a reliable upgrade of the old GE legacy breakers to new Emax 2 Retrofill Breakers Range.

Below figures (front and back views with finger clusters) present Emax 2 Retrofill breakers, which can replace AKR breakers.

Figure 1

AKD-8 800A to 2000A AKR30/30H, 30L, AKR-50/50H/T-50H Breaker in Cassette (Front View)

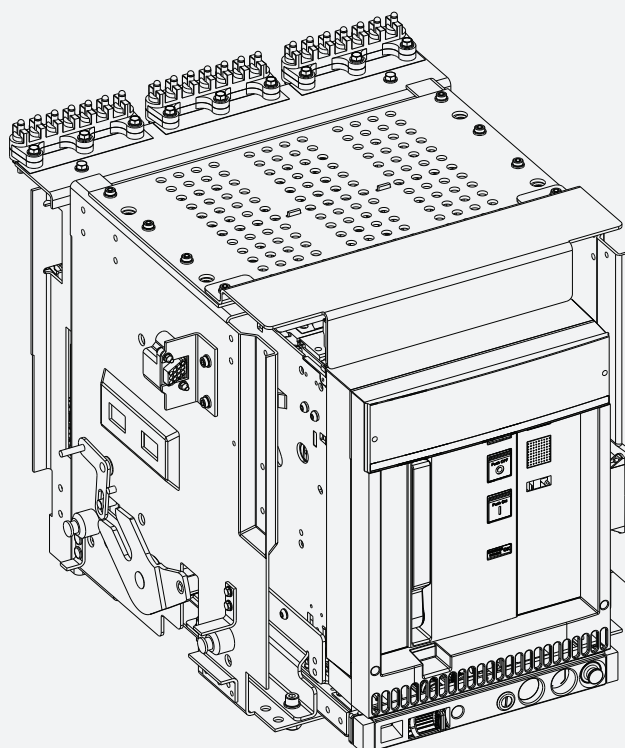


Figure 2

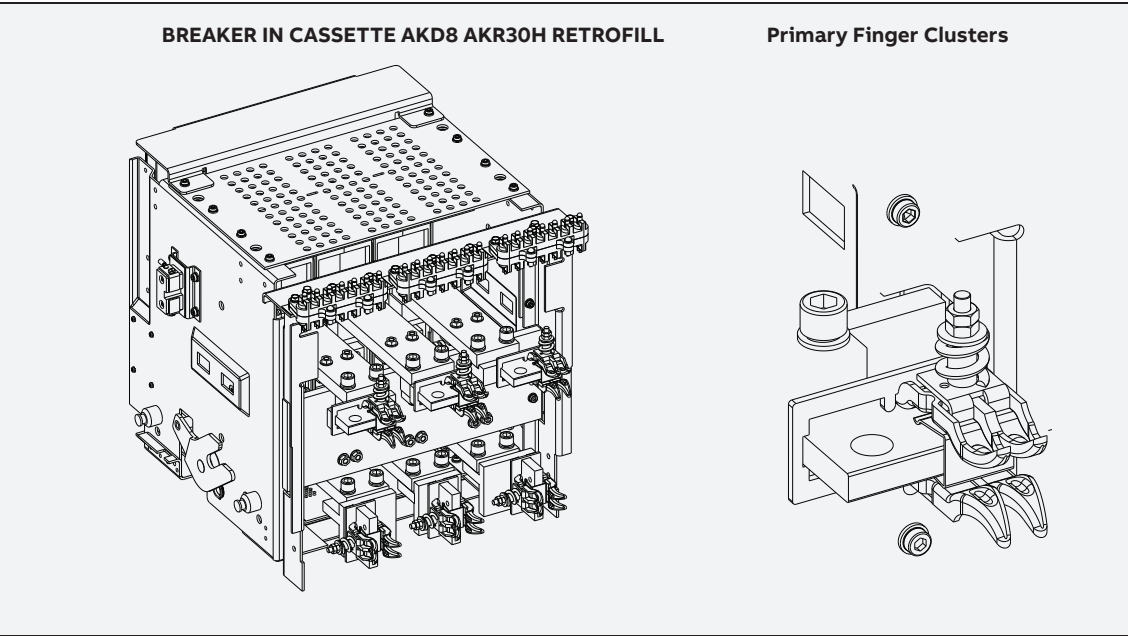


Figure 3

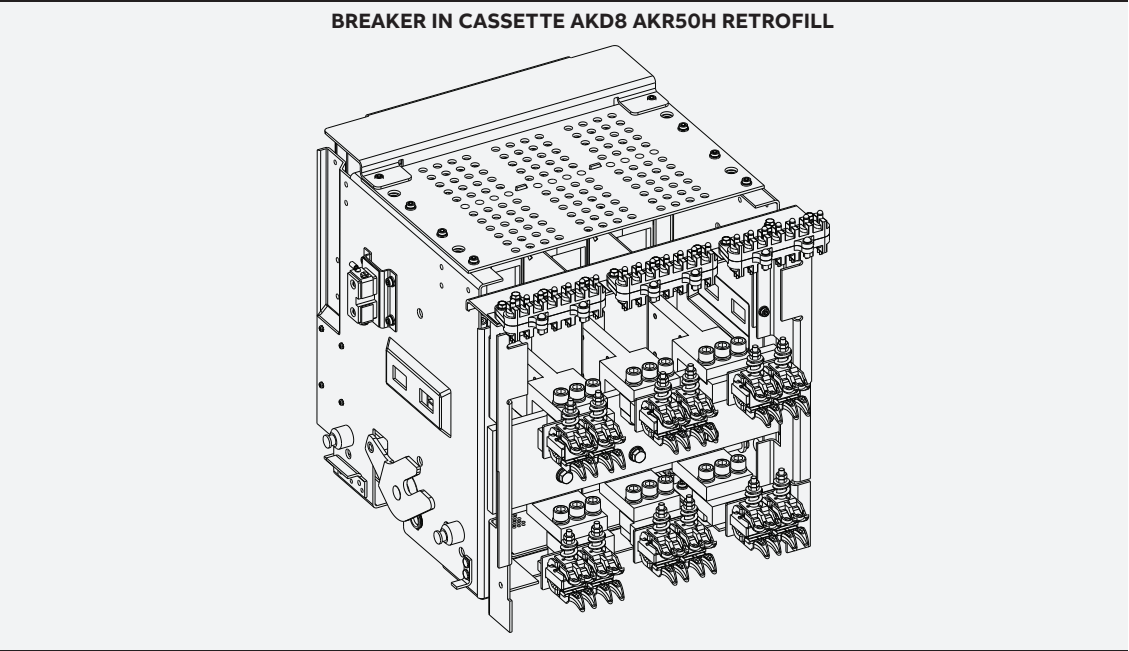


Figure 4

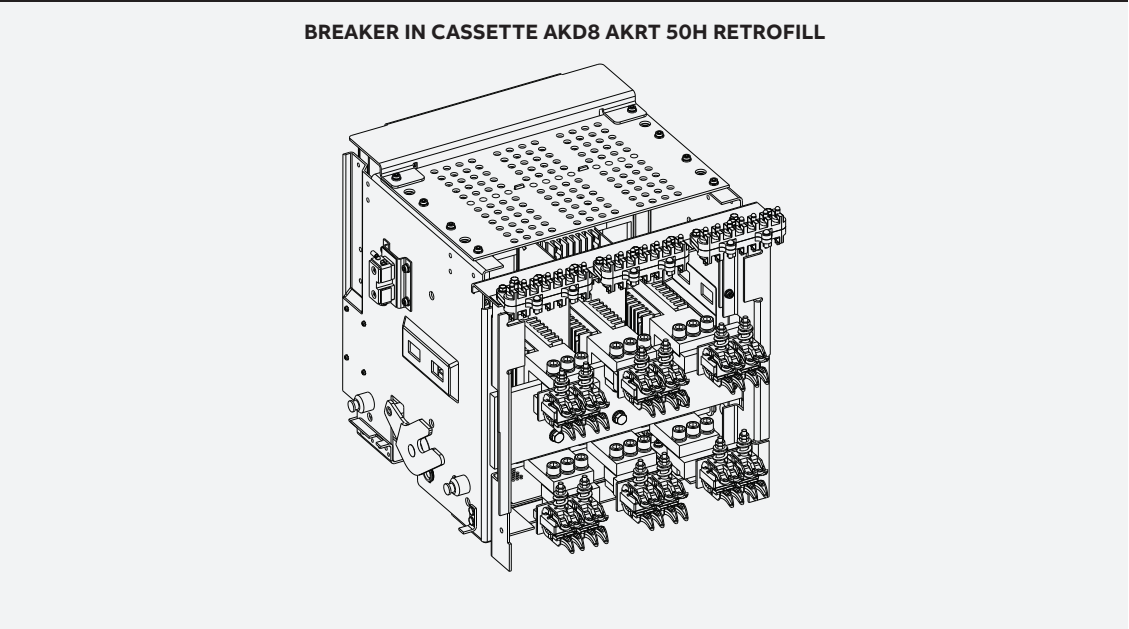


Figure 5 & 6

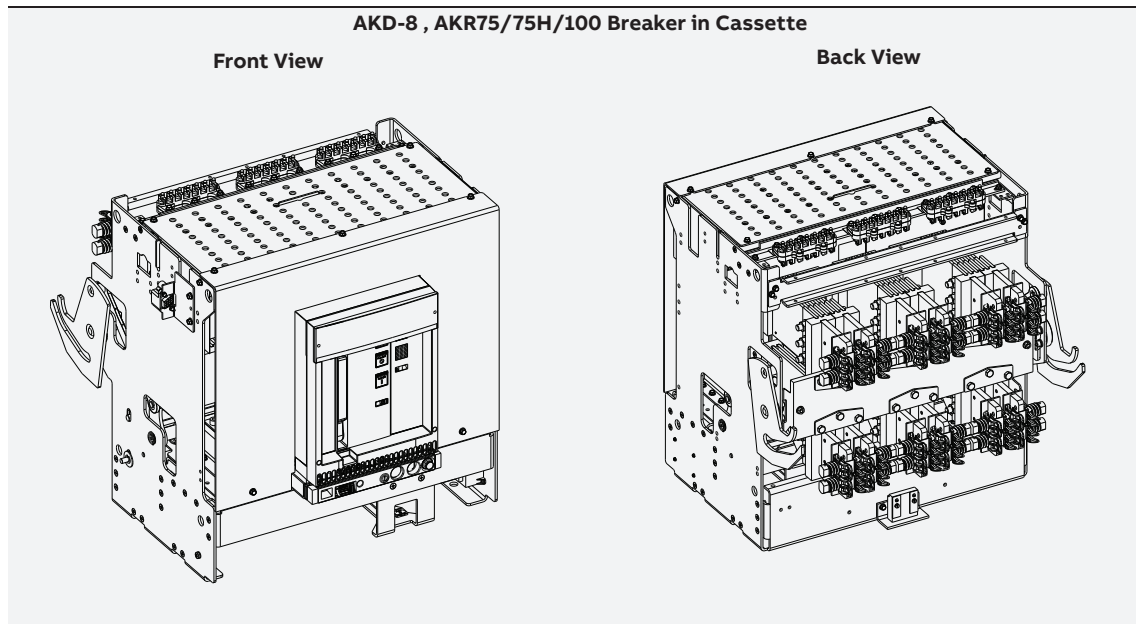


Figure 7

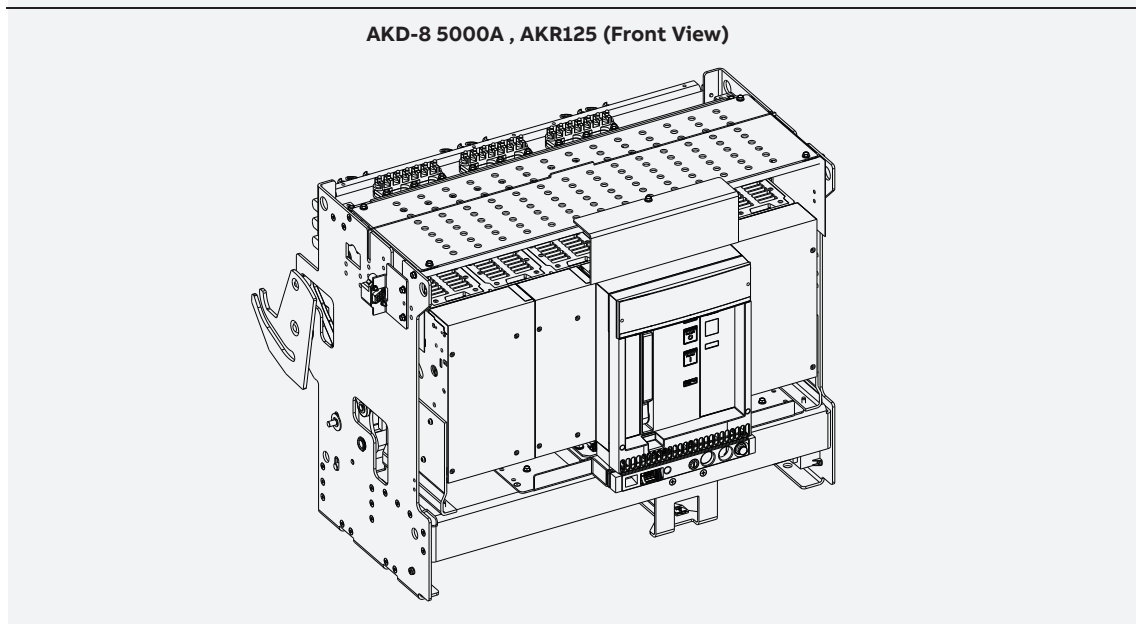
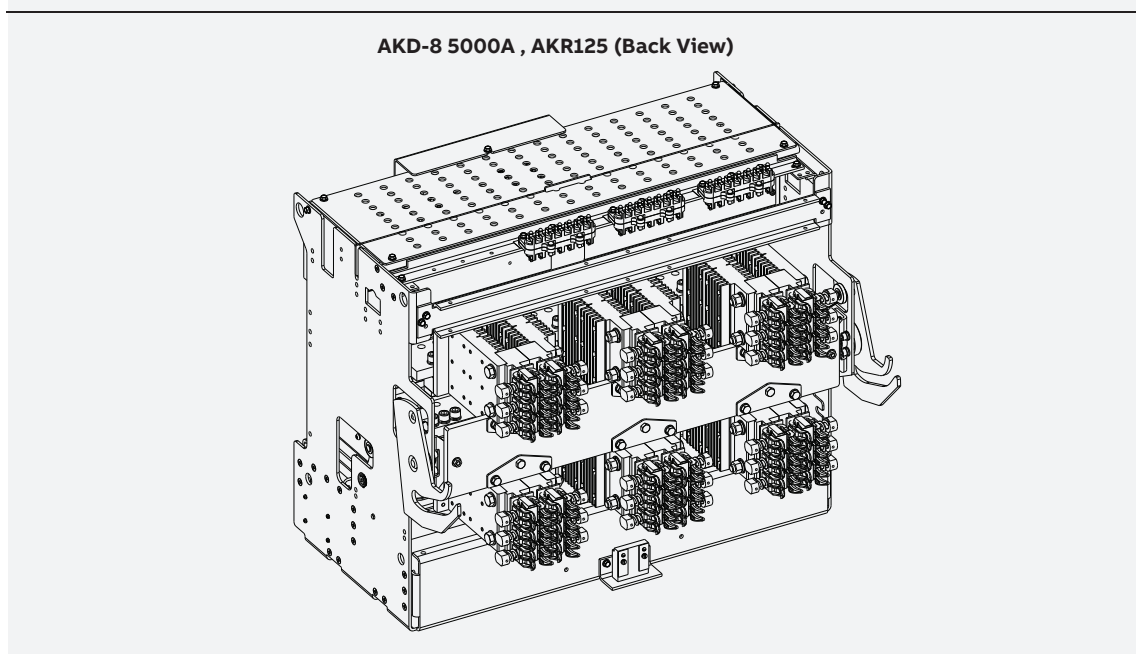


Figure 8



Emax 2 Retrofill Circuit Breaker is suitable for application on power systems up to 635 VAC 50/60 Hz.

History and Types

10 - History of AKD

AK - Power Circuit Breaker Equipment

D - Drawout circuit breaker construction

Manufactured from 1951 to 1975, all bolted, copper bus design, all drawout breakers AK- 1,2,3,-15 /25 / 50 /75 / 100; the 4000A-max bus rating. Breakers had a ratcheting drawout mechanism, with an open-door drawout. Breakers were painted ANSI61, light gray,manufactured in Philadelphia from 1951 to the mid-60s and in Burlington, Iowa from the mid-60s to 1975.

The breaker compartment was a welded assembly, and the equipment frame was bolted. Breaker boxes were stacked to make a vertical section with equipment frame around the breaker boxes. There were no bus compartment barriers, just an open bus design. Ring silver-plating was applied to bolted connections.

-
- AKD - 5** Manufactured from 1960 until 1977, the aluminum bus had copper that was “flash-butt welded’ to the aluminum at bolted connections. During that time, AK-2A, 3A -25 / 50 /T50/75 / 100 (“A” signifies AKD-5 drawout) were produced. Breakers up to 2000A had primary finger clusters. 3000 & 4000A breakers had a circular primary finger cluster arrangement in the switchgear compartment. Pull-lanyard drawout mechanism in the switchgear on early designs was replaced by a single jackscrew mechanism and then later replaced by a double jack-screw mechanism. Featured is a closed-door, drawout with inner house breaker compartment, where door moves with the breaker as it is racked in or out. Two bus levels are available with a ring bus used at 4000A. Particulars include: welded/riveted frame, bus compartment barriers, line/load separation barriers on mains and ties, isolation barriers on transformer transitions, copper runbacks on feeder breakers, ring silver-plating on copper, and aluminum bus unplated (welded connections). The switchgear is painted sand-gray (beige), with some instrument doors painted blue. AKR-30/50 in 22"-wide sections were introduced in AKD-5 construction, early 70s. AK25s and AK50s were also available as substructure kits for OEMs to build around customer gear.

Note: All legacy AK & AKR breakers have a draw out letter code “A”.

-
- AKD - 6** AKD-6 was manufactured in Salisbury, NC from 1977 to 1981. Some AKD-5s, which were built in Salisbury from 1975 until 1977, got name-plated as AKD-6. There is no “flash-butt” welded aluminum to copper. Aluminum bus is tin-plated and bolted at shipping splits (but welded everywhere else). Copper bus design has ring silver plating at bolted joints. AKR-75 / 100s were introduced during this time. Stab-and-finger connections on 3200A and 4000A breakers were improvements, versus the round the primary disconnects on the AKD-5, The 4000A breaker was also narrowed to same width and phase-phase spacing as the 3200A.

The AKD-6 uses inner-house drawout breaker compartments on the 800 - 2000A breaker compartments. They are painted ANSI 61 light gray and breakers have ECS or SST trip units.

AKD-6 should mark a shift away from all AK breakers and to AKR breakers. The AKR-30/50/50H/T50 breakers used in AKD6 have a shallow 1” steel front escutcheon are drawout letter code “A” i.e. AKR-4A-30. The AKR-30/50/50H/T50/75/100 breakers sold to OEMs for their switchgear have a 5” deep plastic front escutcheon & spring loaded sliding “picture frame”.

These are draw out letter code “B” i.e. AKR-4B-30.The AKR-75/100 breakers used in AKD-6 have a shallow 1” steel front escutcheon and vertical primary fingers. They are drawout letter code”C” i.e. AKR-4C-75.

AKD - 8 The AKD-8 was manufactured in Salisbury, NC from 1980 to 1984 and in Burlington, Iowa from 1984 to 1999. It was mostly replaced by AKD-10 in 1999 to 2000 but was available thru 2015.

Model 1 and 2 have extruded vertical bus. Model 2 was introduced in 1983 to accommodate revised wire harness routing. Model 3 was introduced in 1991, using a flat bar vertical bus. AKR breakers use Micro VersaTrip 9, MVT RMS9, EPIC, MVT Plus, MVT PM or EntelliGuard TU. Aluminum bus was removed from the design in 1996 in favor of the standard tin-plated copper bus (silver plated optional).

The AKR-30/50/50H/T50 breakers used in AKD8 have 5" deep plastic front escutcheon & spring loaded sliding "picture frame". They are drawout letter code "D" i.e. AKR-7D-30. In AKD-8, most 800-2000A breakers are "feeder" breakers with vertical lower stud & primary disconnect fingers clusters, but 800-2000A breakers designated as "Main" breakers, have horizontal lower finger clusters, which is the same as "D" letter code breakers sold to OEM's. A lower stud rejection bracket differentiates between lower stud orientations.

AKR-75/100/125 circuit breakers used in AKD-8 switchgear have a 5" deep plastic front escutcheon & spring loaded sliding "picture frame" similar to the small frame breakers. The positions DISC/TEST/CONN are shown on the side of the front escutcheon by position of the sliding "picture frame". The GE AKD-8 breakers have a drawout letter code "D". OEM versions are drawout letter code "B" and GE Switchboard versions are drawout letter code "FP", "B" & "F" breakers only differed by appearance items. All Primary disconnect stabs are vertically oriented.

The AKR-125 is a 5000A breaker that had (2) cooling fans. It was release in 1995. None of the Emax 2 Retrofill breakers utilize fans except for 4000A rating only.

AKD - 10 AKD-10 was manufactured in Burlington, IA from 1999 thru 2015. The switchgear compartment sizes and main & vertical bus arrangements are the same as AKD-8 Model 3. The compartments have pull-out rails. AKD-10 uses WavePro * drawout-only style breakers. All breakers have 4 rollers which align with the compartment rails.

The secondary control wiring for all functions is connected thru either one or two 36 point secondary disconnects with gold plated contacts. Secondary control wiring terminates at fixed standard locations on the 36 point disconnects. Each breaker has a pump style manual charging handle and manual push OPEN and Push CLOSE buttons. The front escutcheon is 5" deep with a sliding picture frame, but is wide enough so the trip unit and new style bell alarm are visible thru the front door of the switchgear.

Note GE Switchboard plants initially shipped "WS" style breakers and later shifted to "WE" style breakers to be consistent with GE Switchgear from Burlington, Iowa. The 5000A breaker had cooling fans. None of the Emax 2 Retrofill breakers utilize fans except the 4000A fully rated breaker.

(W1 & We Catalog numbers on legacy WavePro breakers designate additional dead front shields)

AKD-8: Retrofill Breaker

11 - AKD -8 :Breaker Models

The following figures depicts the AKD8 Retrofill breakers (800-5000A)

Figure 9

Retrofill Breaker (800-2000A)



Figure 10

Kirk-lock Actuator Link AKD-8 Compartment Kirk-lock upto 2000A

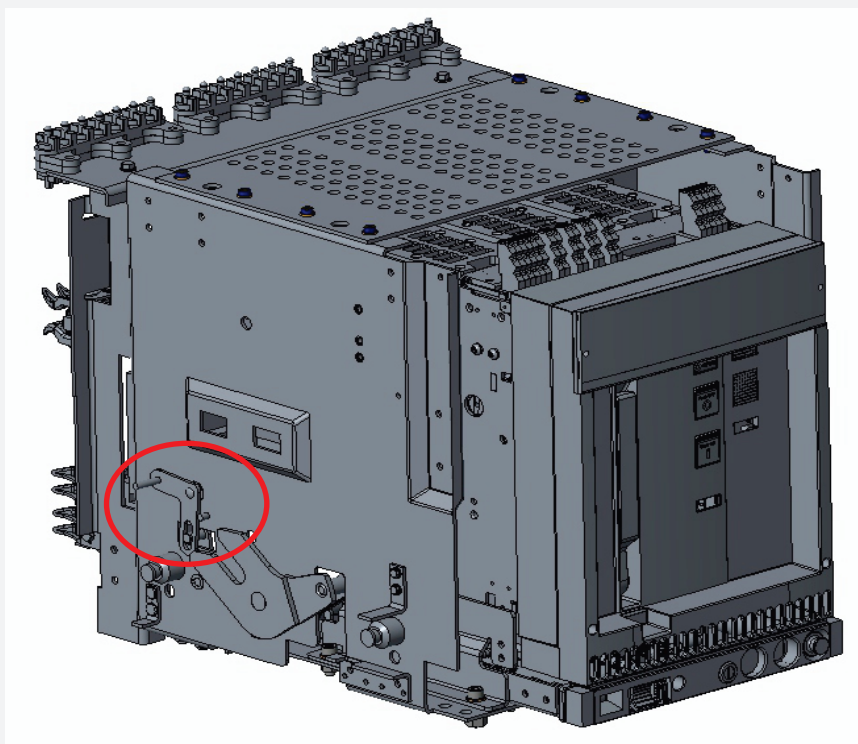


Figure 11

Retrofill Breaker (3200-5000A)

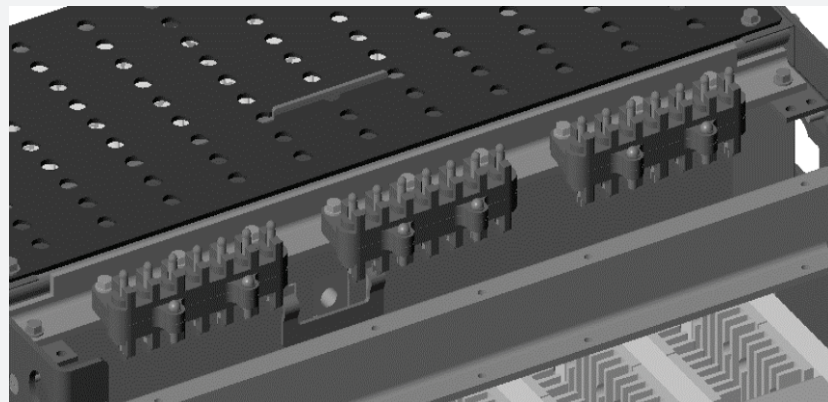
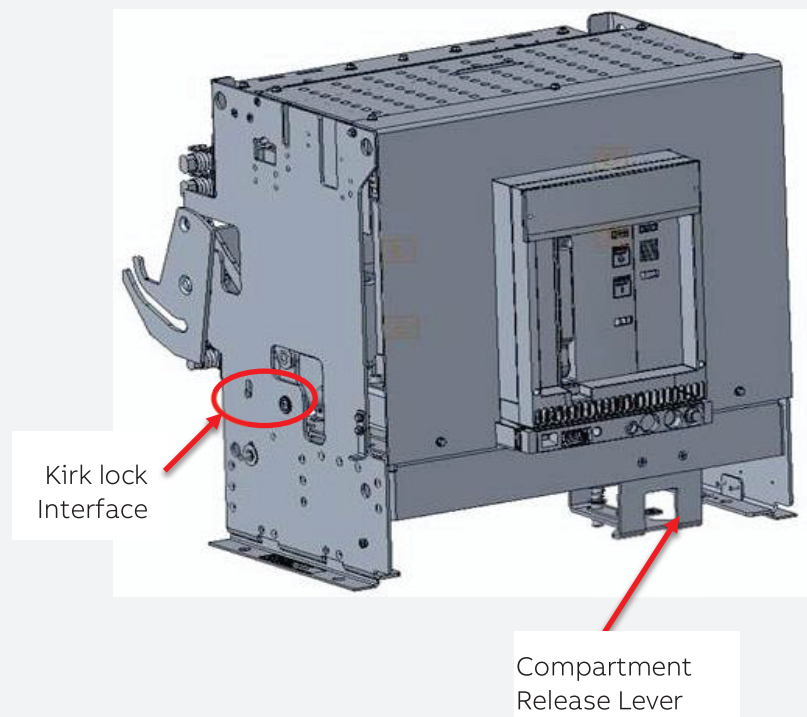


Figure 12

**AKD-8 Compartment Kirk-lock 3200A-4000A
Kirk lock Actuator/ Compartment Release lever**



12 - AKD -8 :Mechanical Drawings

The following engineering or assembly drawings describe the layout and dimensions of the AKD-8 Retrofill breaker.

Figure 13

AKD-8 : AKR30/30H Retrofill Breaker Dimensions

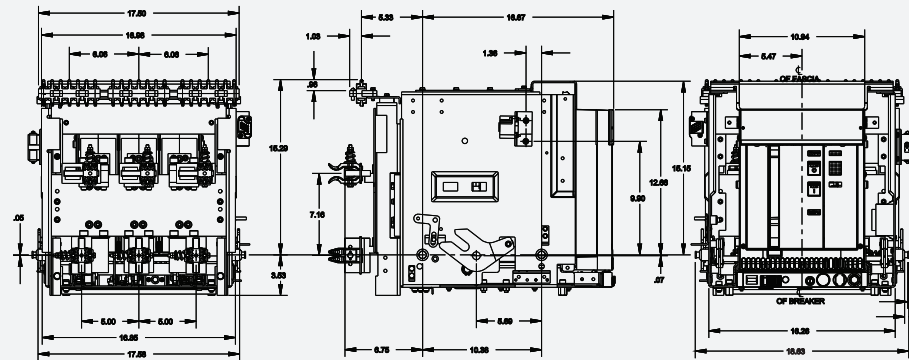


Figure 14

AKD-8 : AKR30S, Retrofill Breaker Dimensions

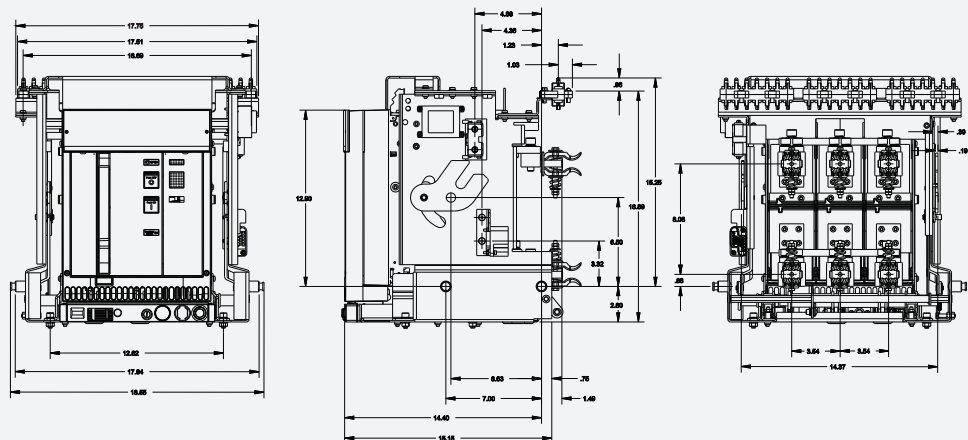


Figure 15

AKD-8 : AKR50/50H/30L/AKRT-50H, Retrofill Breaker Dimensions

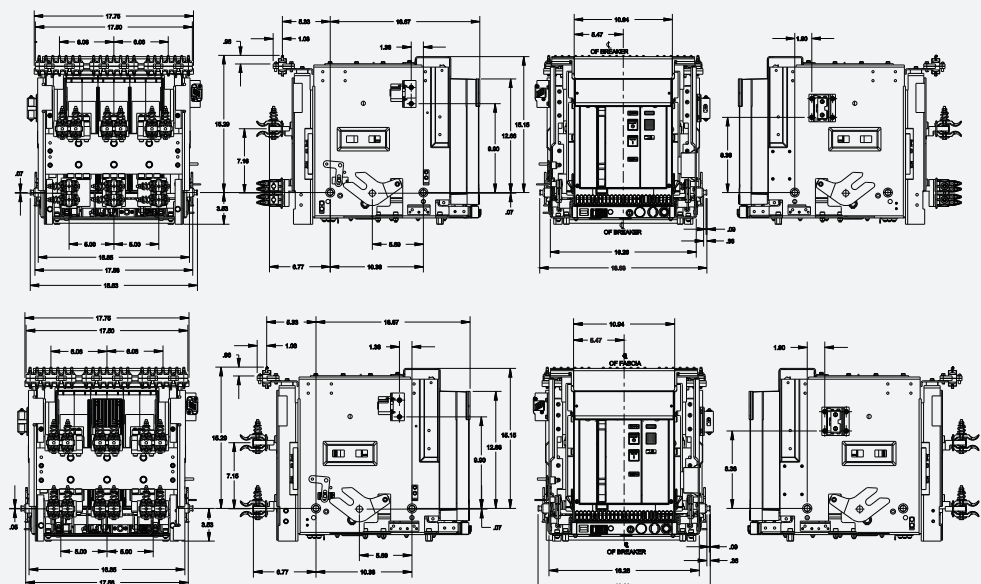


Figure 16

AKD-8, AKR75/75H - 3200A Retrofill Breaker Dimensions

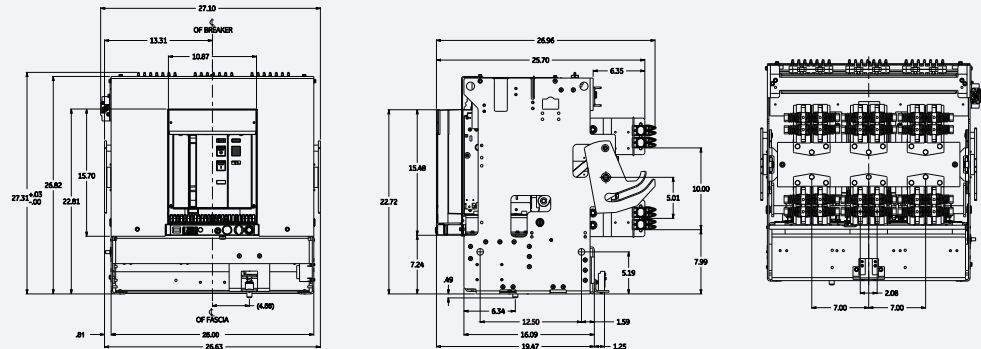
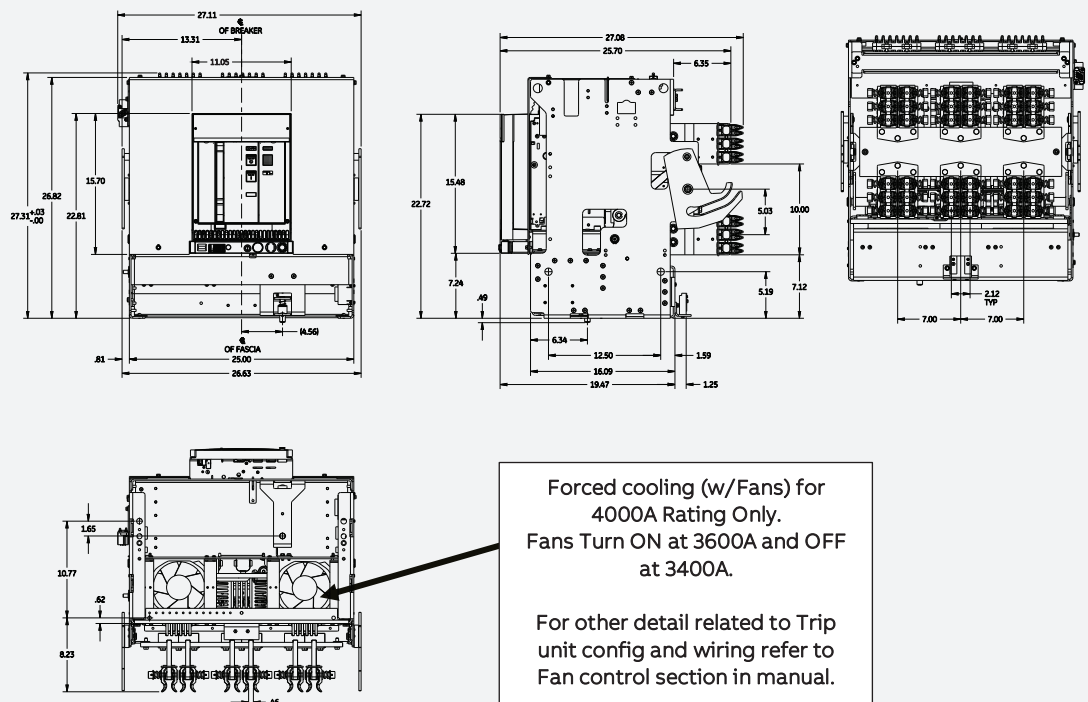


Figure 17

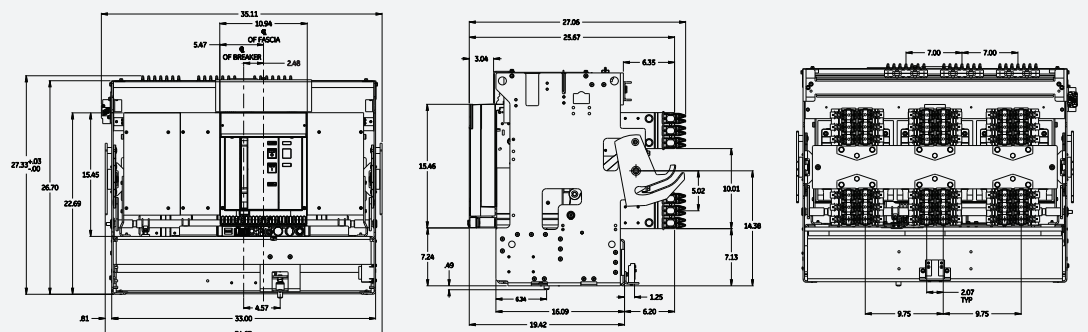
AKD-8, AKR 100 - 4000A With forced cooling (w/ fans) AKR-100 Retrofill Breaker Dimensions



Breakers ordered with a 3600A Rating plug for max 90% load do not require fans

Figure 18

AKD-8, AKR125, 5000A Retrofill Breaker, Dimensions



Cooling Fans are not Required on 5000A Emax 2 Retrofill Breakers.

AKD-8 Compartment

13 - Interior View

The figures below represent a Typical AKR-30/50/T50 AKD-8 compartment.

Figure 19

AKD-8: Empty Compartment , View 1
NOTE: Section width 22"- AKR-30/50/T50

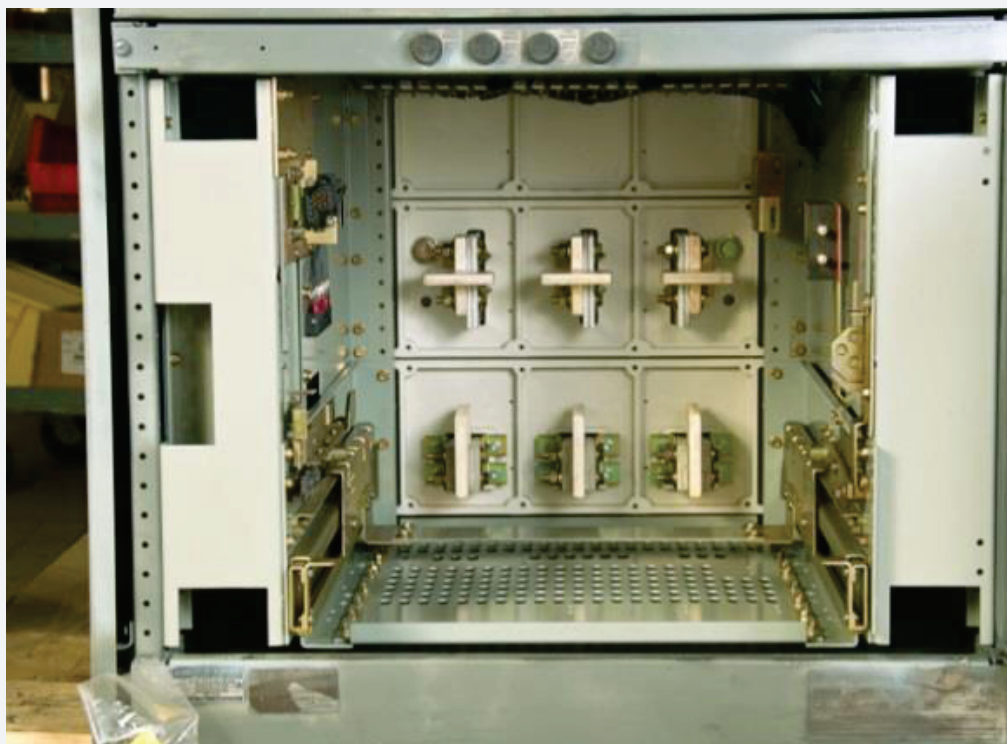


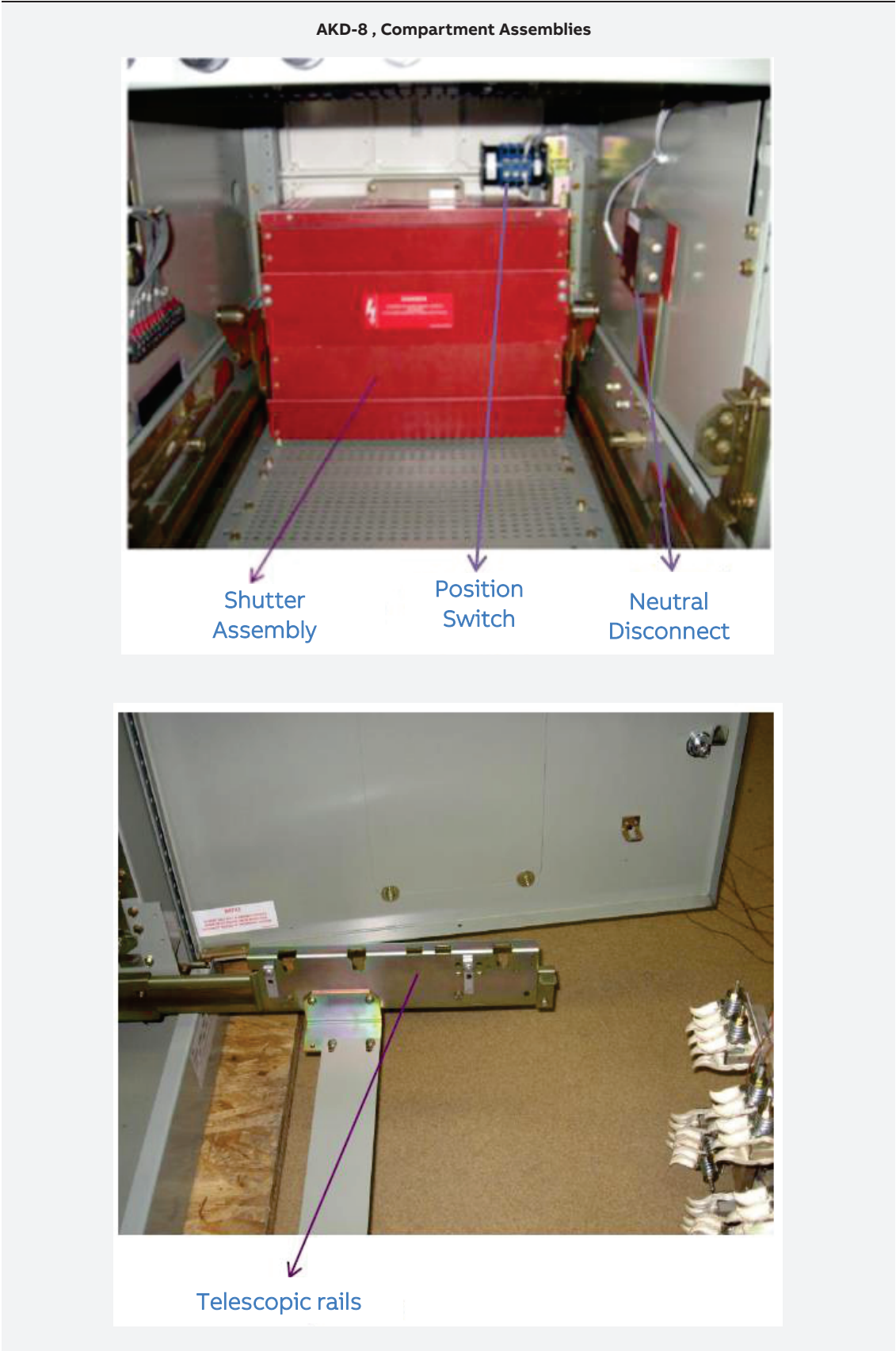
Figure 20

AKD-8: Empty Compartment ,View 2 , Racks/Rails Extended



Figure 21 is a photo of the interior of the AKD-8. The photos point out the shutter assembly and telescopic rails in the AKD-8.

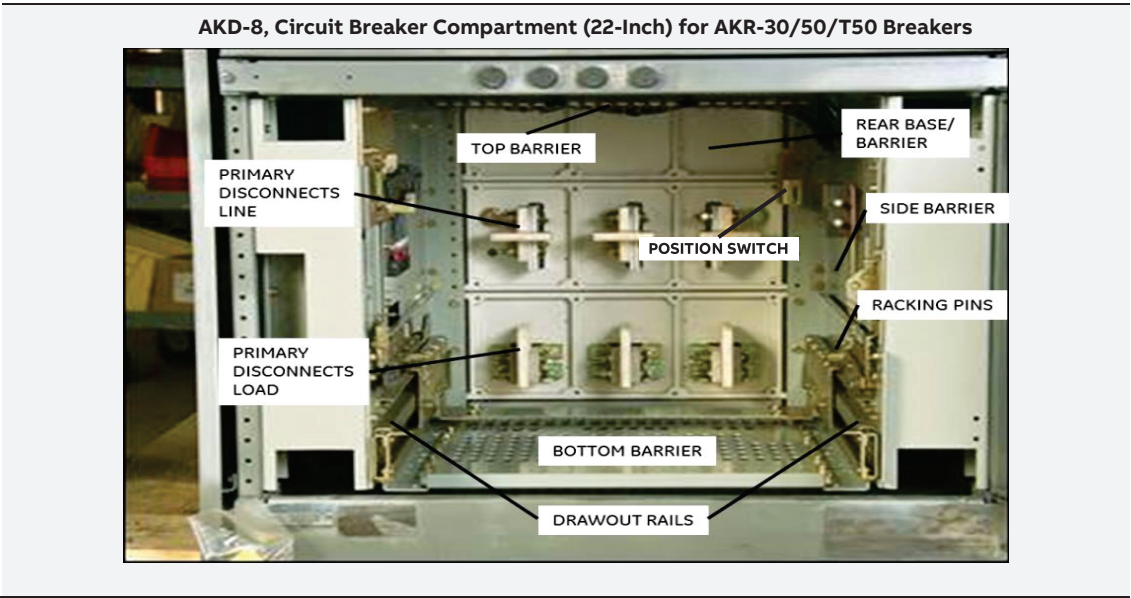
Figure 21



15 - Interior Components

Figure 22 points out the major components of an AKD-8 compartment.

Figure 22



15 - Interior View

The figures below present a Typical 30" AKR-75/100 AKD-8 compartment. (AKR-125 is similar but 38" wide)

Figure 23

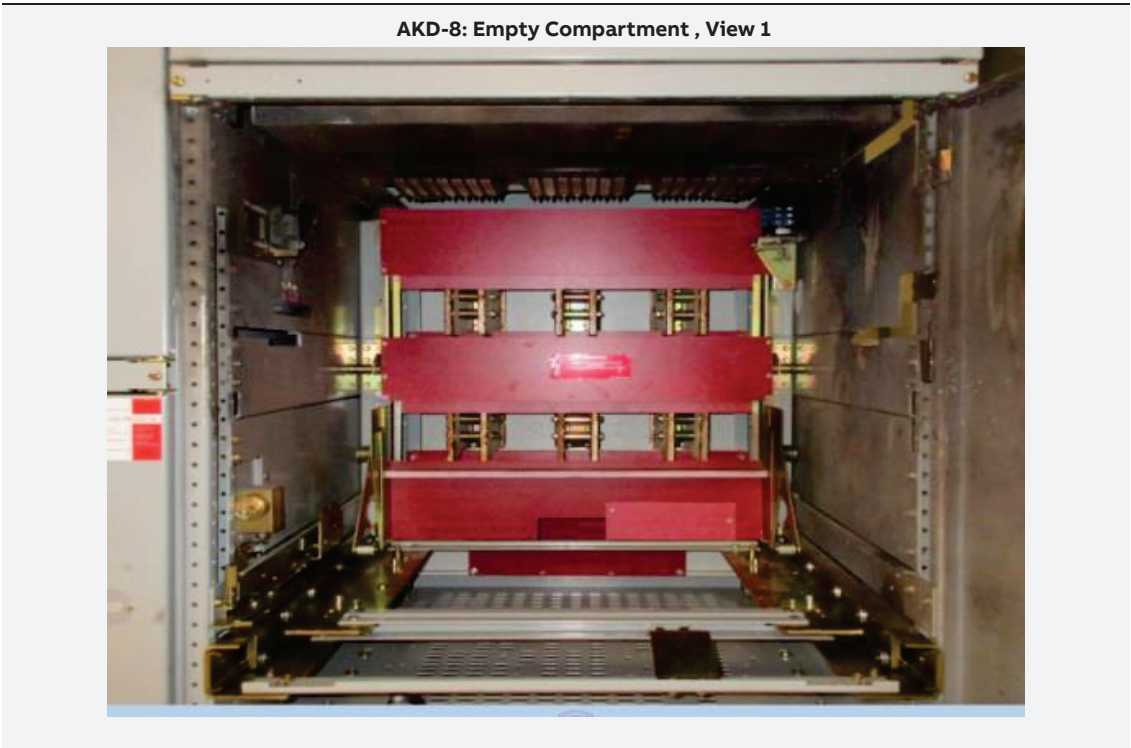


Figure 24

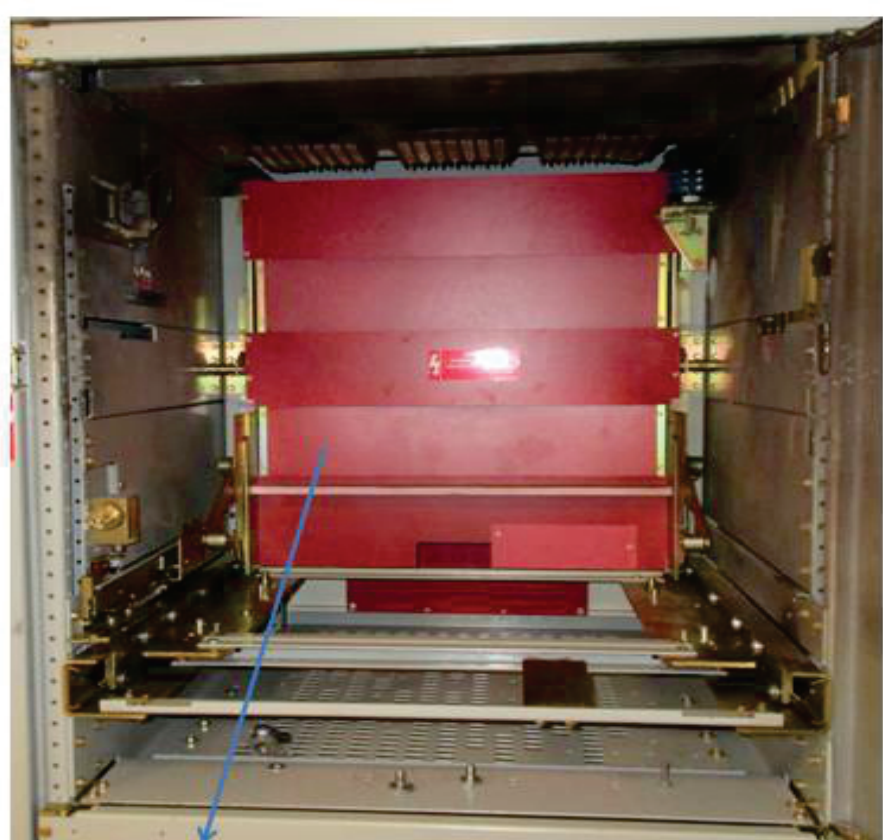
AKD-8: Empty Compartment, View 2, Drawout Tray Extended



Figure 25 is a photo of the interior of the AKD-8. The photos point out the shutter assembly and Draw out tray assembly in the AKD-8.

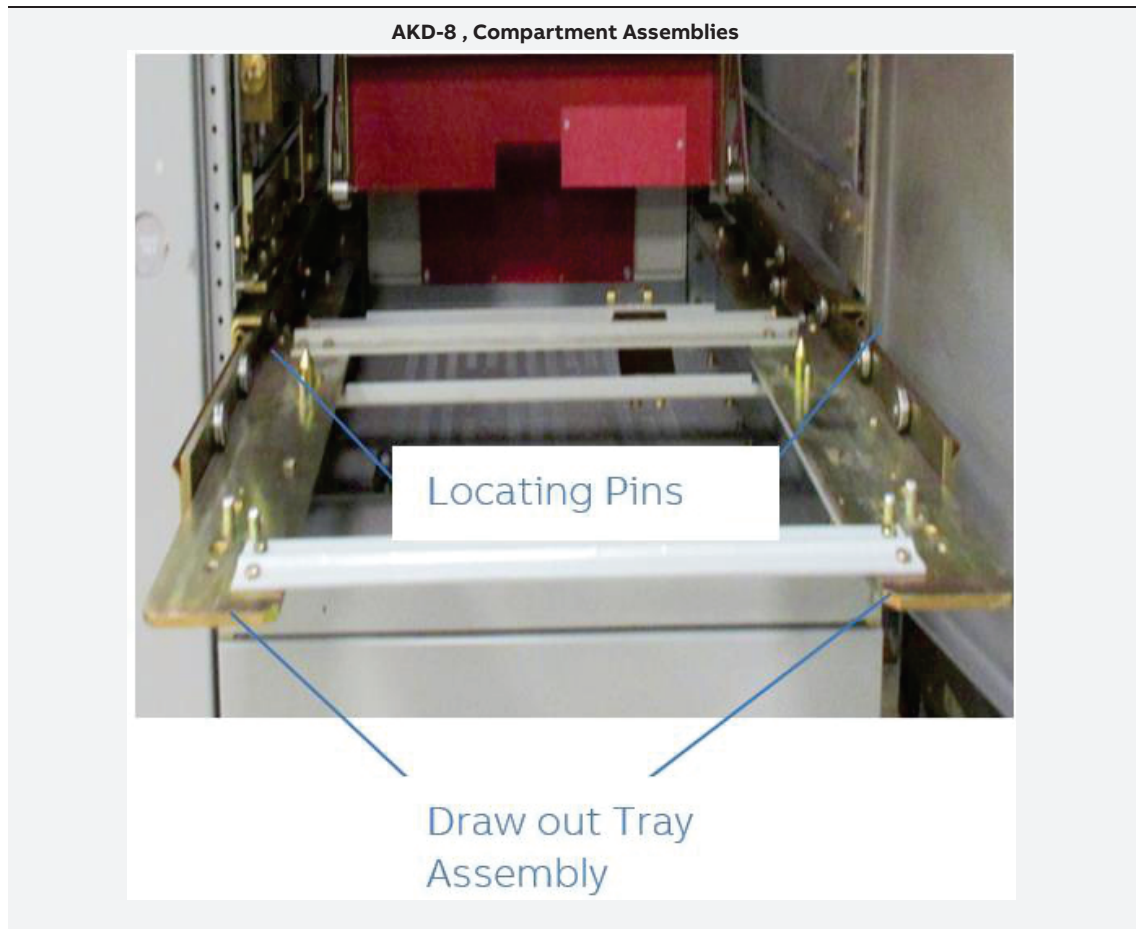
Figure 25

AKD-8 , Compartment Assemblies



Shutter Assembly

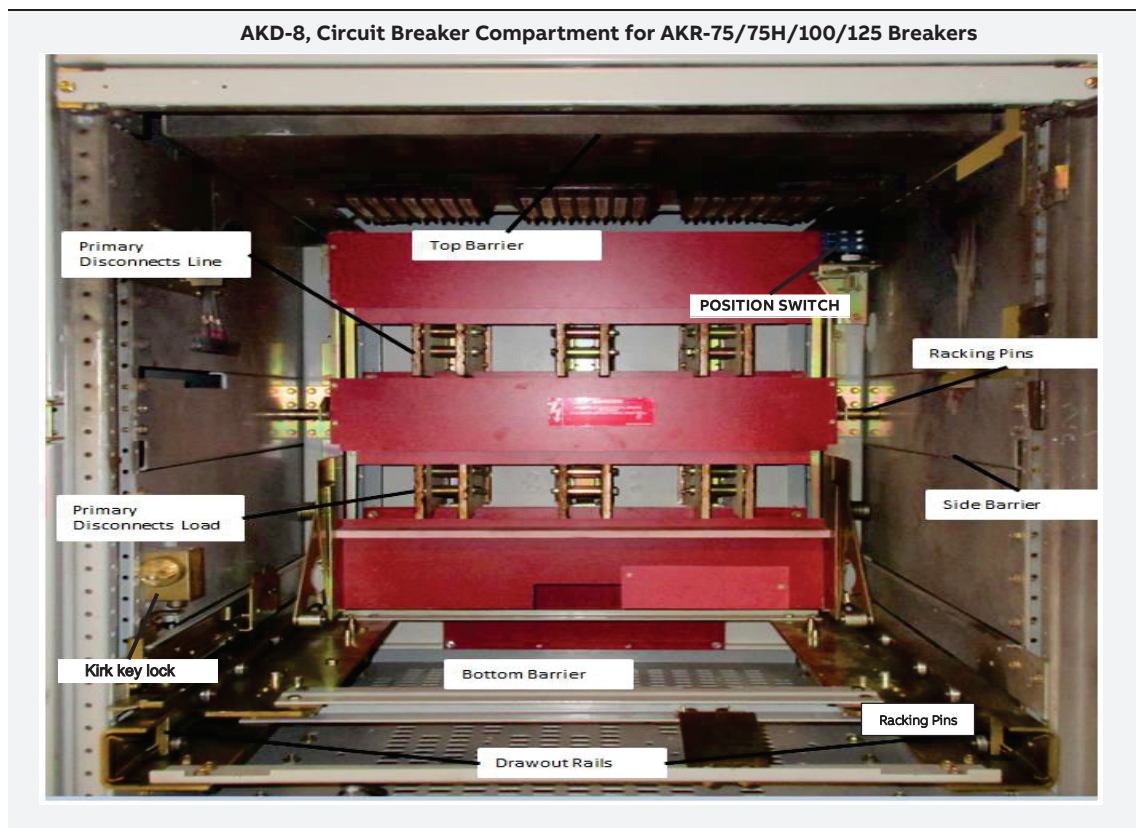
Figure 26



16 - Interior Components

Figure 27 points out the major components of an AKD-8 compartment.

Figure 27



Unpack Circuit Breaker

Danger



- 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.

Caution



Falling Object

- Do not walk or remain under any heavy assembly while hoisted above head as the chains securing the assembly may give way.

- Ensure lifting equipment has capability for device being lifted.
- Wear hard hat, gloves, and safety shoes.
- Failure to comply with these instructions could result in serious injury.

Notice



PRODUCT DAMAGE

- Ensure circuit breaker and its accessories are always used within their designated ratings.
 - Do not allow the circuit breaker to hit a hard surface while handling.
 - Do not drag or slide the circuit breaker across a hard or rough surface.
- A factory-installed rejection feature prevents mismatching circuit breakers and cassettes/ substructure, preventing the insertion of a circuit breaker with a lower rating into a higher rated cassette/substructure, or the insertion of a higher rated circuit breaker into a lower rated cassette/substructure.

By following the procedures below, you should be able to install the breaker with minimum effort and time.

Modify AKD-8 , Switchgear Compartment

17 - Cut Power to AKD-8 Switchgear

Danger



- It must be ensured that the supply power to the compartment is turned off/ compartment is deenergized for all the incoming and outgoing circuits of the LVS prior to any work being conducted on it.
- During the installation and related work on the equipment, it must be ensured that the operator is using the prescribed PPE for the specified tasks

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

Before modifying the switchgear compartment, de-energize/switch off the breaker. If the circuit breaker is ON and the springs are charged, to turn it off, press the OPEN button on the circuit breaker fascia, and ensure that the circuit breaker contacts are open.

18 - Rack Out AKD-8 Legacy/Existing CB

To rack-out legacy old breaker from compartment, refer to your legacybreaker's manual on how to remove the existing breaker.

19 - Check,Clean,Grease AKD-8 Compartment

1. Inspect the compartment for damage or signs of overheating.
2. Check the orientation of primary finger clusters match the switchgear stabs.
3. Check racking pin diameters agree with breaker racking cam slots .
4. Check the secondary disconnect integrity & their mounting supports for any damage or cracks .
5. If switchgear parts show cracks or damage contact ABB post sales service 888-437-3765.
6. Check each breaker compartment for bolted joints in the primary disconnect bars. Where such joints exist, check the bolts for tightness.
7. Inside the compartment, check the contact areas on each primary disconnect bar for foreign matter that may have accumulated. Clean those areas if necessary with a clean, lint-free rag and isopropyl alcohol or acetone.
8. Be sure to apply a thin film of red Mobilgrease 28 to the primary disconnect contact areas for better electrical connections inside the compartment.

20 - Quality

All Emax 2 Retrofill circuit breakers have been designed and manufactured to ANSI standards. The design was based on the original requirements of the legacy switchgear and breaker. The product is manufactured in ABB Inc USA, Senatobia, Missisipi (MS) and is inspected using some of the same master gauges used on the legacy WavePro breakers to confirm electrical and mechanical performance, including rejection-features.

21 - Information Label

On the front of each circuit breaker there is a factory-assembled label that details all electrical accessories included on the circuit breaker.

22 - Product and Catalog Serial Numbers

Product catalog and serial numbers should be kept handy when communicating about the circuit breaker. Each circuit breaker has a unique serial number (S/N) located on the front fascia.

23 - Remove Circuit Breaker from Container

Inspect and Prepare

1. Inspect the shipping container for obvious signs of rough handling and/or external damage incurred during transportation.
 2. Record any observed damage for reporting to the carrier. Ensure all recorded reports and claims include the order number and name plate information.
 3. Remove the banding straps and lift the top cover.
 4. Remove all packaging material.
 5. Remove all product documentation and store properly.
 6. Unscrew the mounting screws that fasten the circuit breaker to the bottom of the shipping pallet and remove the circuit breaker.
 7. Remove the two shipping brackets and discard them.
-

Use Lifting Device

1. Use a lifting device for moving circuit breaker in order to avoid personal injury and damaging the breaker.
 2. Use a proper overhead lifting device to mount breaker into the switchgear. Contact the nearest sales office for availability of a hoisting device.
-

Store Circuit Breaker

Notice



PRODUCT DAMAGE

- Do not store circuit breaker in corrosive environments above LC1 (sea salt mist) and G1 as per ANSI/ISA-S71.04-1985.
- Ensure circuit breakers are stored in a clean, dry location, in their original packaging.
- Failure to comply with these instructions may result in product damage.

If you decide not to install the Retrofill breaker until a later time, then you can store it away for installing it later.

1. Store the circuit breakers in a clean, dry location in an upright position.
2. Make sure that the breakers are properly supported to prevent bending of the studs or damage to any of the breaker parts. Do not remove any protective grease until the assemblies are ready to be installed. Cover to prevent dust from settling on the breakers.
3. If breakers are not to be placed in service at once, remove them from their shipping cartons and thoroughly inspect them for damage.
4. If everything is in satisfactory condition, replace the breakers in their shipping cartons for storage. If it is necessary to store the equipment for any length of time, use the following precautions to prevent corrosion or deterioration.
5. Store in a clean, dry, rodent-free location with moderate temperature & provide protective coverings to prevent dirt, water, or other foreign substances from entering the breaker.
6. If dampness or condensation is encountered in the storage location, heaters installed in the switchgear can be used to prevent moisture damage.
7. After prolonged storage, Level 1 maintenance is needed under two years of storage. While Level 2 maintenance is needed over two years of storage. Refer to circuit breaker manual in maintenance L1-L2 descriptions.
Refer to Emax2 Installation, Operation and Maintenance Instructions — Publication #1SDHOO1000RO002 pages 99-112.

Check Before Installing

Danger



- It must be ensured that the supply power to the compartment is turned off/ compartment is deenergized for all the incoming and outgoing circuits of the LVS prior to any work being conducted on it..
- During the installation and related work on the equipment, it must be ensured that the operator is using the prescribed PPE for the specified tasks

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

These breakers are supported on a rollout track in the same manner as the AKR breakers. Racking cams on both sides of the breaker frame engage the drawout mechanism pins fastened to both sides of the compartment.

Check to see that the breaker or breakers match their respective compartments. Look on the breaker summary sheet, the front view drawings, breaker nameplate, and on the identification card on the breaker shipping carton.

Clean and Grease Breaker

1. Before installing or operating a breaker, refer to the breaker instruction manual for pre-operation inspection and test.
2. Check thoroughly for any damaged or loose parts and for any dirt or foreign matter which may be in the breaker.
3. Clean those areas if necessary with a clean, lint-free rag and isopropyl alcohol or acetone.
4. Be sure to apply a thin film of electrical grease (Mobilgrease 28) to the primary disconnect fingers (Figure 28 and 29).

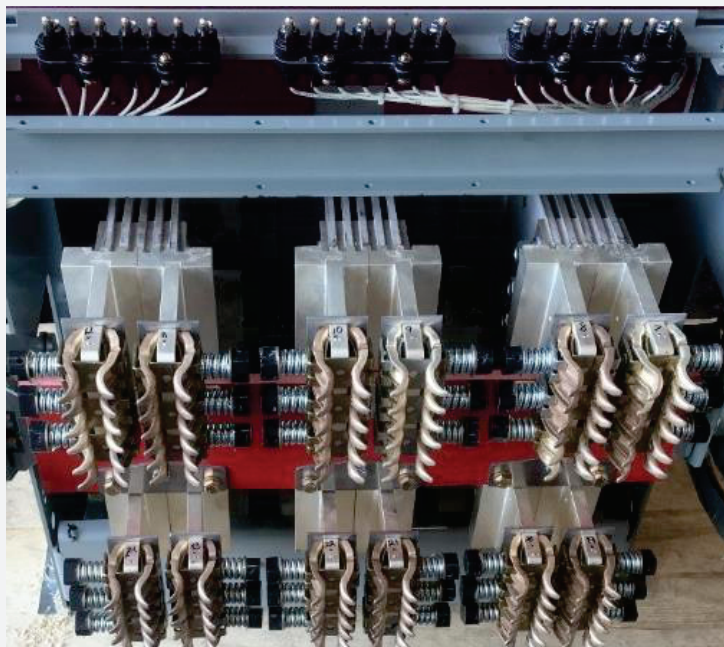
Figure 28

AKD-8 Primary Contacts or “Fingers” (Apply Grease to sliding surfaces)



Figure 29

AKD-8 , (3200-5000A) Primary Contacts or “Fingers” (Apply Grease to sliding surfaces)



Modify Retrofill

Notice



WIRING

- Before installing the breaker, the secondary disconnects must be wired to the Emax 2 Retrofill Breaker.
- Wires with wire markers are provided on the breaker. Make sure that the switchgear wiring connection points match up with the original wiring of the cubicle. This ensures that all wiring connections are properly made.
- Wrong connections will cause the breaker to malfunction.

Modify AKD-8 AKR30S Switchgear Compartment only

Danger



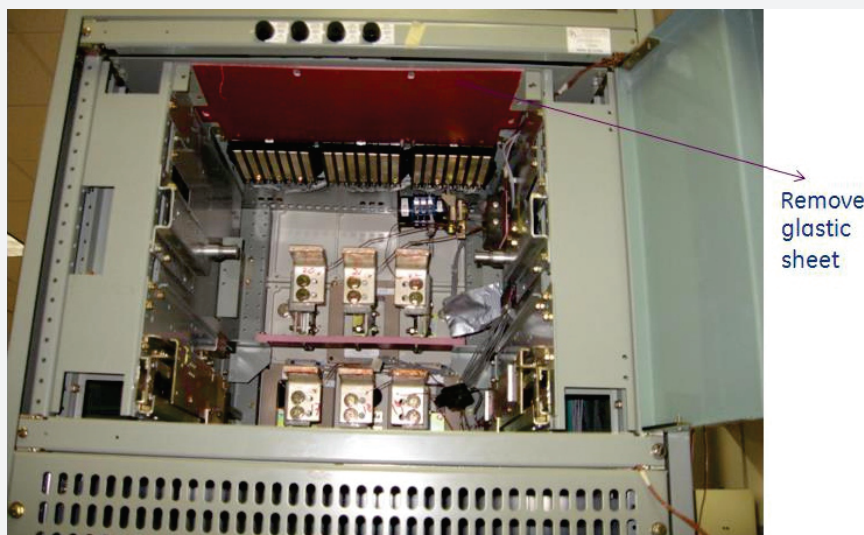
- It must be ensured that the supply power to the compartment is turned off/ compartment is deenergized for all the incoming and outgoing circuits of the LVS prior to any work being conducted on it..
- During the installation and related work on the equipment, it must be ensured that the operator is using the prescribed PPE for the specified tasks

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

24 - AKD-8 , AKR-30S Remove Glastic Sheet of compartment

Figure 30

Remove Glastic Sheet for AKR 30S only



The AKD-8 AKR30S switchgear compartments need this particular attention.

The glastic sheet has to be removed (Figure 30).

In some cases, however, it is possible that this sheet is not secured to the top of the cabinet properly, and was found to sag around the middle of the cabinet. This could lead to the sheet interfering with secondary disconnects. Resecure it to the top of compartment or replace it with any UL recognized reinforced polyester glass sheet.

Danger



- It must be ensured that the supply power to the compartment is turned off/ compartment is deenergized for all the incoming and outgoing circuits of the LVS prior to any work being conducted on it.
- During the installation and related work on the equipment, it must be ensured that the operator is using the prescribed PPE for the specified tasks

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

Figure 31

Modify Bracket



Steps for removing the bracket pin:

1. Remove the left bracket assembly (75C149309G061) from the compartment (Figure 31). The assembly is bolted to the side sheet. Remove (4) # $\frac{1}{8}$ -20 thread forming screws using a socket wrench and $\frac{3}{8}$ " hex socket.
2. Remove the pin from the bracket (75A106208P204). The pin is riveted from the inside and has to be drilled from the same side. Removing the bracket is necessary.
3. Note that the assembly must be done by a trained service technician only.
4. Apply corrosion resistance treatment to the exposed metal after removing the pin.
5. Reassemble the bracket assembly and scrap or discard the pin. Torque $\frac{1}{8}$ -20 thread forming screws to 85 in-lb.

Install AKD-8 (800-2000A) Retrofill Breaker

Danger



- It must be ensured that the supply power to the compartment is turned off/ compartment is deenergized for all the incoming and outgoing circuits of the LVS prior to any work being conducted on it..
- During the installation and related work on the equipment, it must be ensured that the operator is using the prescribed PPE for the specified tasks

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

After the existing breaker is removed, the compartment modified and secondary wiring verified, the Retrofill breaker can now be installed in the AKD-8 switchgear, OEM switchgear or switchboard.

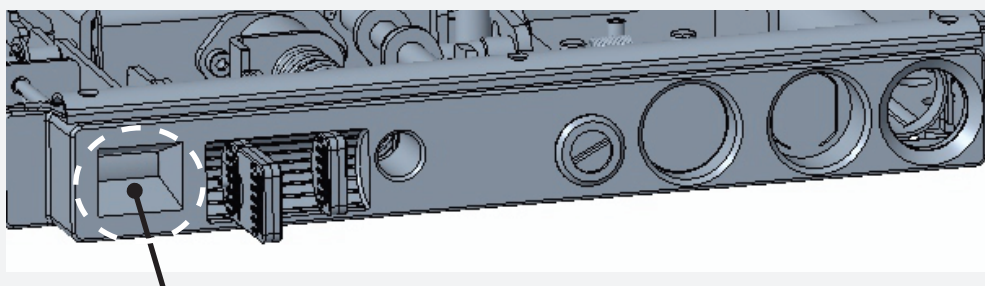
Note : the preferred lifting method is always to use proper ABB lifting (spreader) bar. It will provide the best chance of installing breakers, especially into the upper compartments, without damaging the breakers. The WavePro small frame lifting bar had a 3rd lifting hook at the front and it will not fit on the retrofill breaker. Any time eye bolts (small frame breakers) or large diameter holes (large Frame breakers) and generic lifting chains are used, caution must be used to keep the chains to no less than 45 degree angle from horizontal to avoid damaging the breaker side frames)

800A - 2000A Breakers : ABB Lifting Bar #2TSE431929R1000, old GE #0247B8961G002
3200A— 4000A Breakers : ABB Lifting Bar #2TSE431931R1000, old GE #0247B8961G001
5000A Breakers : ABB Lifting Bar #2TSE431932R1000, old GE #0247B8961G003

1. Verify that the breaker is in the DISCONNECTED and OPEN position before mounting it on the rails. Refer to figure 32.

Figure 32

Cassette Position Indicator



Indicator Position Location
(DISCONNECTED, TEST & CONNECTED)

2. Using the chosen lifting method, raise the breaker to a height slightly above the rails.
3. Pull out the cubicle rails, horizontal to the ground. Make sure no one stands underneath the suspended load
4. Carefully lower the breaker onto the rails, making sure both pins on each side land centrally on each rail such that the full weight of the breakers is fully supported by the rails.
5. Remove the lifting bar, any lifting eye hooks and chains.
6. For AKR-30S Retrofill Breaker: Insert eyebolts in the 10 mm eye bolt weld nuts as shown in Figure 33. Use a chain and hook to lift the breaker from above.
7. For AKR30/30H/30L/50/50H/-T50H Breakers same arrangement as above can be used to lift breaker
OR
Use ABB part number 2TSE431929R1000 lifting bar and suitable hoist to lift from above as shown in Figure 34.

Figure 33

AKD-8, Location of Eyebolts

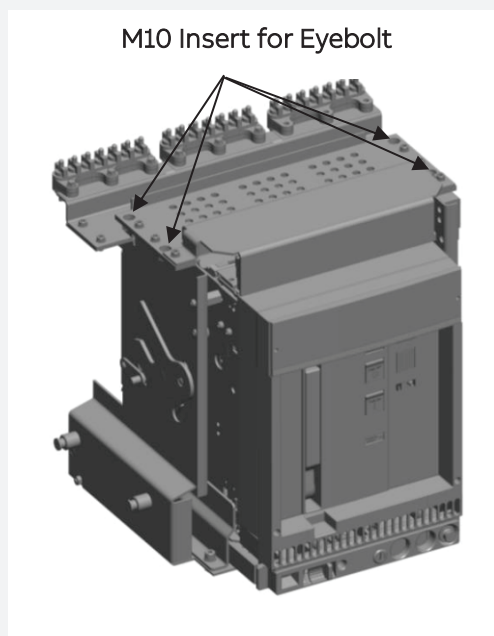


Figure 34

AKD-8, Using ABB Lifting bar and hoist



Figure 35

AKD-8, Using J Lifting bar



Use FRONT Rectangular cut to insert J - lifting bar

- Note 1: Make sure the J hook of the lifting bar is secured in the front window on both Side sheets of the breaker as shown in fig 35. This will ensure the breaker is better balanced when lifted.
- Note 2: The size of the slot at the top of the lifting bar is 0.7" wide and 1" high. Hooks used in the hoist should be suitable to engage with this slot size. After loading on rails of fully withdrawn position remove the eye bolts or lifting means.
- Note 3: Use of Lifting bar or spreader bar allows to reach the top most switchgear Compartment easily, so it is the recommended method.
- Note 4: As an alternate to above lifting process, eye bolts, chain attached to eye bolts through S hook, and connector can be used to lift the WavePro Retrofill Breaker. Examples of an eye bolt and connector are shown in fig's 36 and 37. Insert M10 eyebolts of rating minimum 250lbs in the eye bolt weld nuts as shown in Figure 38. Use four eye bolts, chain and suitable "S" hooks or chain connectors to safely lift the breaker onto the rails. "S" hooks with a locking feature as shown in Figure 38 are preferred to basic "S" hooks. Each chain should be rated minimum 500lbs. Mount a connector to join both chains in the center. Connector should be rated minimum 1000lbs. The connector is then attached to a hoist hook as shown in Fig 38 to lift the breaker.

Note: Eye bolts, chain & connectors are not supplied. If used, remove before Installing breaker into the compartment.

Figure 36

Eye bolt Ex: McMaster CARR Part # 3107T43



Figure 37

Chain connector Ex: Lowes item #184600 Reese Model : 74602HD



Figure 38

AKD-8: Using Chain & Hook (alternate method)



8. Check that the breaker is free from obstruction while pushing it inside the compartment, especially the rejection features below the breaker.
9. Check the secondary disconnects are aligning while pushing the breaker into the compartment from fully withdrawn to DISCONNECT position
10. Push the breaker in until the compartment racking pins engage with the breaker racking cams.
11. Remove the racking tool (Figure 39) from the storage location on the breaker front panel and extend the torque bar from inside the handle.

Figure 39

AKD-8, Racking Tool & storage location



Racking handle tool storage location

Figure 40

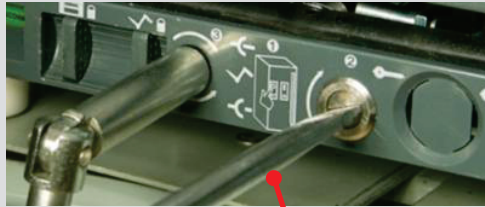
Racking Tool



12. Use a blade-type screwdriver in the slot or rack out lock of the breaker (Figure 41), and turn it clockwise to the right so that the racking handle shutter opens.

Figure 41

AKD- 8, Racking Tool and Screwdriver Inserted



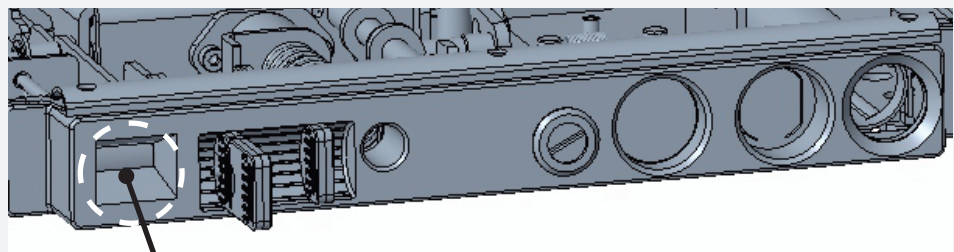
Blade type Screw Driver

- It must be ensured that the supply power to the compartment is turned off/ compartment is de-energized for all the incoming and outgoing circuits of the LVS prior to any work being conducted on it.
- During the installation and related work on the equipment, it must be ensured that the operators using the prescribed PPE for the specified tasks.
- First insert a blade screwdriver in the righthand slot and rotate it to the right.
- Then, while holding the screwdriver torqued to the right, insert the racking tool in the left slot until it engages with the mechanism inside.
- After the racking tool engages, remove the screwdriver.

13. While turning the screwdriver to the right with the shutter open, insert the racking tool in the handle insertion hole so that it engages with the racking mechanism, and remove the screwdriver (Figure 41).
14. With the racking tool inserted, crank clockwise so that the Retrofill starts to move in, slowly sliding forward into the compartment. Rotating clockwise racks the circuit breaker all the way into the enclosure.
15. Rotating clockwise ~37 turns racks the circuit breaker all the way into the enclosure.

Figure 42

Cassette Position Indicator



Indicator Position Location

(DISCONNECTED, TEST & CONNECTED)

16. As the breaker approaches the TEST position, check the alignment of the fixed and moving parts of the secondary disconnect contacts. If a spring charging motor or under voltage-release is installed, these may operate when approaching the TEST position. Fig 42
17. Continue rotating the racking handle clockwise until the position indicator first shows TEST, then CONNECTED. Fig 42.

NOTE: When approaching the CONNECTED position, more torque for turning the racking handle is normal as the primary finger clusters engage with the AKD- 8 or OEM substructure primary bus stabs.

NOTE: At the end of 37 rotations, the breaker is in its maximum travel position. At this point, the primary disconnect fingers have completely engaged with the primary bus stabs.

18. Remove and store the racking handle in its storage location. Fig 39.

26 - AKD-8: Racked -In

The photo below shows one example of a racked-in AKD-8 Retrofill.

Figure 43

Emax 2 Retrofill 800, 1600 & 2000A Frames



Emax 2 Retrofill , AKD-8, Connect Position



Install AKD-8 & Substructure type 3200, 4000 & 5000 Retrofill Breaker

Danger



- It must be ensured that the supply power to the compartment is turned off/ compartment is deenergized for all the incoming and outgoing circuits of the LVS prior to any work being conducted on it.
- During the installation and related work on the equipment, it must be ensured that the operator is using the prescribed PPE for the specified tasks

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

To remove the exiting breaker follow instructions provide with the legacy breaker and or switchgear/ switchboard. Note that one must remove the two # 3/8-16 bolts holding the breaker down on the drawout tray assembly. (found at the front of the tray). Notice how the breaker is located at the rear by two 3/8" diameter pins passing thru the old breaker frame. Notice how the rejection plates on the floor of the switchgear compartment align with rejection pins on the circuit breaker. Verify the correct breaker is being used. Compare the rejection plate arrangement on the new breaker to those on the old breaker.

After the existing breaker is removed and the compartment updated with any added features, and secondary wiring checked the breaker can be installed in GE AKD-8 Switchgear, GE Switchboard or OEM Equipment.

1. Verify that the new breaker is in the DISCONNECTED and OPEN position.
2. For AKR-75/100/125 Retrofill Breaker.
 - a. It is best to use ABB Lifting Bar Part number 2TSE431931R1000 for 3200-4000A and 2TSE431932R1000 for 5000A and a suitable hoist to lift from above as shown in Figure 45. (These lifting bars have been tested to 200% of their 700 lb ratings.)
 - b. Use of Lifting (Spreader) bar allows to reach the top most switchgear compartment easily, so it is the recommended method.
 - c. Alternate method, use a lifting chain and hooks rated at least 1400 lbs to lift the breaker from above as shown in Figure 46. (chains must not be at an angle less than 45 degrees from the horizontal plane.) Installation in upper compartments may not be possible with limited overhead space or the GE switchgear hoist.

Figure 44

AKD-8 Location of Lifting Holes for Alternate Method

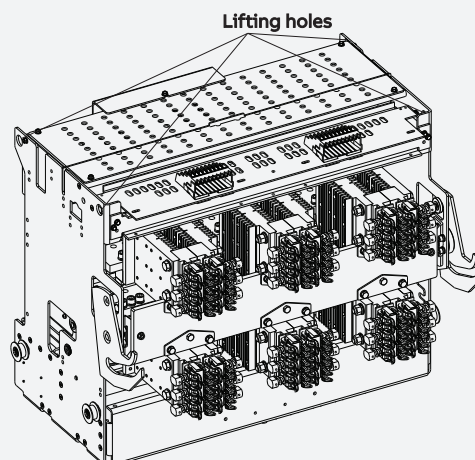


Figure 45

AKD-8 Using ABB Lifting bar and hoist (preferred method)

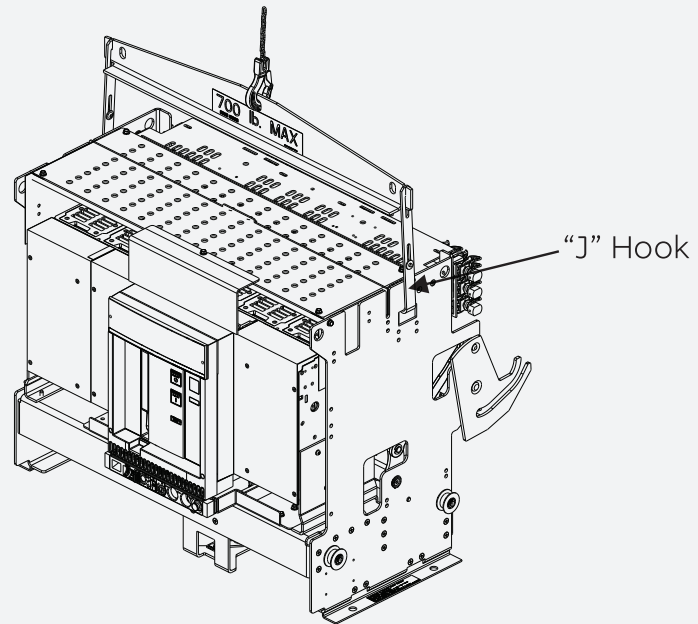


Figure 46

AKD-8 Using Chain & Hook (alternate method)



3. Make sure that the lifting bar “J” hooks or generic chain-hooks are secured and locked in place.



Dropping a breaker can result in injury or death.

4. Line up the breaker in front of the compartment where it will be installed; then raise it slightly above the height of the drawout tray assembly and do not move the hoist left to right with the breaker suspended.
5. Pull out the two rails being cautious not to position anyone underneath the suspended load. Pulling from the middle of the tie bar connecting the two rails and lifting up slightly will help the rails to slide out more easily.
6. Align the breaker in front of the 5/8" diameter conical topped pins at the rear of the tray and align the smaller 3/8" diameter pins to locate thru the holes in the breaker frame.
7. Lower the breaker down on the tray. It should sit flat if the rejection pins pass thru the rejection plates properly and the breaker was located as in step 6.
8. Install two 3/8-16 bolts thru the lower breaker frame at the front corners and into the drawout tray assembly. Torque both to 25 lb-ft.
9. Remove the lifting bar and or chains.
10. Check for alignment of the optional Programmer disconnect on the left side in the compartment. (It is fragile and will break if not properly aligned).
11. Push the breaker into the compartment slowly while observing the programmer disconnect mating and watching for the alignment of the secondary disconnects and opening of the optional shutter. A compartment interlock rod in the right front will ride over a cam and drop into position in the Disconnect position.
12. When fully installed to the DISCONNECT position, the racking cams will stop on the racking pins in the compartment and the breaker will be ready to rack in.
13. Remove the racking tool. (Figure 40) from the storage location on the breaker front panel and extend the torque bar from inside the handle.
14. Use a blade-type screwdriver in the slot or rack-out-lock of the breaker (Figure 41) and turn it clockwise (to the right) so that the racking handle shutter opens.
15. While turning screwdriver to the right with shutter open, insert racking tool in handle insertion hole so that it engages with the racking mechanism, and remove the screwdriver (Figure 41).
16. Rotating clockwise ~37 turns racks the circuit breaker all the way into the compartment.
17. As the breaker approaches the TEST position, a spring charging motor or undervoltage release if installed may operate. (~ 9 racking turns).
18. Continue rotating racking handle clockwise until position indicator first shows TEST; then CONNECTED.
19. When approaching the CONNECTED position, more torque for turning the racking handle is normal as the primary finger clusters engage with the primary bus stabs.
20. At the end of 37 to 37-1/2 rotations, the breaker is in its maximum travel position. At this point primary disconnect fingers have completely engaged with the primary bus stabs.
21. Remove and store the racking handle in its storage location.

The photo below shows an example of a racked-in AKD-8 Retrofill.

Figure 47



AKD-8: Install Accessories

Notice

NOTICE

WIRING

- Before installing the breaker, the secondary disconnects must be wired to the Emax 2 Retrofill Breaker.
- Wires with wire markers are provided on the breaker. Make sure that the switchgear wiring connection points match up with the original wiring of the cubicle. This ensures that all wiring connections are properly made.
- Wrong connections will cause the breaker to malfunction.

28 - AKD-8: Secondary Disconnects , Bullets

This section deals with installing and wiring the legacy secondary disconnect assemblies

The Emax 2 Retrofill Breaker has these two options:

- All secondary disconnects installed
- No secondary disconnects installed

In case the application requires installing all 3 secondary disconnect blocks (actually, three sets of bullets), you would select the first option. As secondary disconnects can be pre-installed on the breaker, wiring the secondary disconnects can be done.

In case the application does not require any secondary disconnect assemblies, take the second option. Thus, no further wiring is needed.

If the application requires less than 3 secondary disconnect blocks, the customer can choose the second option, order secondary disconnect blocks as needed, and then install the secondaries, completing the wiring for the breaker. These options are discussed in the next sections.

The secondary disconnect block assemblies (Figure 48) for the AKD8 version of the Emax2 Retrofill Breaker can be purchased and installed. Here are the installation instructions:

Figure 48

**AKD8 Retrofill Breakers
AKD-8, Seven Bullets to a Block, Three Blocks**



1. If the Emax 2 Retrofill breaker order included (3) 7 point secondary disconnect blocks see step 2 otherwise skip past the wiring instructions.
2. Check that bullets, on top of the secondary disconnects, are not damaged and that they slide in to the blocks freely. The bullets are spring-loaded and return to their initial positions when they are released from being pressed down.
3. Check for electrical continuity between the bullets on one end and the wire terminations on the other. Blocks containing faulty bullets should be replaced.
4. Place the secondary disconnect block on top of the horizontal plate at the rear of the Emax2 Retrofill ACB, which runs across the width of breaker.
5. Align the three holes on the face of the supplied secondary block to the three holes on the plate and secure the block to the plates using the %4-20 thread forming screws. The screw tightening torque should be ~40 in-lbs. (Be careful not to over tighten or it may break the plastic).

Notice

NOTICE

WIRING

- Do not pinch/damage the wires while installing the secondary disconnect blocks.

Figure 49

AKD-8, Seven Bullets to a Block, Three Blocks to a Retrofill (Images)

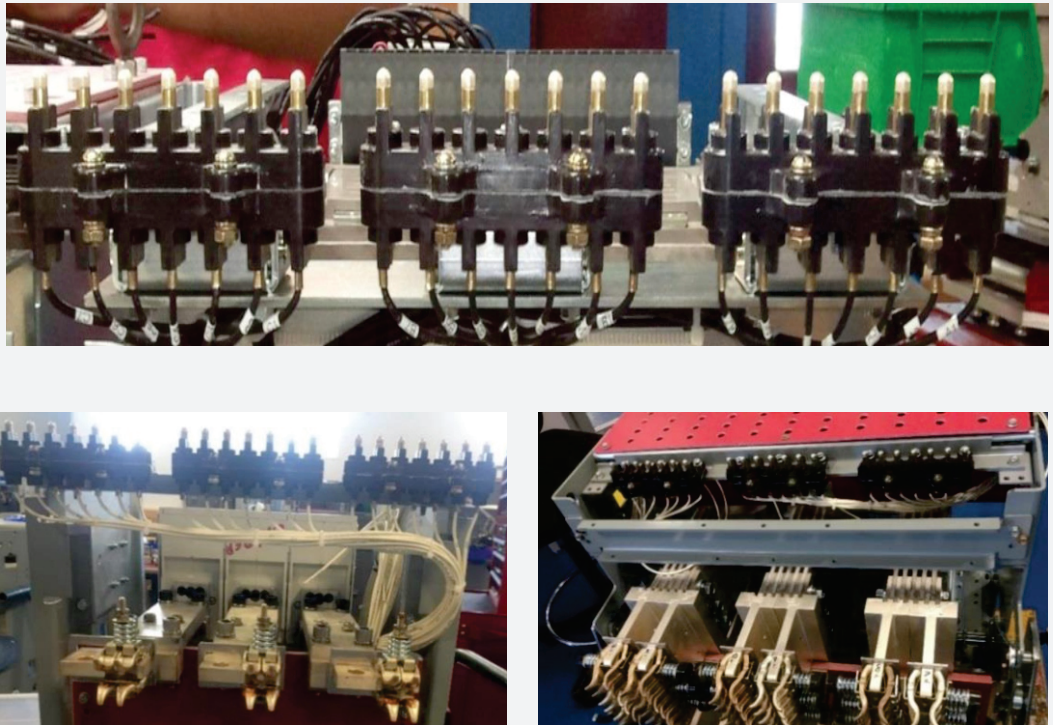


Figure 50

AKD-8: Landed Wiring sideways (Photo View)



Wire Secondary Disconnect Assembly-AKR30/30H/50/50H/30L/30S,T-50H

As mentioned above, the secondary disconnect blocks are available with all blocks installed. In this case, the wires on the blocks will be routed through one side of the breaker and on the front. The wires on the front are left loose for ease of landing the wires in the breaker secondary Terminal Blocks.

If the secondary disconnect blocks are installed at the customer site, the wires will not have been routed. The wires should not be routed on the outside of the metal structure as it might interfere with the motion of the kit when racking into the compartment. Ensure that the wires are securely fixed on the inside metal frame of the cassette using sticky pads and tiewraps or holes available in side frames.

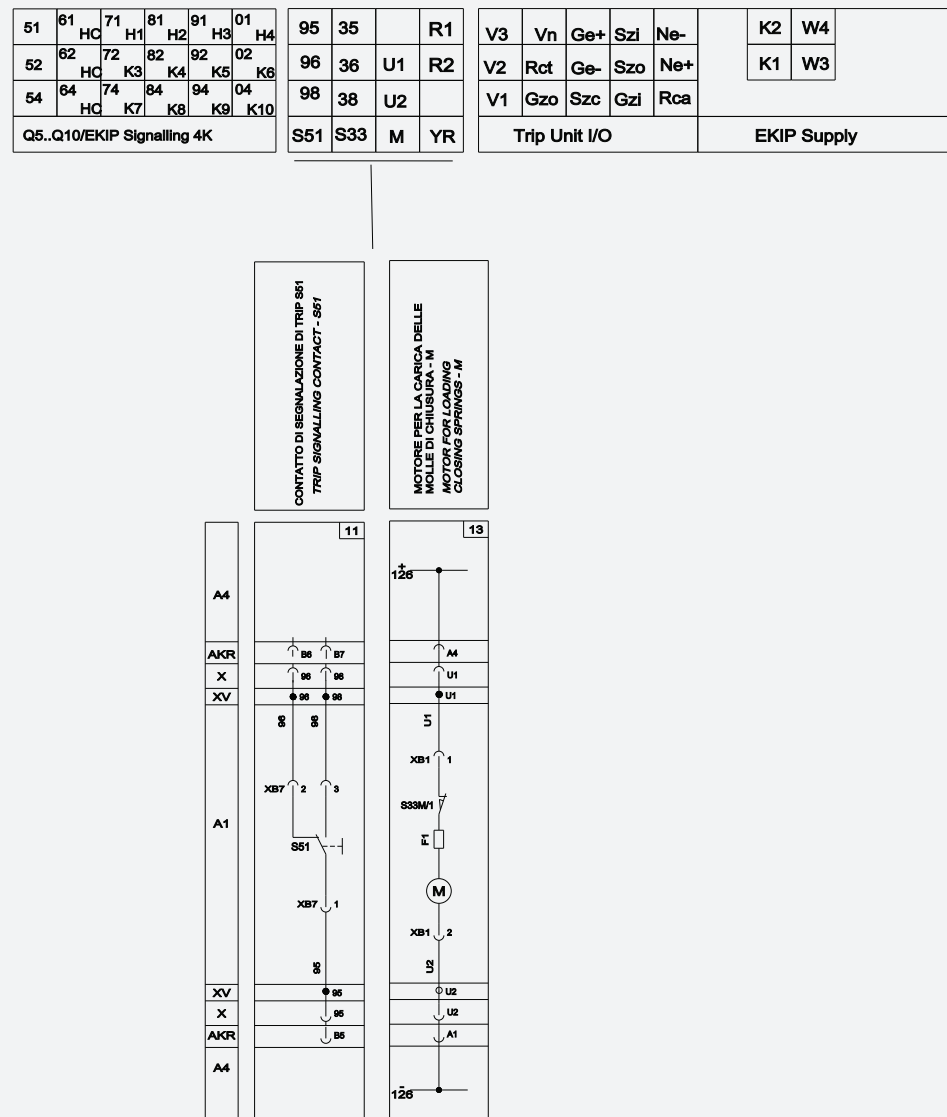
Verify that the wire routing is not exerting pressure on bullets because this can bend the connection points and effect biasing and contact pressure. By using tie-wraps and stickpads, wire routing can eliminate sagging of the wire harness and pressure on secondary bullets.

Once the above mentioned steps are completed, begin landing the wires to the points on the secondaries, based on the typical wiring diagrams found in Figure 49 and Figure 50.

AKD-8, Secondary Disconnects Wiring Diagram

Table 5 shows one of the Example of AKD-8 Secondary disconnect to Emax 2 Breaker wiring

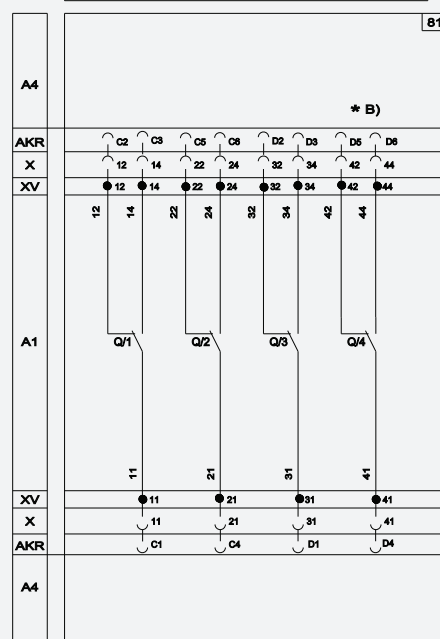
Table 5

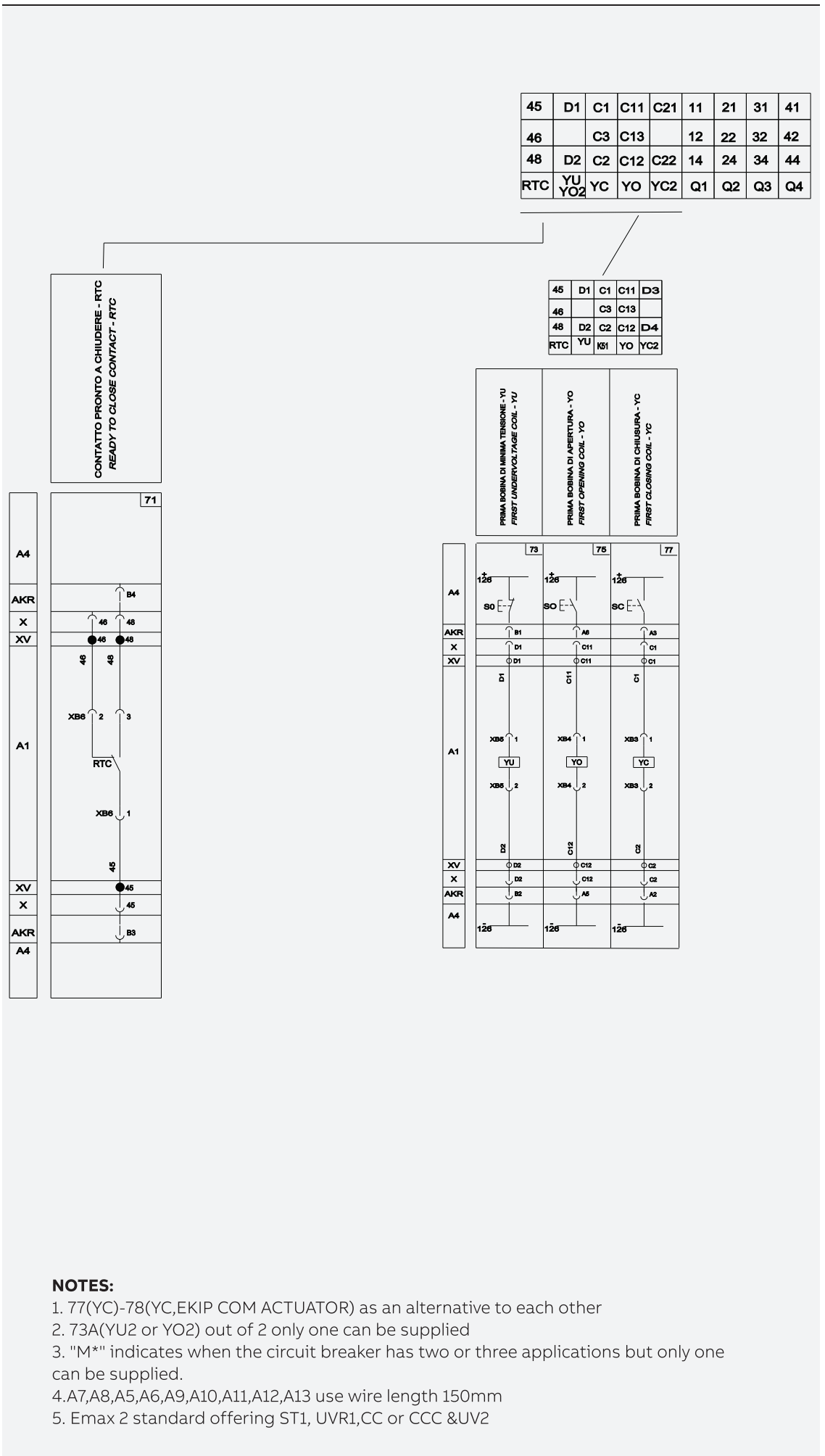


45	D1	C1	C11	C21	11	21	31	41
46		C3	C13		12	22	32	42
48	D2	C2	C12	C22	14	24	34	44
RTC	YU Y02	YC	YO	YC2	Q1	Q2	Q3	Q4

11	21	31	41
12	22	32	42
14	24	34	44
Q1	Q2	Q3	Q4

**CONTATTI AUSILIARI APERTO/CHIUSO
DELL'INTERUTTORE (PRIMO SET)
OPEN/CLOSED AUXILIARY CONTACTS
OF CIRCUIT-BREAKER (FIRST SET)**





NOTES:

- 77(YC)-78(YC,EKIP COM ACTUATOR) as an alternative to each other
- 73A(YU2 or YO2) out of 2 only one can be supplied
- "M*" indicates when the circuit breaker has two or three applications but only one can be supplied.
- A7,A8,A5,A6,A9,A10,A11,A12,A13 use wire length 150mm
- Emax 2 standard offering ST1, UVR1,CC or CCC &UV2

Notice

NOTICE

- Before installing the breaker, the secondary disconnects must be wired to the breaker.
- Wires with wire markers are provided on the breaker. Make sure that the switchgear wiring connection points match up with the original wiring of the cubicle. This ensures that all wiring connections are properly made.
- Wrong connections will cause the breaker to malfunction.

The programmer disconnect consists of 2 assemblies, one mounted on the breaker side and the other mounted on the cabinet. The breaker side assembly consists of the mounting bracket and plug assembly. The compartment side assembly consists of the plug assembly mounted on a spring-loaded assembly that receives the breaker.

Notice

NOTICE

WIRING

- **Note:** Look for the wiring connection scheme on the existing or old terminal block and use the same references or wiring information while re wiring the new terminal block.

Procedures 1. Identify the existing programmer disconnect assemblies in the compartment.

The existing programmer disconnect plugs used in AKD-8 generation of the AKR breakers are provided on the left side for the AKR30/30H/50/50H/30L/T-50H/75/100/125 and on the Right side for the AKR30S retrofits.

Programmer disconnects are provided with legacy AKR breakers in AKD-8 LVS. The breakers were equipped with the following pin configurations, depending on the application:

- 9-pin configuration (Manual plug resulting from a trip unit conversion kit)
 - 12-pin configuration (Dash 1 breakers, 12 pin Tyco type plug ~ 1988-2015)
 - 24-pin configuration (Original MicroVersa Trip disconnect -AMP Rectangular plug.
2. Identify the type of programmer disconnect assemblies to be installed on the Retrofill breaker.

The programmer disconnect assembly to be assembled depends upon the type of legacy breaker that is being replaced. These are as follows:

- AKR30/30H/50/50H/T50H/30/75/100/125L—In these, the programmer disconnect is mounted on the left side wall of the Retrofill breaker.
- AKR30S—in these, the programmer disconnect is mounted on the right side wall of the Retrofill breaker.

Programmer disconnect assemblies are available in two configurations, namely:

- 12-pin configuration. If the legacy LVS has a 12-pin programmer disconnect in use, the same can be used with the Retrofill breaker. In this case, only the breaker side programmer disconnect assembly on the breaker needs to be installed. The numbers for the programmer disconnects are mentioned below.
- 19-pin configuration-If the legacy LVS doesn't have a 12-pin programmer disconnect configuration, and the customer chooses to install a programmer disconnect, then the 19-pin programmer disconnect assembly needs to be installed in the compartment and the breaker.

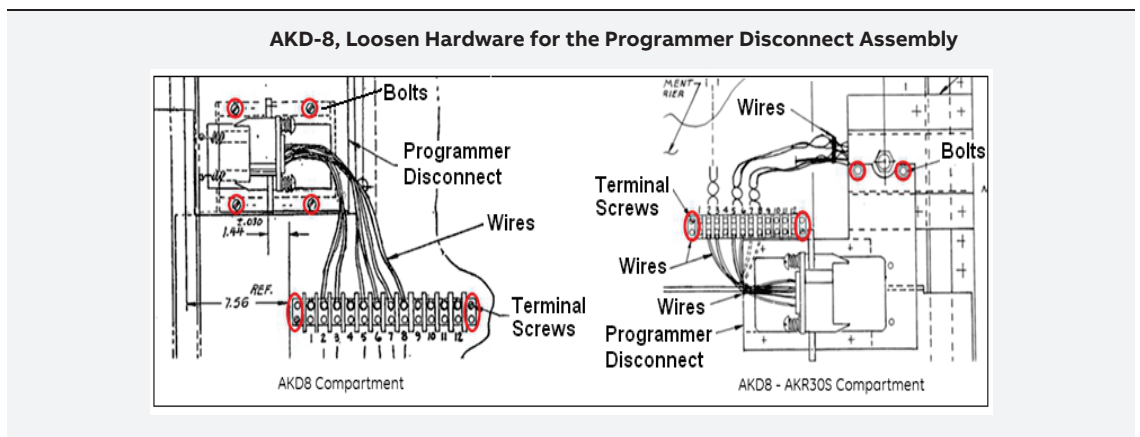
12-Pin Programmer Disconnect Breaker Side		
2TSE431952R1000	PROG.DIS.ASSY, AKD8	AKR30H/50H/T50H AKD8
2TSE431953R1000	PROG.DIS.ASSY	AKR30S
2TSE431954R1000	PROG.DIS.ASSY	AKR75/100/125
19-Pin Programmer Disconnect Breaker & compartment Side		
2TSE431946R1000	PROG.DIS.ASSY, AKD8	AKR30H/50H/T50H AKD8
2TSE431947R1000	PROG.DIS.ASSY, AKR30S	AKR30S
2TSE431950R1000	PROG.DIS.ASSY,AKR75/100/125	AKR75/100/125

3. If applicable, remove the existing compartment side programmer disconnect assembly.

The programmer disconnect assembly must be removed, if:

- A 9-pin manual programmer disconnect assembly is installed in the cabinet as a result of conversion kit.
 - A 24-pin programmer disconnect assembly is installed in the cabinet original MicroVersaTrip ~1979-1984.
 - Customer chooses to replace a 12-pin configuration with a 19-pin configuration to Add RELT
4. Before uninstalling the existing programmer disconnect assembly, verify that the wiring details match the wiring numbers. Any changes or deviations need to be noted for use while installing the new programmer disconnect.
 5. Check that the compartment is de-energized and is safe to work in; and that the legacy breaker has been removed from the cabinet.
 6. Disconnect the wires connecting the terminal block to the compartment Programmer disconnect assembly. See Figure 51.
 7. If the customer has chosen to install a 19-pin programmer disconnect assembly, Replacing A 12-pin programmer disconnect assembly, the terminal block mounted on the compartment needs to be removed as well. This can be achieved by unfastening the two screws securing the terminal block with the side wall of the compartment.
 8. Unfasten the four bolts included that the hold the programmer disconnect assembly on the wall of the compartment to remove the compartment-side programmer disconnect assembly.

Figure 51



9. Install applicable programmer disconnect assembly on compartment and breaker.

Wiring and completing task:

Install 19-pin programmer disconnect assembly on compartment and breaker:

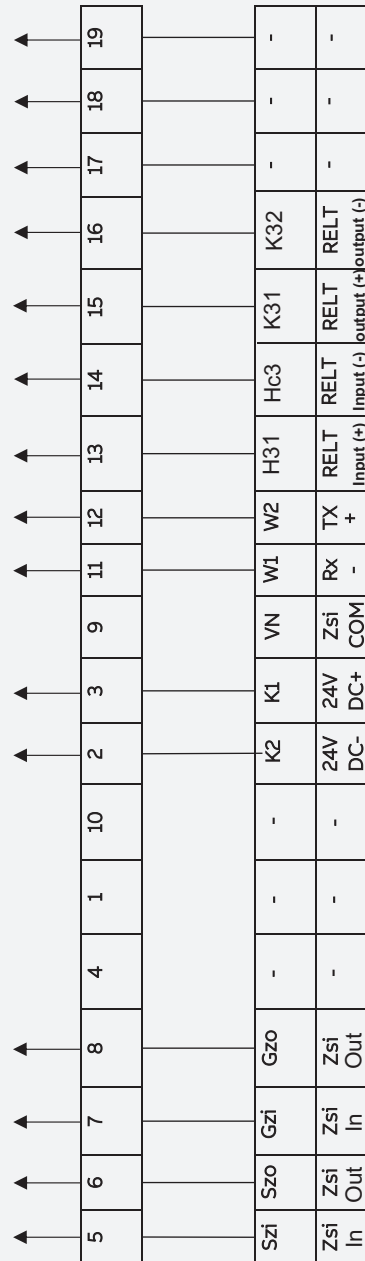
1. Unpack the 19-pin programmer disconnect assembly from the box. Each box of the programmer disconnect assemblies has a 20-pin terminal block supplied.
2. Check that the secondary disconnect plug assembly is not damaged and the wiring is intact.
3. Check that the programmer disconnect block is moving freely within the assembly and retracts to its original position by spring-loading when it is slid back to the fully activated condition.
4. Check for electrical continuity between the contact pins on one end and the wire termination on the other. Blocks containing faulty bullets should not be used for installation.
5. Install the new terminal block on the side wall of the compartment and land the Incoming wires from the compartment to the terminal block. Any additional wires from the compartment side which are required for the 19-pin programmer need to be landed on the terminal block and checked for electrical continuity.
6. Mount the programmer disconnect assembly on the side wall of the compartment Where the original programmer disconnect assembly was mounted.
7. Land the wires from the programmer disconnect to the terminal block mounted earlier.
8. Using a multimeter, check for continuity between the terminal block contact points to the corresponding pins on the programmer disconnect. This should match against the wiring scheme planned for the new 19-pin programmer disconnect assembly on the compartment.

**Wiring and
Completion**

1. Note that the breaker side programmer disconnect assemblies come pre-installed and wired From the factory, so no action needs to be done on the breaker.
2. Check that the compartment side programmer disconnect assembly wiring scheme matches that of the breaker side wiring scheme.
3. See the wiring diagram used for the programmer disconnect as shown here (Figure 52)

Figure 52

Typical Programmer Disconnect Wiring Scheme

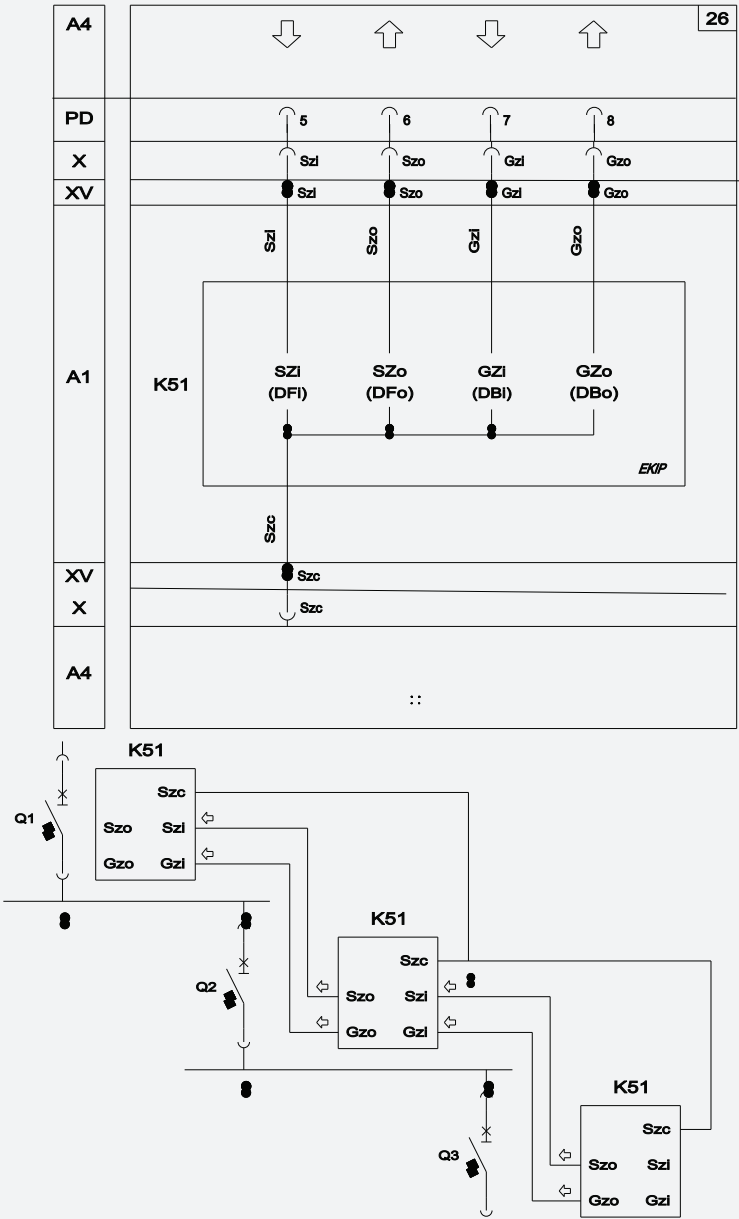


- **Voltage Sensing:** Pins 1,4,9 &10 for voltage sensing need not be connected as in Emax2 voltage module is wired internally to Ekip Trip Unit for more details on voltage sensing refer 1SDHO01316R1002
- **RELT:** It requires a dedicated RELT-Signaling 2K-3 module + Relt blu switch “GTUTRSK” [1SDH001000R0524](#)
- **IGF:** will require NCT adapter [1SDH001000R0530](#)
- **Zone selectivity:** Reuse of external existing wiring by rewiring the internal ZSi, “Legacy zone selectivity is not compatible with Emaxz. In case the functions is used, it is necessary to replace all legacy breakers connected with Emax2 retrofit” [1SDC007100G0205](#)
- **Dialogue Module:** “Emax2 offers multiple communication modules, like Ekip Com Modbus TCP, Ekip Com EtherNet/IP™, Ekip Com Profinet, Ekip Com IEC 61850, Ekip Com Modbus RTU, Ekip Com Profibus DP, Ekip Com DeviceNet™; integration with Emax2 integrated communication modules with different protocols requires the adaptation of existing supervision system to accept new connections with dedicated new system interfaces refer the following document for details [1SDH001140R0001](#)

Zone Selectivity Wiring Scheme

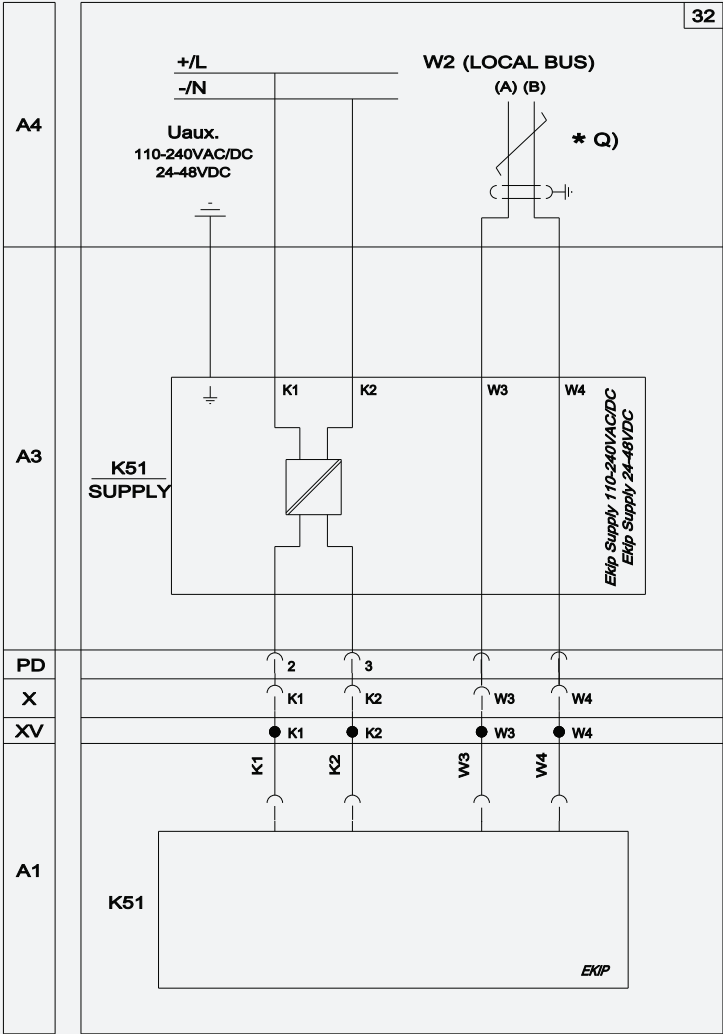
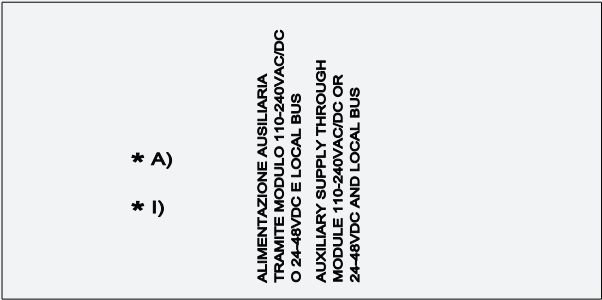
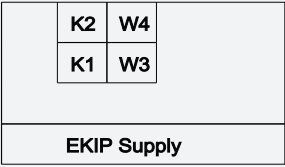
V3	Vn	Ge+	Szi	Ne-
V2	Rct	Ge-	Szo	Ne+
V1	Gzo	Szc	Gzi	Rca
Trip Unit I/O				

* A)
* AB)
SELETTIVITA' DI ZONA
ZONE SELECTIVITY



ESEMPIO DI SCHEMA APPLICATIVO (TRA 3 INTERRUTTORI)
EXAMPLE FOR APPLICATION DIAGRAM (AMONG 3 CIRCUIT-BREAKERS)

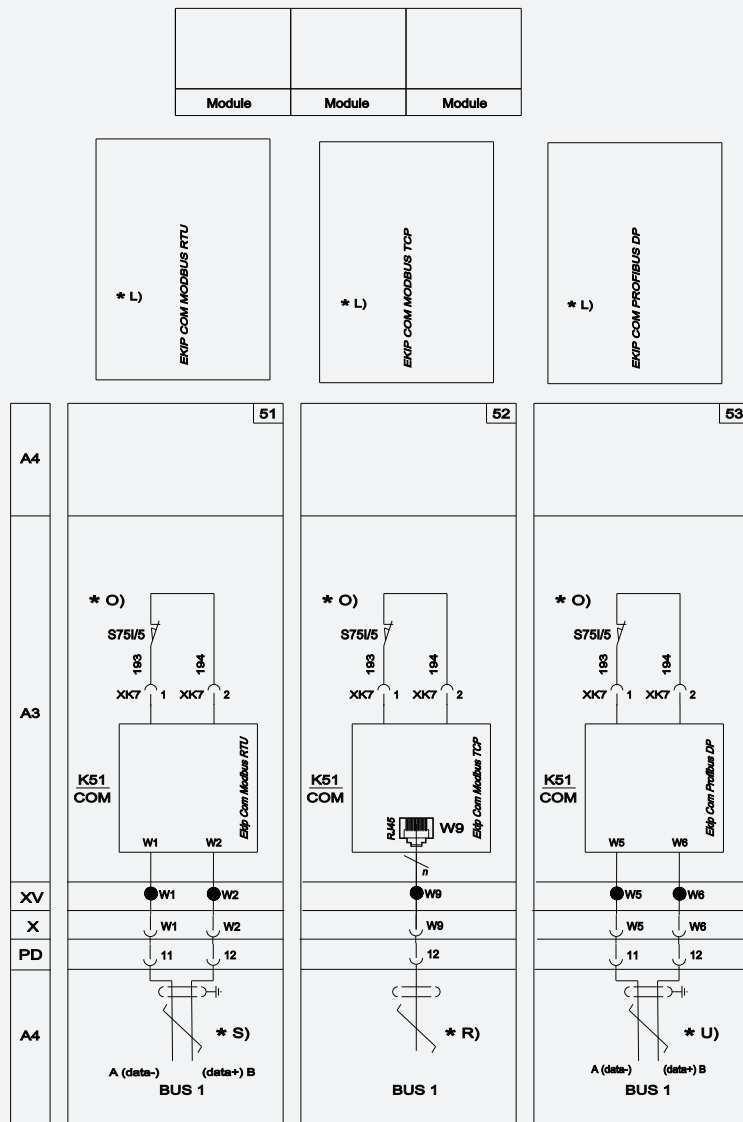
Auxiliary Supply Wiring Scheme



NOTES:

1. Auxiliary supply through module 110-240v ac/dc or 24-48v dc and local bus – ekip supply

EKIP Com Wiring Scheme



Tools required: wrenches, flat head screw driver, wire stripper, wire cutter, star-type screw driver

30 - AKD-8: Primary Disconnects (Contacts) or “Fingers”

The Finger Clusters Accessory Manual 2TSA451012PO000 covers the primary disconnects. The primary disconnects are flexible connections between the breaker line and load terminals and between the equipment line and load terminals. All primary disconnect fingers are factory-installed and are assembled on Emax 2 Retrofill circuit breakers.

Use this instruction sheet if damaged fingers need to be replaced. It takes about 5 minutes to install a finger cluster, defined as a double pair of fingers on a breaker. Figure 53 shows finger clusters or primary disconnects on a Retrofill circuit breaker. Figure 54 details the finger-cluster assembly.

Figure 53

Circuit Breaker Removed, Featuring Primary Disconnects “Fingers” (Contacts)

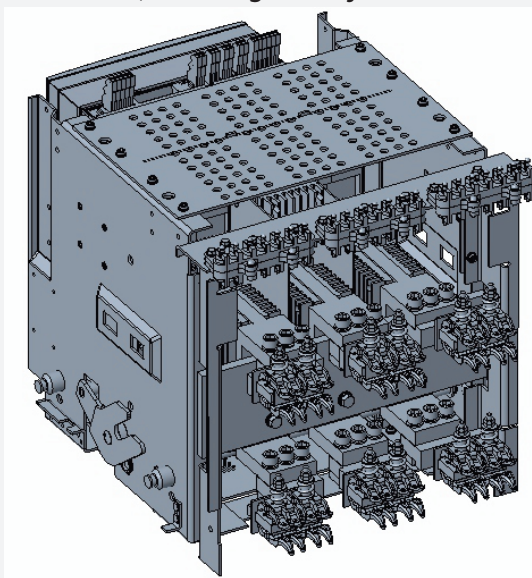
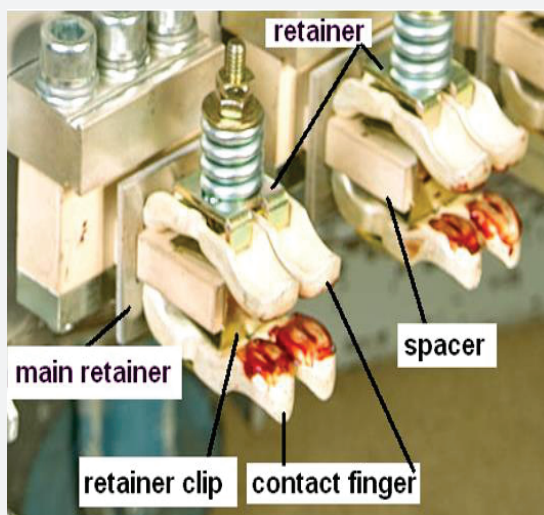


Figure 54

Circuit Breaker ,Fingers Details



Remove and Replace

The primary disconnect assembly is factory adjusted with a gage to apply a 95 + 10 lb. force to a 1/2-inch thick copper bar, inserted between the upper and lower fingers. Set this force range, in the field, by tightening the nuts to set the spring dimension shown in Figure 55. Note that this dimension is measured between the top of the retainer and the underside of the washer. Also note that no bar is inserted between the fingers when setting this dimension. Figure 56 shows the cluster components.

Figure 55

Circuit Breaker, Fingers (Some Details)

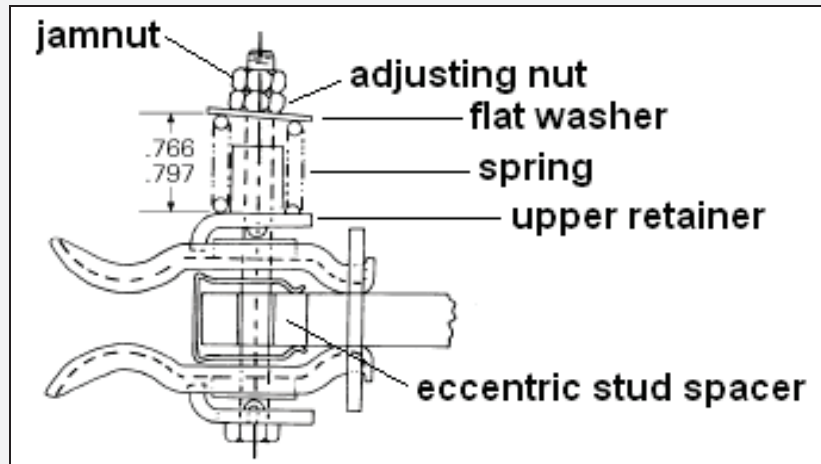
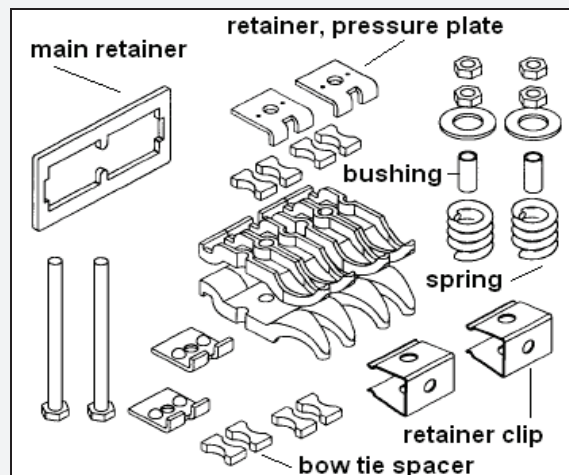


Figure 56

Circuit Breaker, Fingers (Some Details)



1. Using proper safety procedures and wearing required Personal Protective Equipment (PPE), remove breaker from compartment, and place it on a solid work surface in a well-lit location.
2. To uninstall the primary disconnects, remove the two nuts from one of the long bolts holding the primary disconnect assembly together.
3. Carefully slide out the bolt while removing the flat washer, spring, bushing, upper retainer, bow-tie spacers, lower retainer, and fingers from the bottom of the assembly.
4. Do the same for the other assembly bolt and components.
5. Slide off the retainer clips.
6. Take off the main retainer from the stud.
7. Slide the main retainer over the stud.
8. Install eccentric spacer and position spring clips on the stud.
9. Set a pair of bow-tie spacers into a pair of fingers, place a pressure plate retainer over the spacers to hold them in position, and then turn the subassembly over. Hook them into the main retainer.
10. Slide a long bolt through the hole in the retainer, between the finger, and then through the clip and eccentric stud spacer.

11. Hold the bottom finger subassembly in place.
12. Place two fingers around the bolt from the top, hooking the fingers into the main retainer. Then place a bow-tie spacer in each finger and hold them in position with a pressure plate retainer.
13. Place a spring, bushing, and flat washer over the bolt, then secure with the two nuts.
14. Repeat Steps 7 through 13 for each set of fingers.
15. Adjust the nut to get a spacing of 0.766 - 0.797 inch between the top of the upper retainer and the bottom of the flat washer.
16. Tighten the jam nut to lock in the adjustment.
17. Clean finger assemblies, if necessary, with a clean, lint-free rag and isopropyl alcohol or acetone.
18. Be sure to apply a thin film of Mobilgrease 28 to the contact areas which slide onto the switchgear stabs (See Figure 57, Step 2). This product is available in a 1-oz tube ABB Part #193A1751P1

Figure 57

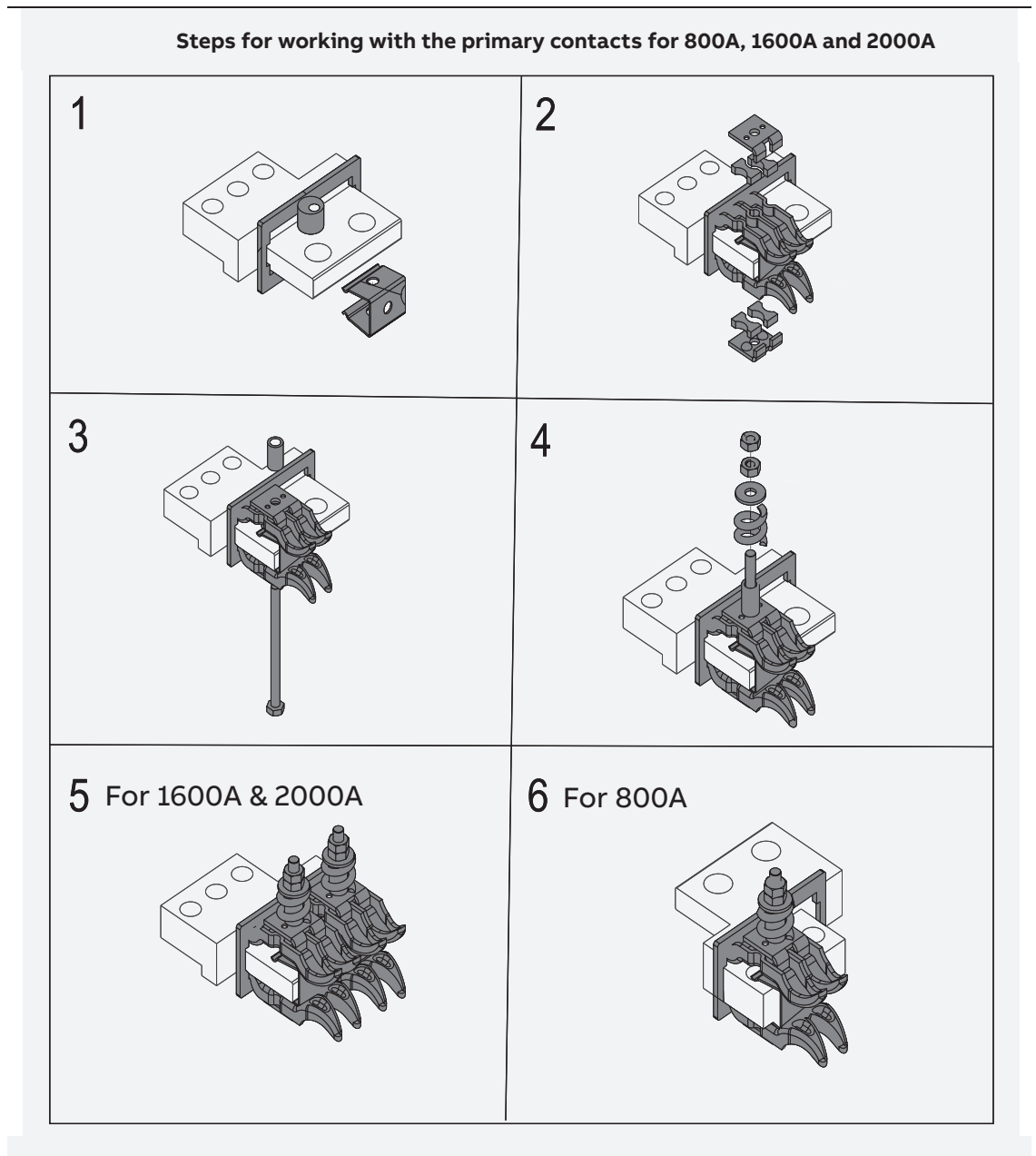
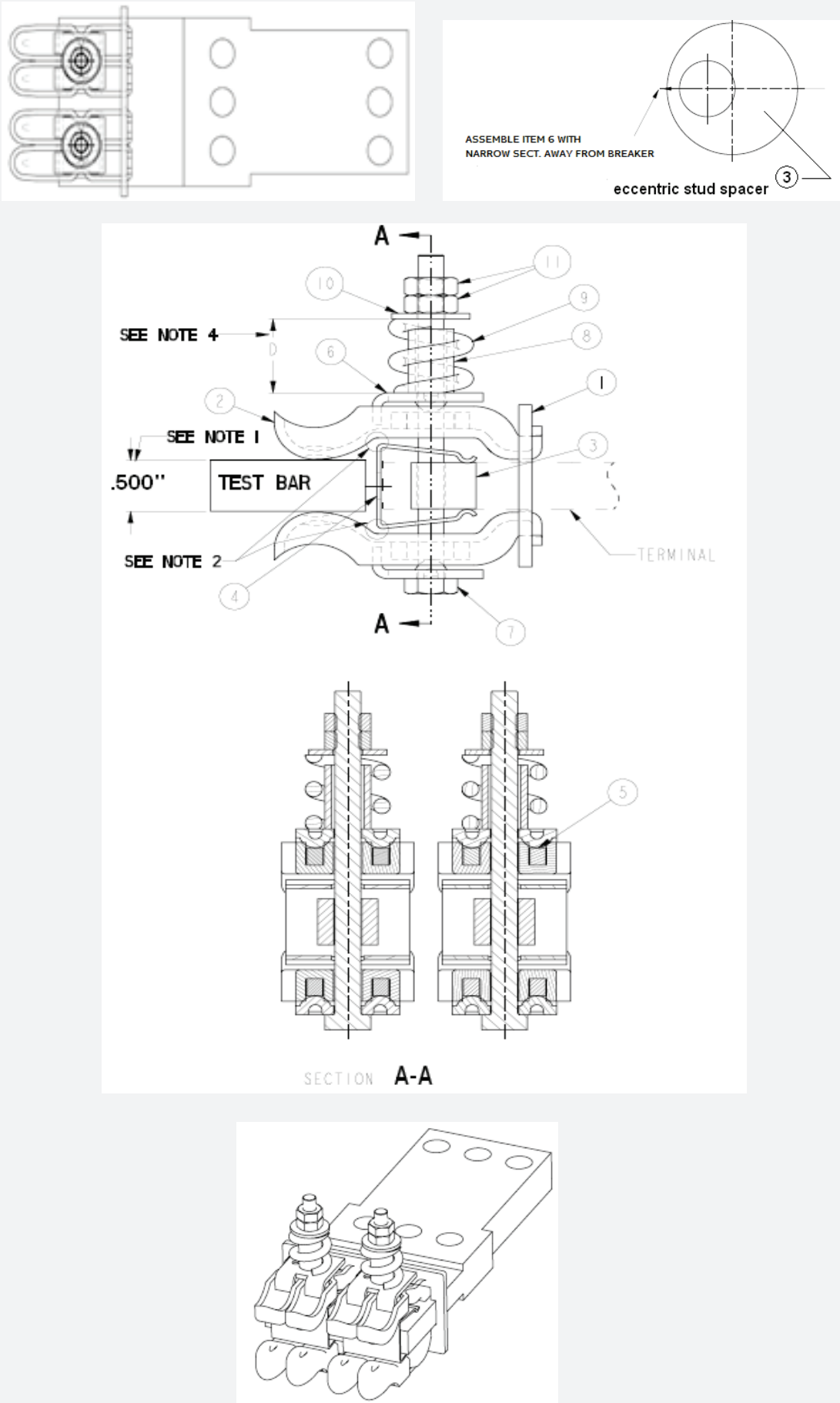


Figure 58



Remove and Replace AKR 75/100/125

The primary disconnect assembly is factory-adjusted to apply a 95 + 10 lb. force to a 1/2-inch thick copper bar, inserted between the upper and lower fingers. Set this force range, in the field, by tightening the nuts to set the spring dimension shown in Figure 59/60. Note that this dimension is measured between the top of the retainer and the underside of the washer. **Also note that no bar is inserted between the fingers when setting this dimension.** Figure 61/62 shows the cluster components.

Figure 59

Adjustment - 3200A (Double Spring)

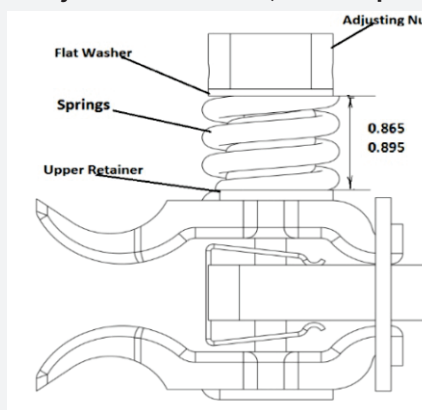


Figure 60

Adjustment - 4000A & 5000A

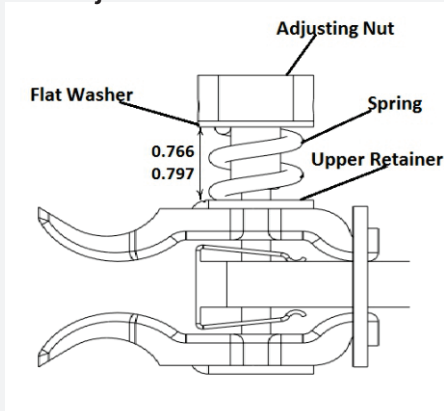


Figure 61

Cluster Components - 3200A

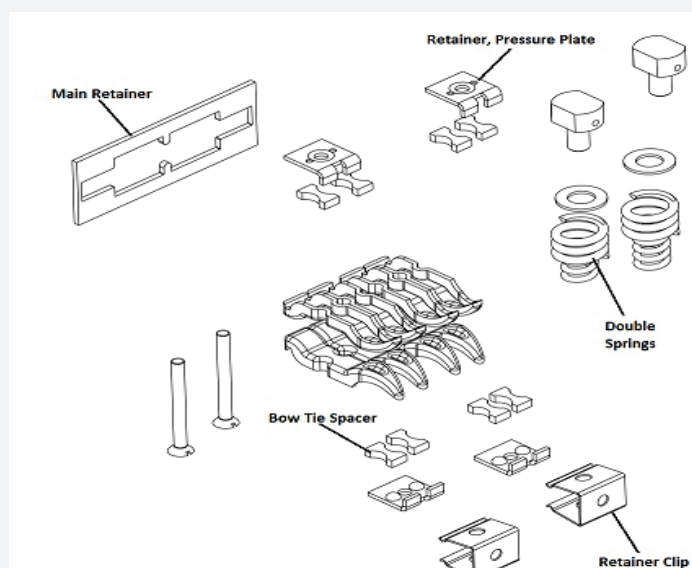
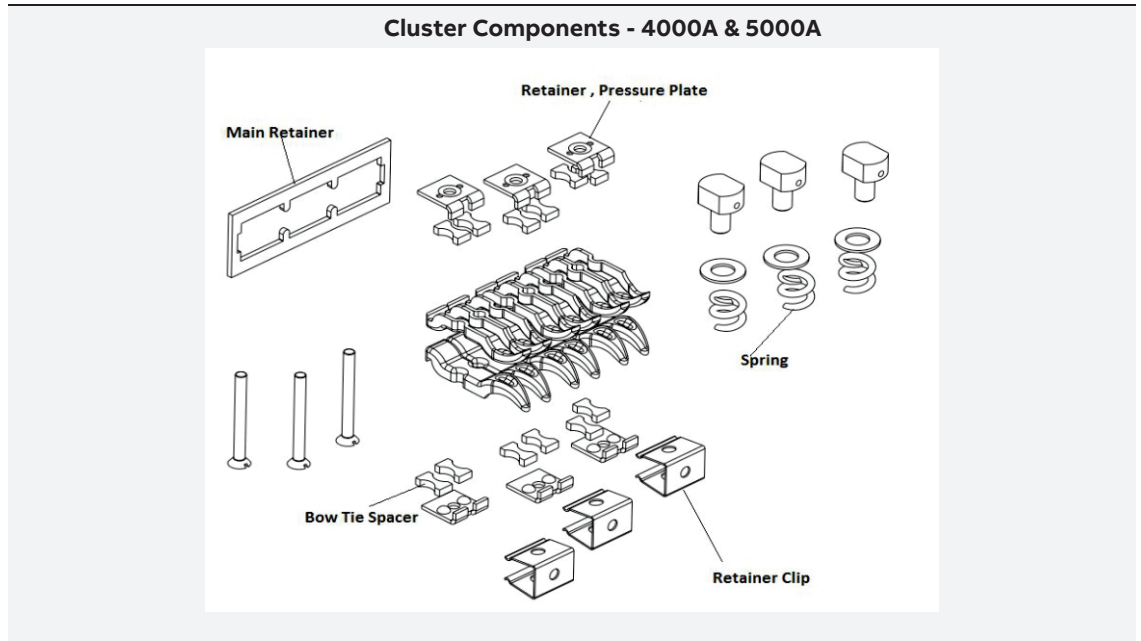


Figure 62



1. Using proper safety procedures and wearing required Personal Protective Equipment (PPE), remove breaker from compartment, and place it on a solid work surface in a well lit location.
2. To uninstall the primary disconnects, remove the Adjusting nut from one of the long bolts holding the primary disconnect assembly together
3. Carefully slide out the bolt while removing the flat washer, spring, upper retainer, bowtie spacers, lower retainer, and fingers from the bottom of the assembly.
4. Do the same for the other assembly bolt and components.
5. Slide off the retainer clips.
6. Take off the main retainer from the stud.
7. Slide the main retainer over the stud.
8. Set a pair of bow-tie spacers into a pair of fingers, place a pressure plate retainer over the spacers to hold them in position, and then turn the subassembly over. Hook them into the main retainer.
9. Slide a long bolt through the hole in the retainer, between the finger, and then through the clip and stud spacer.
10. Hold the bottom finger subassembly in place.
11. Place two fingers around the bolt from the top, hooking the fingers into the main retainer. Then place a bow-tie spacer in each finger and hold them in position with a pressure plate retainer.
12. Place a spring, bushing, and flat washer over the bolt, then secure with the Adjusting nut.
13. Repeat Steps 7 through 13 for each set of fingers.
14. Adjust the nut to get a spacing of 0.865-0.895 inch for AKR75/75H with Double springs and 0.766—0.797 inch for AKR 100/125 between the top of the upper retainer and the bottom of the flat washer.
15. Clean finger assemblies, if necessary, with a clean, lint-free rag and isopropyl alcohol or acetone.
16. Be sure to apply a thin film of Mobilgrease 28 (DS50HD38) to the contact areas which slide onto the switchgear stabs (See Figure 63/64, Step 2). This product is available in a 1-Oz tube, ABB Part #193A1751P1.
17. Figure 63 , Figure 64 and figure 65 summarizes the steps for working with the primary contacts

Figure 63

Steps in Exploded Views for 3200A (WPS-32/WPH-32/WPX-32)

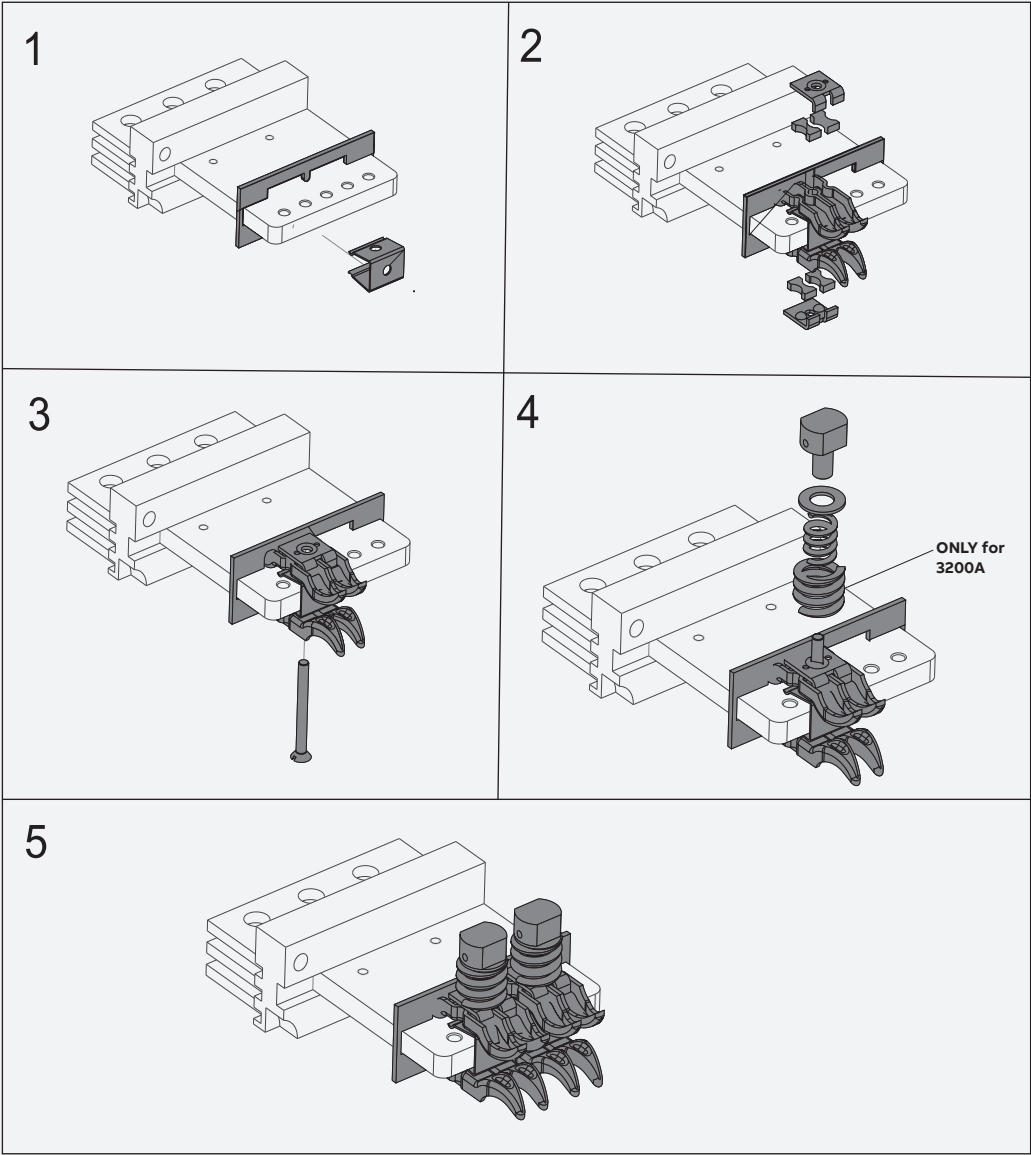


Figure 64

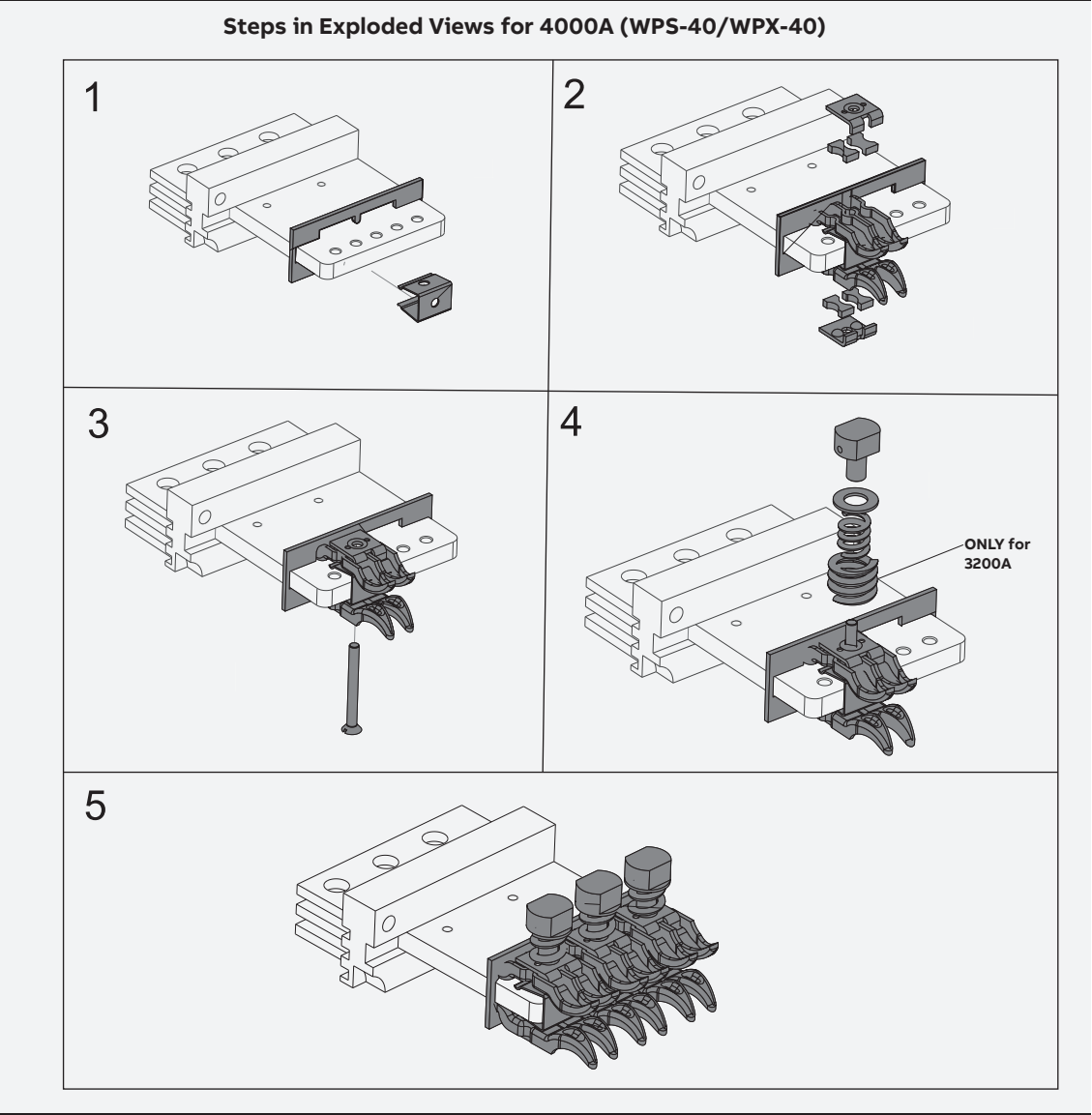


Figure 65

Steps in Exploded Views for 5000A (WPS-50/WPX-50)

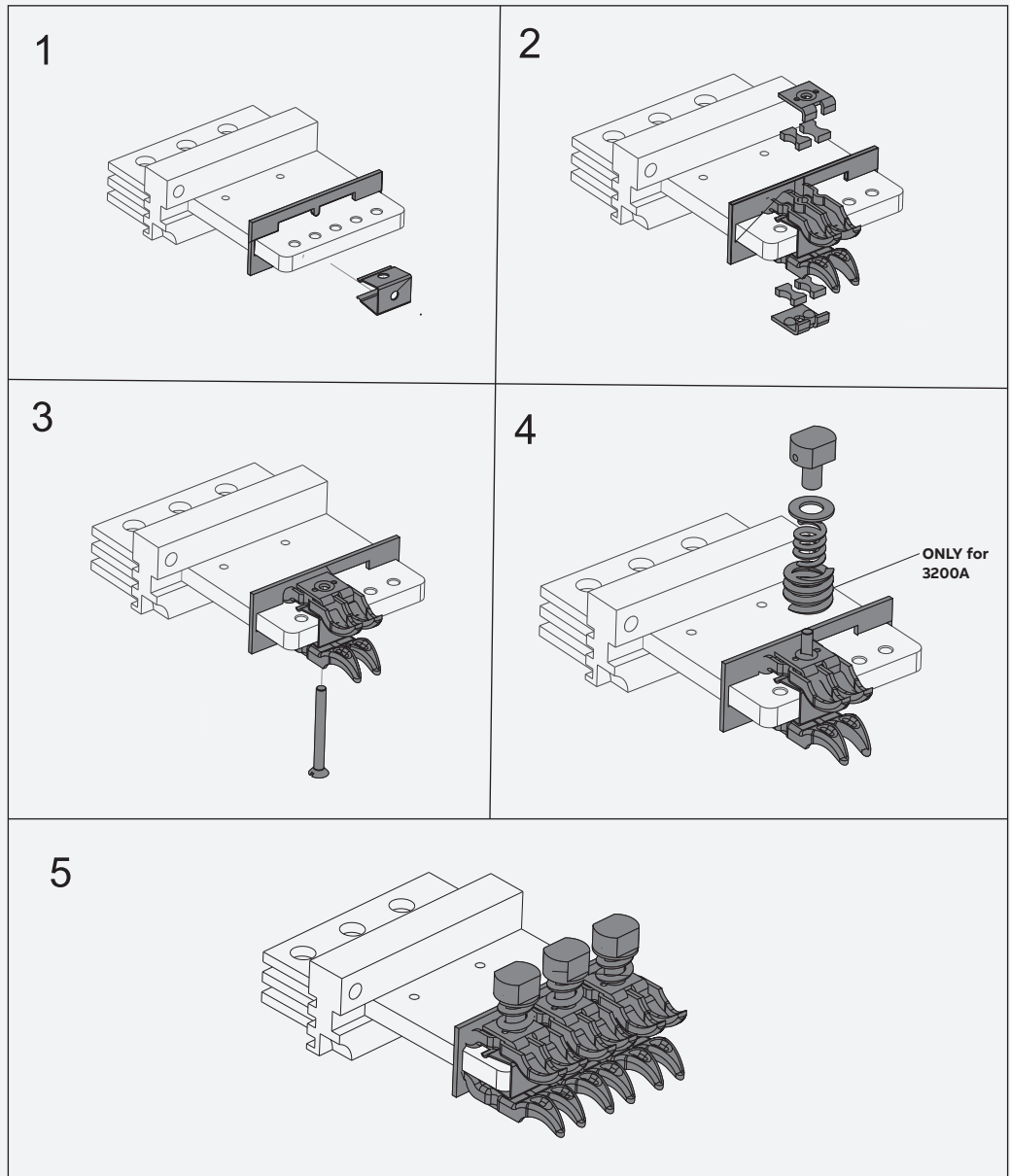
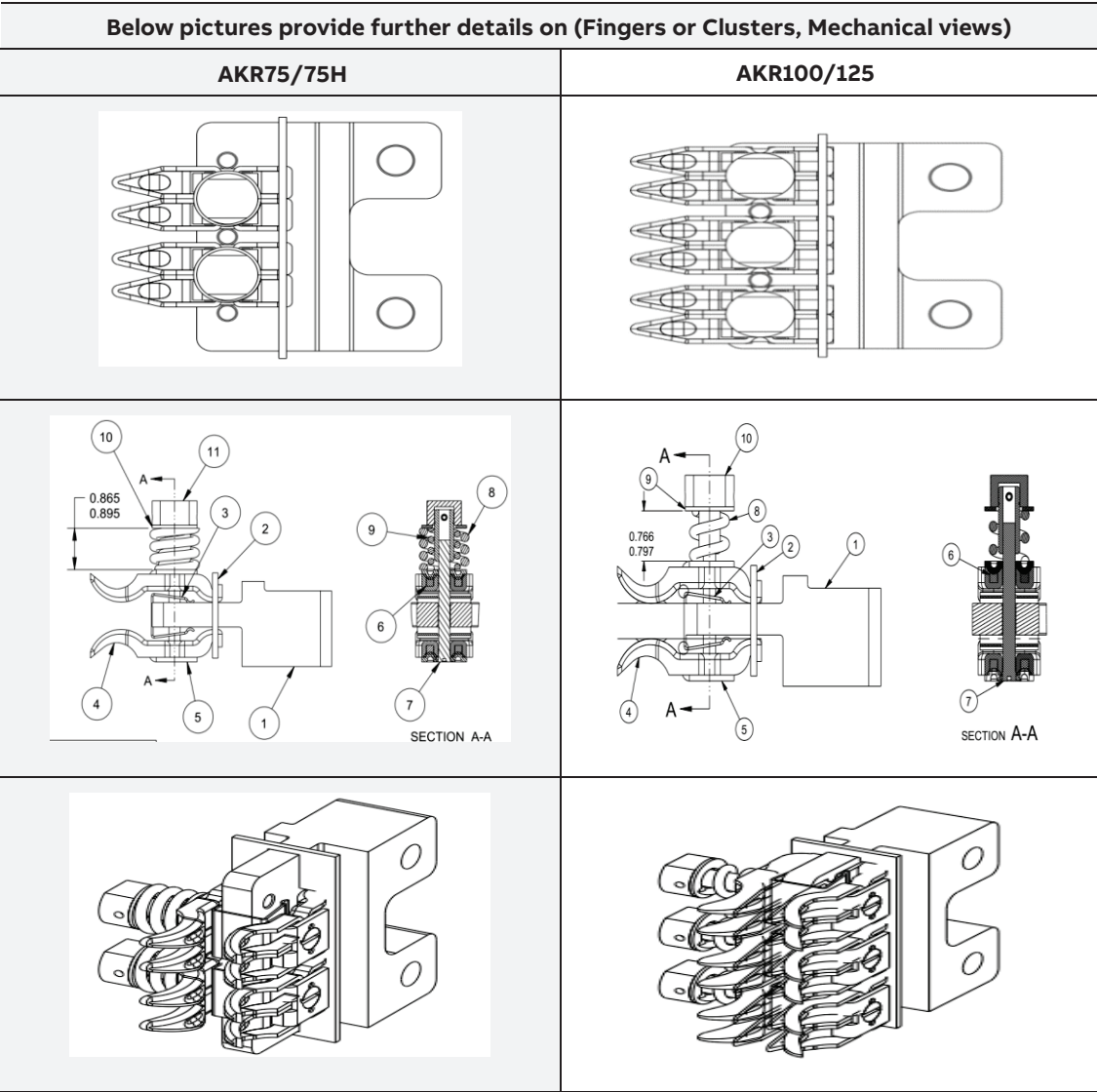


Figure 66



31 - AKD-8: Position Switch Actuator

Position switch actuator comes pre-installed on all versions of Emax 2 Retrofill ACB. Hence, no installation is required. Retrofills provide the same electrical indication scheme as the legacy breakers (Figure 67,68,69 and 70).

A customer can choose to install a position switch if it's not already installed, or if the existing assembly is damaged.

Compartment Position Switch Assemblies	
0343L0881	AKR30S
0343L690G1	AKR30/30H/30L/50/50H
Consult Factory	AKR-75/100/125

Figure 67

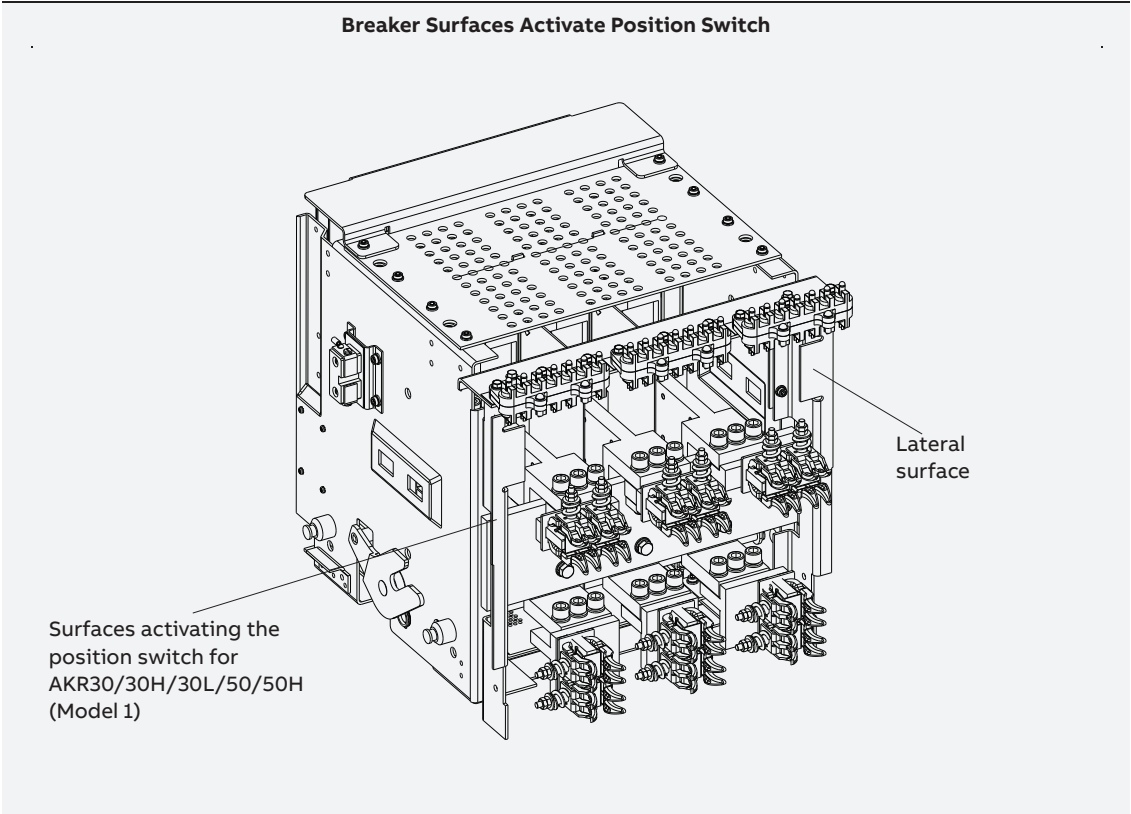


Figure 68

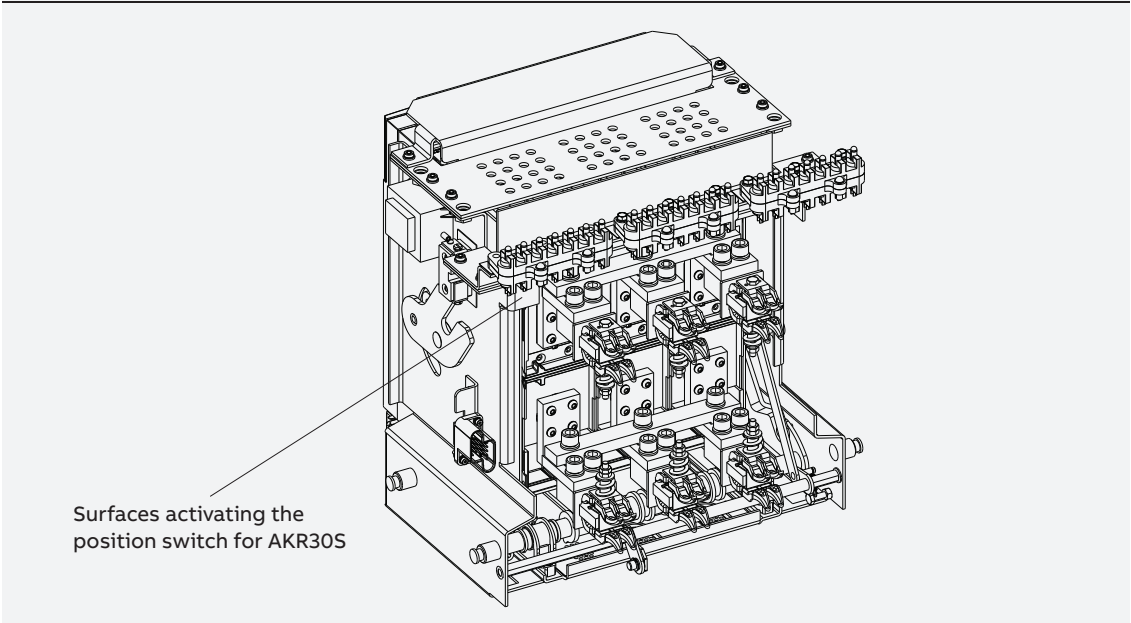


Figure 69

Breaker Surfaces Activate Position Switch. (Model 2)

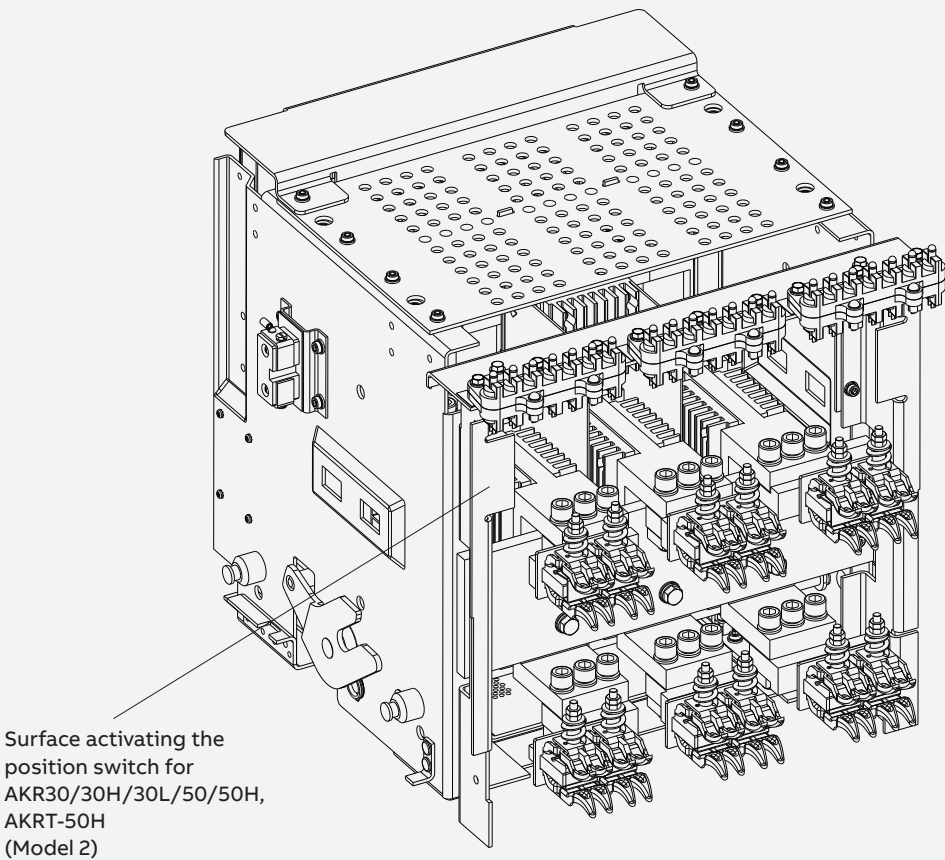
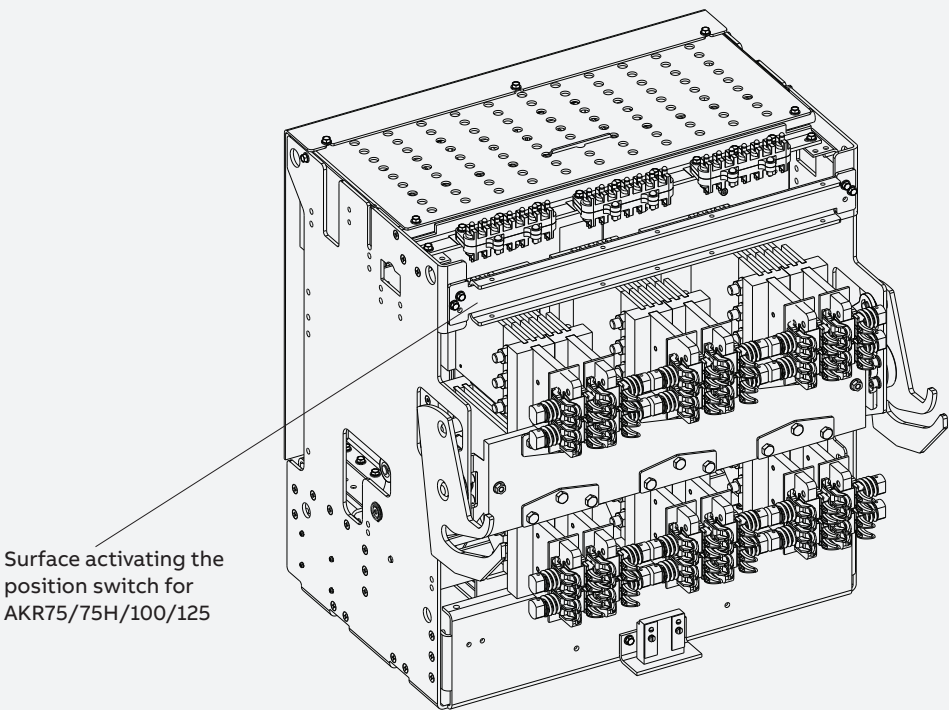


Figure 70



32 - AKD-8: Shutter Actuation

AKD-8 LVS comes installed with shutter assemblies for protection of the live bus bars. Emax 2 Retrofill breaker comes pre-installed with shutter actuators (Figure 71,72,73 and 74) which operate the opening of the shutters. Hence, no installation is required. Retrofills provide the same mechanical indication scheme as legacy breakers.

Figure 71

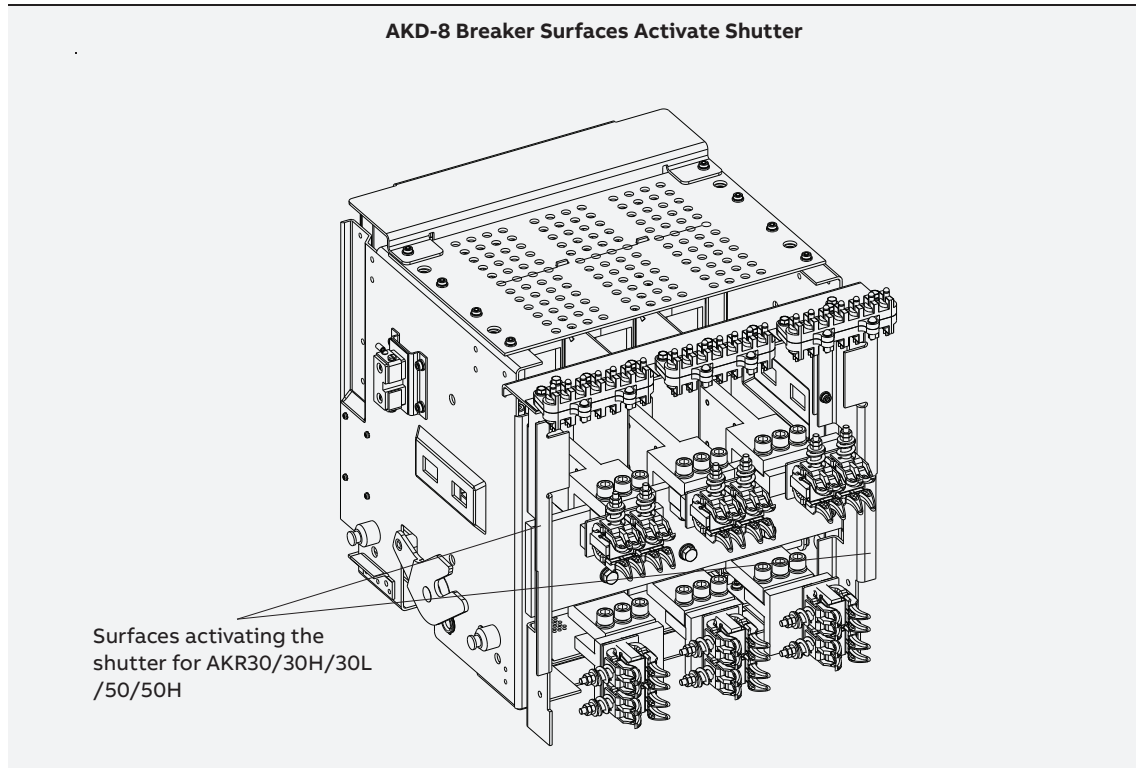


Figure 72

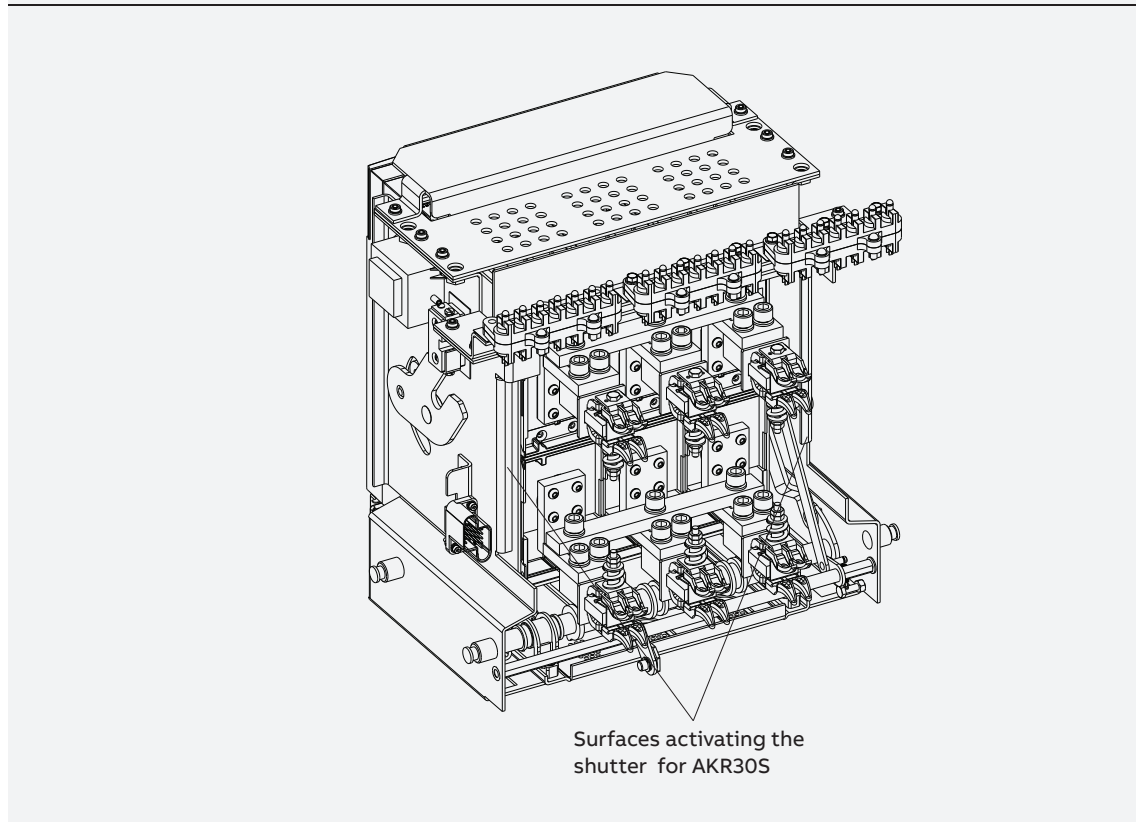


Figure 73

AKD-8 Breaker Surfaces Activate shutter

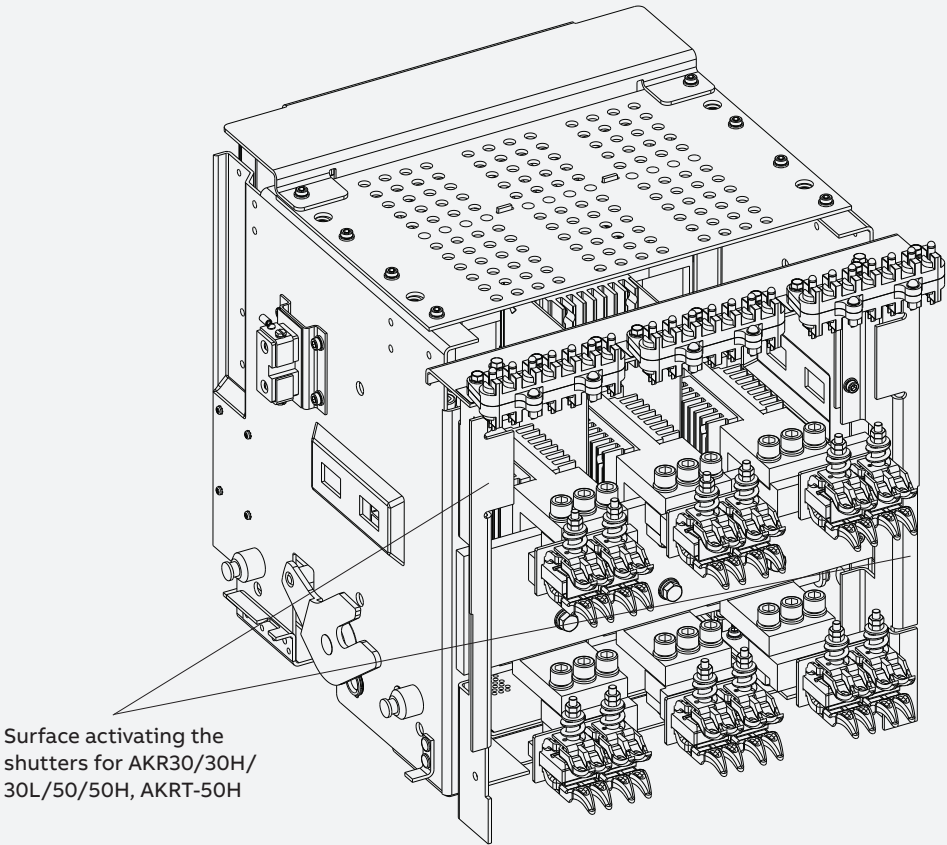
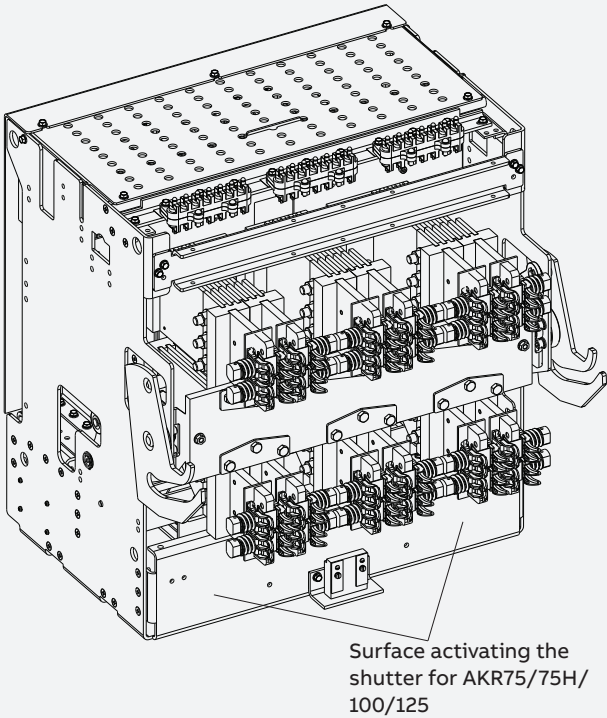


Figure 74

AKD-8 Breaker Surfaces Activate shutter



Door Interlock System

Danger



- It must be ensured that the supply power to the compartment is turned off/ compartment is deenergized for all the incoming and outgoing circuits of the LVS prior to any work being conducted on it.
- During the installation and related work on the equipment, it must be ensured that the operator is using the prescribed PPE for the specified tasks

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

Details regarding installation of door interlock system are shown below in Figure 75, 76, 77 and 78.

Figure 75

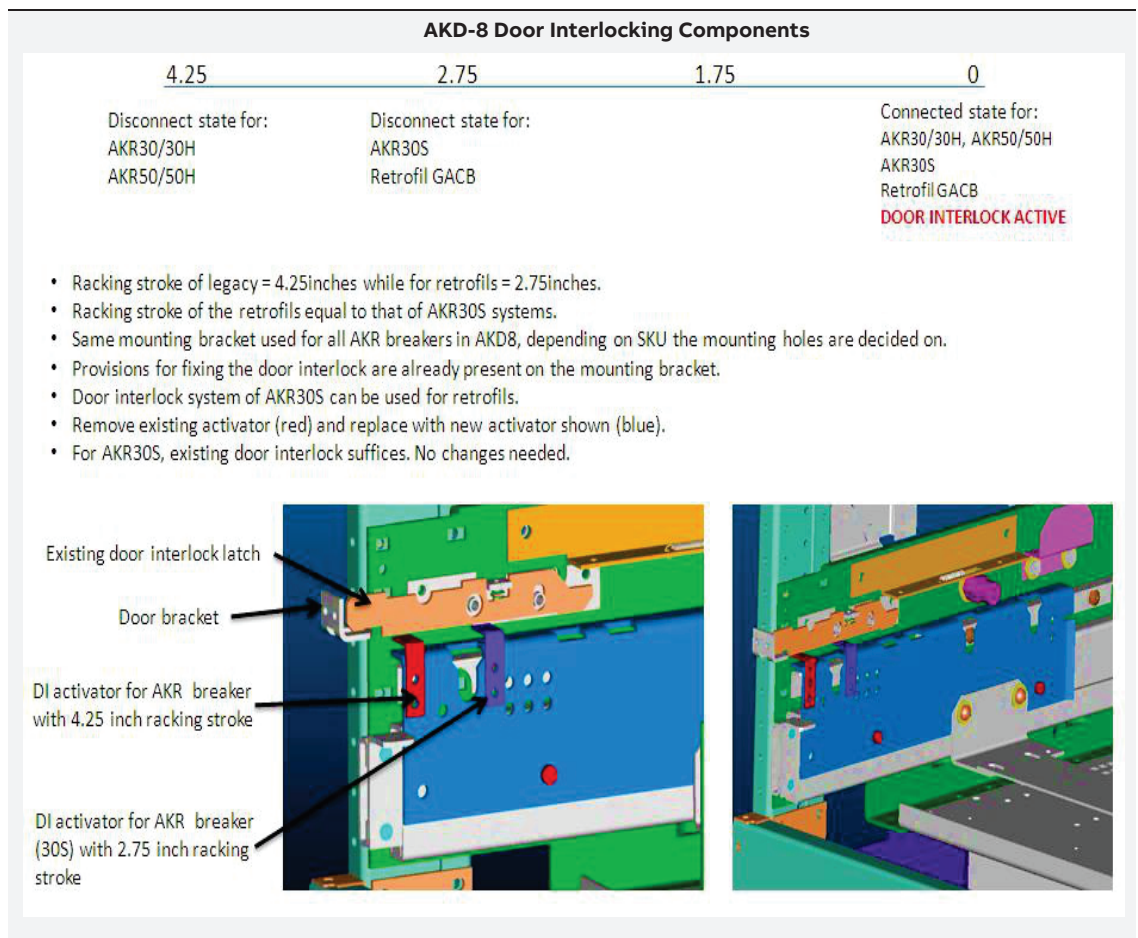
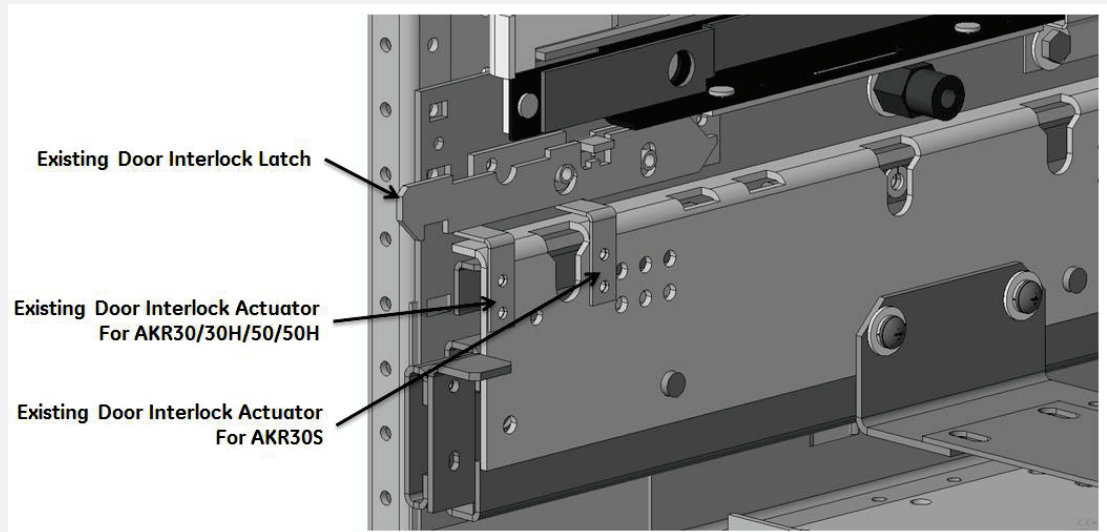


Figure 76

AKD-8, Door Interlocking Components (Model 2)

Figure below shows the components that make up the AKD-8 Retrofill door interlocking assembly.



- Please remove the existing Door Interlock Actuators from the compartment for AKR-30/30H/50/50H & AKRT-50/50H
- The Retrofill breaker has a Door Interlock Actuator Bracket mounted on breaker.

Figure 77

Figure below shows the Door Interlock Actuator mounted on Retrofill Breaker for AKR-30/30H/50/50H & AKRT-50/50H.
For AKR30S, please use compartment Door Interlock Actuator.

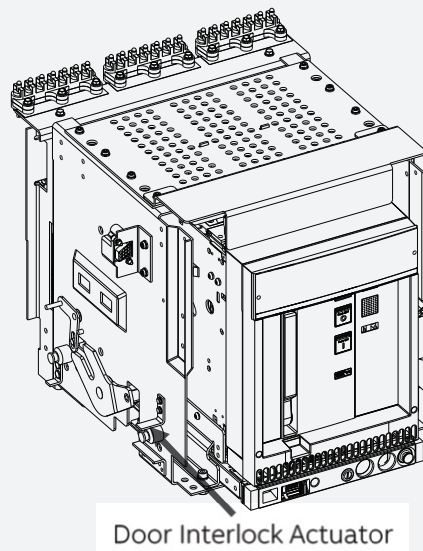


Figure 78

AKD-8 (AKR75/100/125)—Door Interlocking Components

Figure below shows the components that make up the AKD-8 Retrofill door interlocking assembly.

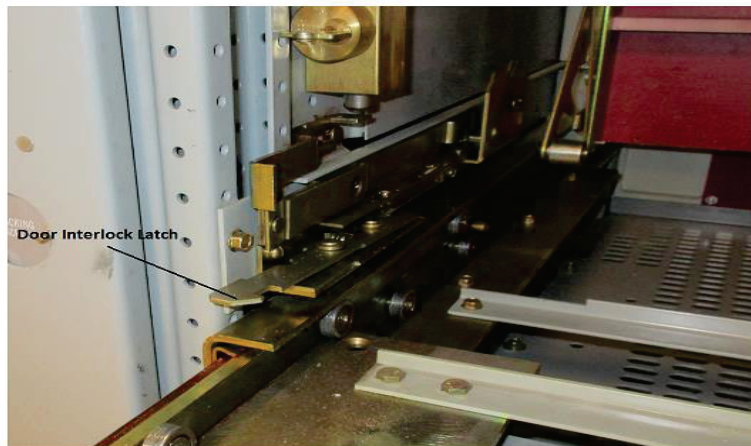
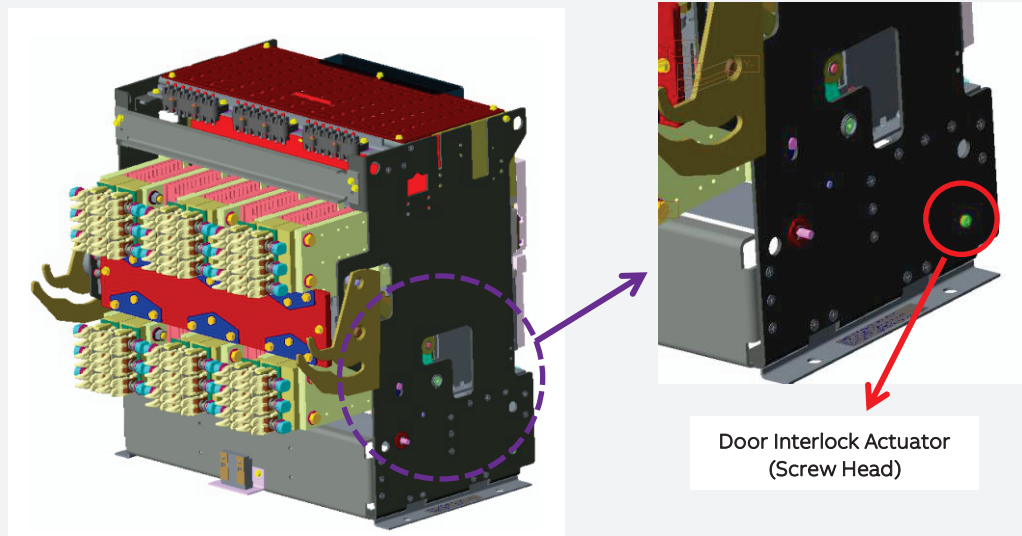


Figure below shows the Door Interlock Actuator mounted on Retrofill Breaker for AKR-75/10



33 - AKD-8: Key Interlock

The Emax 2 Retrofill circuit breakers (AKR-30/50/T50 and all 3200-5000A) provided as replacements for AKR 800- 5000A frame circuit breakers have a trip interlock feature which will function using the AKD-8 compartment mounted Key Interlock. A label is provided with full instructions on how to operate the Legacy Key Interlock. It is suggested to apply the label on the inside of the compartment door. Following is a brief summary of how the Key Interlock system is operated.

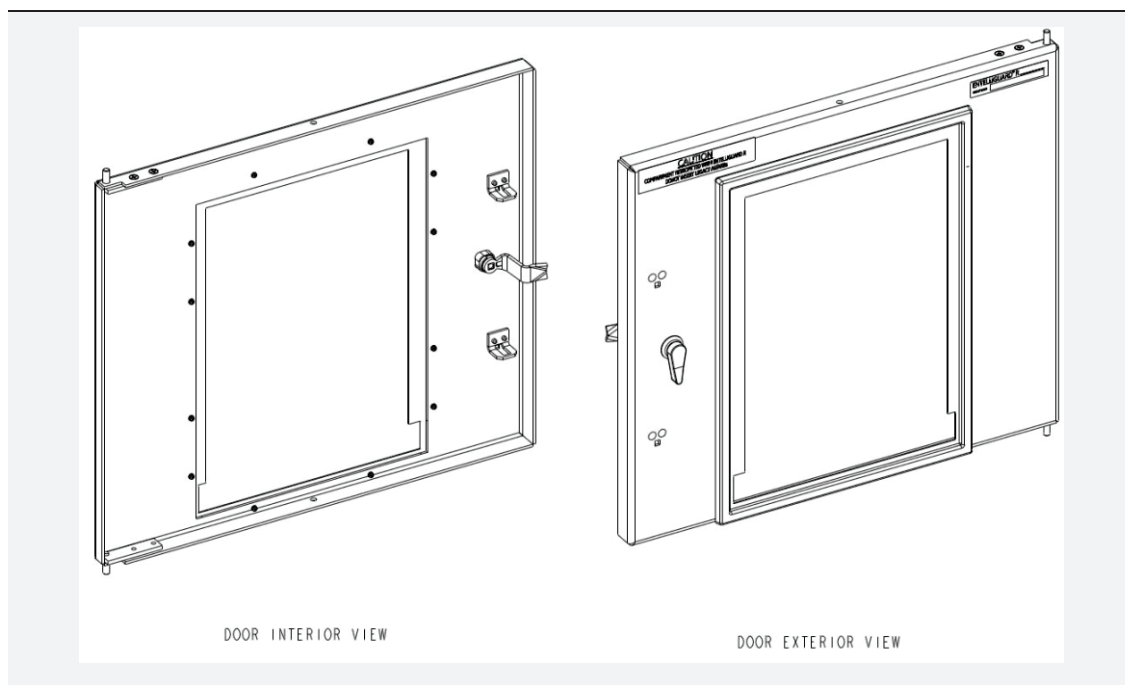
To activate the key interlock:

1. OPEN the breaker.
2. Rotate the screw on the lower front panel of the breaker which normally allows access to the racking screw. This will hold the breaker trip free.
3. While the screw is held rotated Clockwise, the Key Interlock slide in the switchgear is pushed inward, elevating a pin on the left side of the breaker.
4. Turn the key to the key removal position, extending the bolt and lock the breaker in the OPEN position.

Install New Door or Door Adaptor

1. Remove existing compartment door(s) and remove hinge block using #2 Phillips headed screw driver.
2. To install new door follow the instructions below:
 - De-energize/switch off the LVS section that is to be retrofitted
 - Open the compartment door that is to be retrofitted.
 - Rack out the existing legacy AKR breaker from the LVS.
 - Keep the door open for accessing the door mounting pads placed on the right side wall in the LVS compartment.
 - Loosen the screws holding the mounting pads to the compartment frame.
 - Note that this will provide access for removing the old door from the LVS compartment.
 - Unpack the new door assembly and mount it on the compartment and secure via placing the hinges and tightening the screws.
 - Insert the new retrofitted Emax 2 Retrofill circuit breaker into the compartment and slide the breaker into the disconnected condition.
 - Close the new door and secure it to the compartment.
 - Rack-in the new retrofitted Emax 2 Retrofill circuit breaker.
 - For ordering the new door depending on door size refer to document 2TSA451008P0000

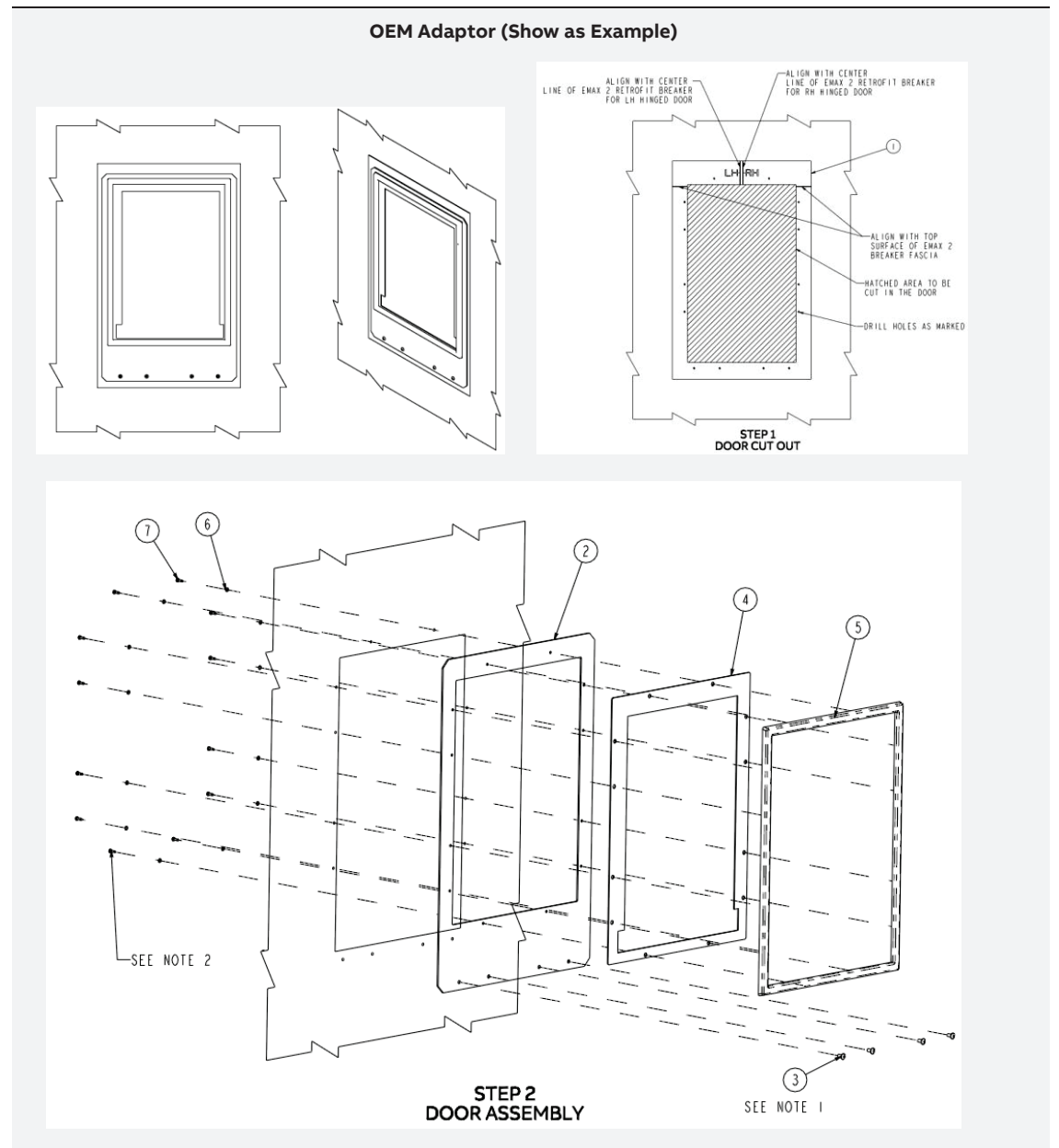
Figure 79



3. To install OEM Door Adaptor Follow the instructions below:
 - De-energize/switch off the LVS section that is to be retrofitted.
 - Open the compartment door that is to be retrofitted.

- Rack out & Remove the existing legacy AK/AKR breaker from the LVS.
- Unpack the new door Adaptor kit assembly
- Modify the door cut out as per the new door cutout template.
- Check the through-door racking with the new door assembly.
- Insert the new retrofitted Emax 2 Retrofill circuit breaker into the compartment and slide the breaker into the disconnected condition.
- Close the door and secure it to the compartment.
- Rack-in the new retrofitted Emax 2 Retrofill Breaker.
- For detail instructions refer document **2TSE431967R1000**, **2TSE431968R1000** & **2TSE431996R1000**

Figure 80



Install AKD-8 , Neutral Sensing for 4 Wire Ground Fault

Danger



- 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

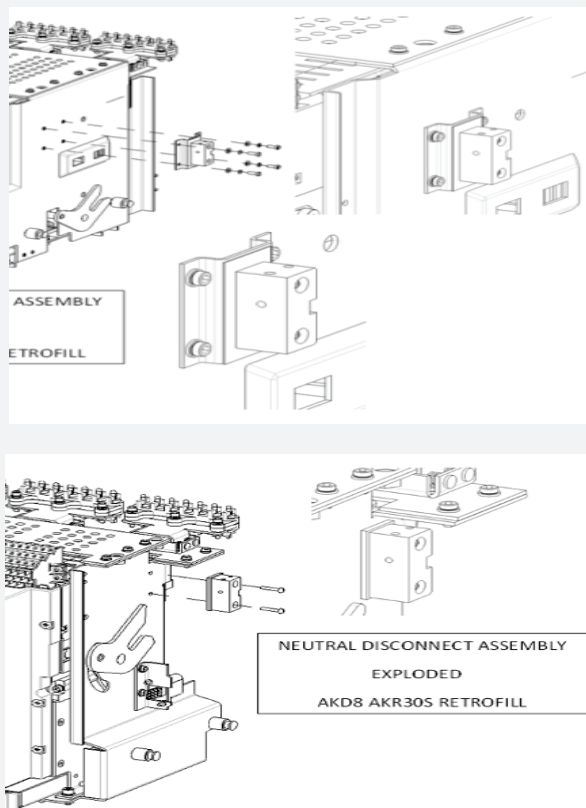
- Ensure only qualified personnel install, operate, service, and maintain all electrical equipment.

34 - AKD-8 , Neutral Disconnect Assembly

Figure 81 shows an exploded view of the breaker side neutral disconnect assembly for the AKD-8 AKR30/30H/50/50H/30L and AKR30S Retrofills. These are available pre-installed and wired from the factory.

Figure 81

AKD-8, Neutral Disconnect Assembly for the AKR30H/50H Retrofill



35 - AKD-8 , Neutral Disconnect Assembly , Bus Compartment

AKD-8 Emax 2 Retrofill Circuit Breaker uses an air-core Rogowski Current sensor to measure current level. Legacy AK and AKR breakers used iron core CTs. For the Retrofill breaker 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. Neutral CT wires from the Rogowski coil to the AKD-8 gray terminal blocks must be run as a “twisted pair”.

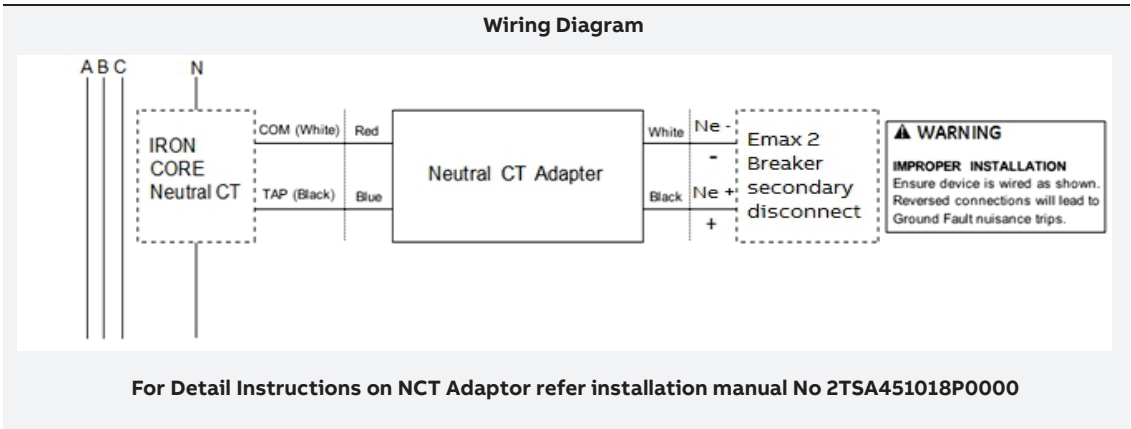
36 - Neutral CT Adapter upto 5000A

This is a miniature Rogowski coil. It mounts on the breaker between the breaker’s Neutral Disconnect and the breaker trip unit. It converts the signal from an iron Core Neutral sensor to a Rogowski voltage output which is wired to the Breaker's Trip Unit Neutral input connections.

The Neutral CT Adapter supports iron core Neutral sensors compatible with MicroVersa Trip, MVT RMS-9, Power Plus, Pro Trip, Emax 2 TU rated from 250 to 5000 Amps as used in GE switchboards and switchgear from 1979-2015. It is available in seven variations (shown in table below).

Kit Number	Supported Neutral CT ratings	Supported T.U
ENCTA0250	250A	Ekip
ENCTA0800	400A,800A	Ekip
ENCTA1200	600A,1200A	Ekip
ENCTA1000	1000A	Ekip
ENCTA3200	1600A,3200A	Ekip
ENCTA4000	2000A,4000A	Ekip
ENCTA5000	2500A,5000A	Ekip

Figure 82



37 - Procedures

Notice

NOTICE

NEUTRAL CT ORIENTATION

- Write down the orientation of the existing Iron core CT and the polarity of the connections. The orientation and polarity NOTICE needs to be matched when the air core Rogowski is assembled in the cable compartment.

1. Ensure that the LVS has been de-energized and the breaker in the compartment being retrofit is switched off and removed from the LVS.
 2. Open the door on the rear of 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. 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. Be careful 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 with the new Rogowski assembly on the horizontal bus bars and fasten it using the hardware previously removed.
 8. Connect a “twisted pair” of wires from the compartment neutral disconnect to the Rogowski CT. 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 on the neutral disconnect assemblies within the LVS compartment. Be sure to orient the CT and wires for proper polarity.
- The new Rogowski assemblies are installed and ready for use.
 - Tools required: Wrenches, wire stripper, wire cutter, continuity tester.

38 - AKD-8, Multi-Source Ground Fault

Retrofills can be used in the following ground fault applications:

Single Source Feeder breakers, 3 wire or 4 wire
Main Circuit breakers, 3 wire or 4 wire

For 4 wire multi-source Ground Fault systems, the Retrofill should be ordered with a neutral CT adapter. These neutral CT adapters are compatible with MVT style neutral sensors. This will allow the new breaker to operate with the existing Neutral CT in most cases.

Example: Neutral sensor Cat numbers beginning with TSVG & CT part #'s 139C4970G#'s.

Please note that these neutral CT adapters are not compatible with Power Sensor or SST style neutral sensors. Replace an SST Neutral CT with a TSVG...BK iron core sensor which will be compatible with the Neutral CT Adapter.

Note: For 4 wire multi-source Ground Fault systems using Rogowski sensors is more difficult and requires that an external GF summing CT scheme must be implemented. This applies to Main—Tie—Main systems or systems with a Main source and then a back-fed generator source.

AKR100 - 4000A, Fan Control Unit Wiring & Trip unit Programming instructions

Wiring Diagram

- Follow the below circuit diagram to make the connections between the 2k-1 signalling unit, relay and fans.
- Refer Relay diagram & 1SDHOO1000R0524 to identify the terminal marking in circuit diagram.
- Note: U1 & U2 Emax 2 motor operator (120 V~) terminal.
- **NOTE 1: In the absence of motor or if motor voltage rating is different than 120 V~, connect 120 V* directly to T1 and T2**

Figure 83

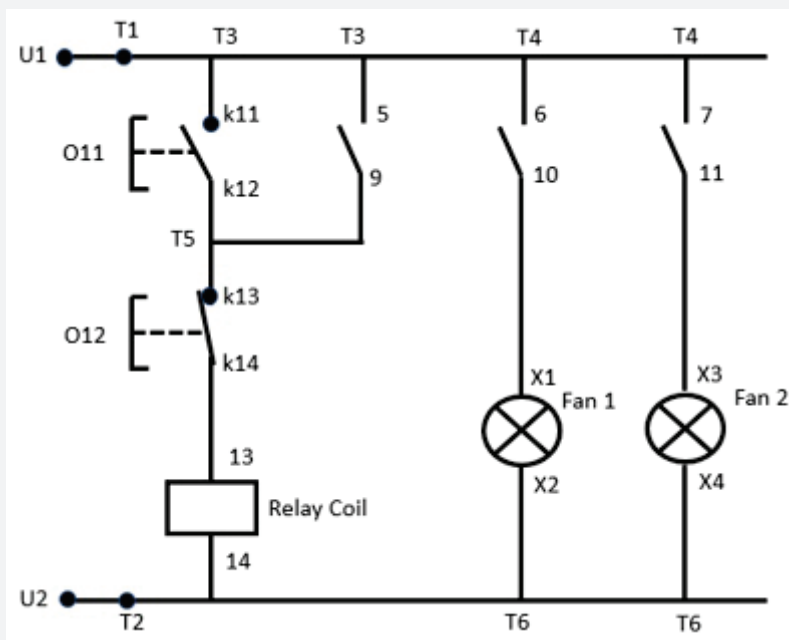


Figure 84

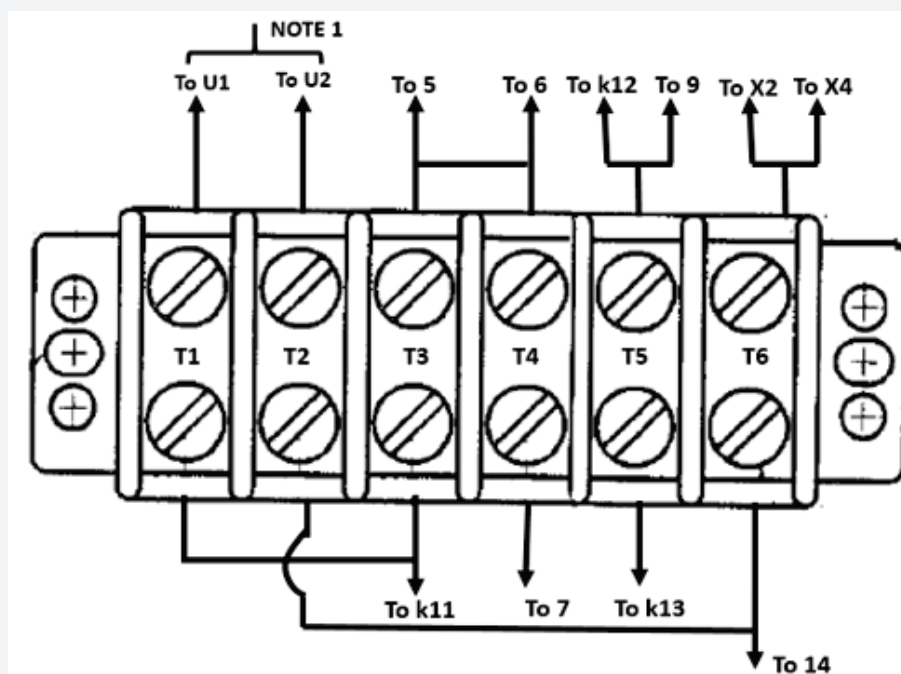
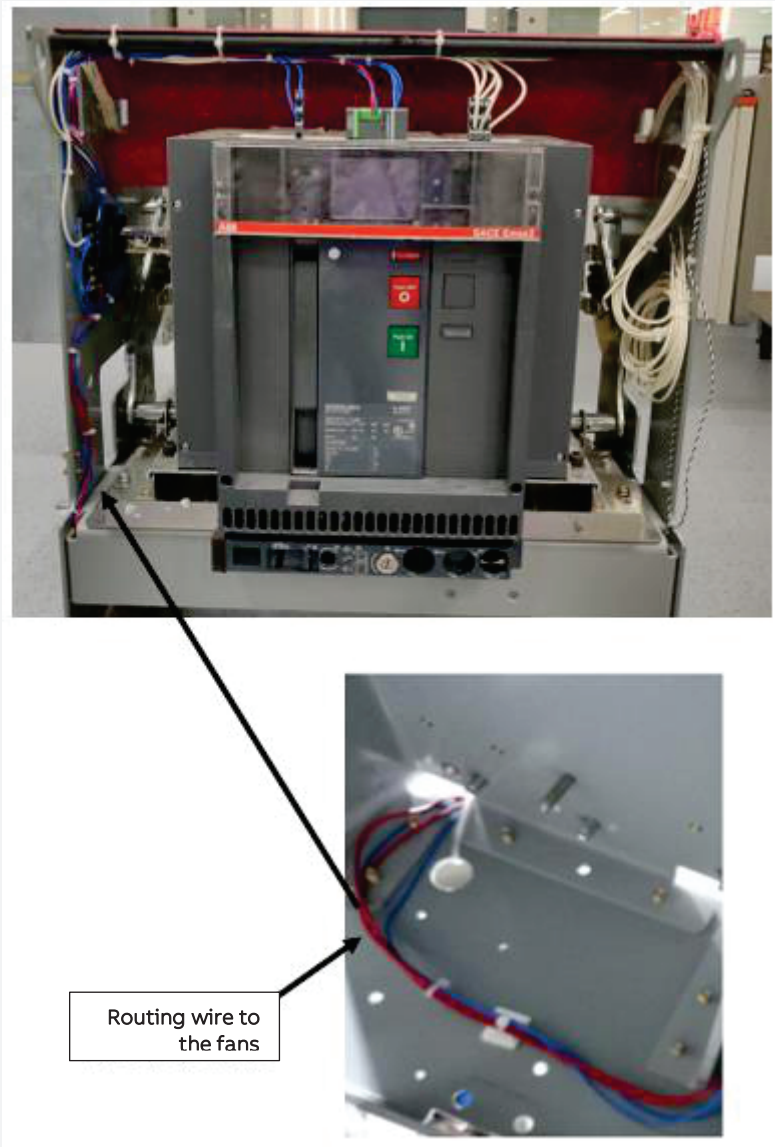


Figure 85

Wiring of AKR-100 4000A breaker with FAN control unit



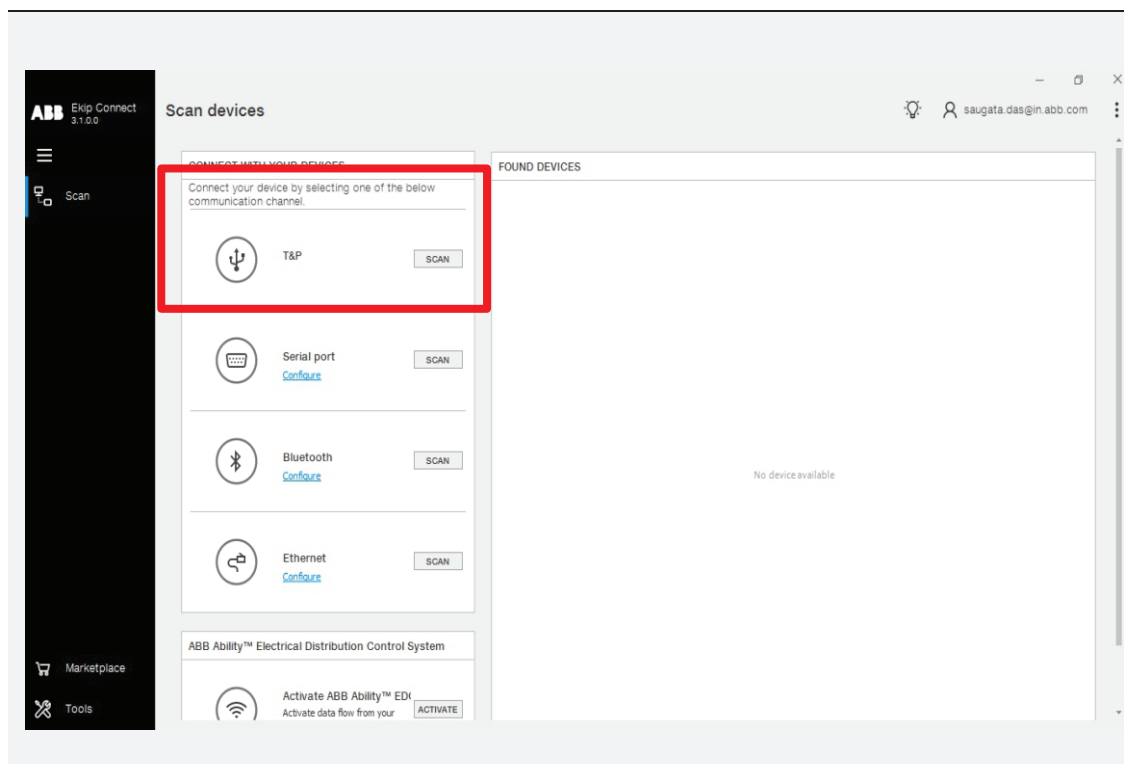
Routing wire to
the fans

Configuring Ekip Touch, Hi Touch Trip unit for Fan control

39 - Connecting Ekip Touch

Connect Ekip Touch or Hi Touch Trip unit using Ekip connect 3.0.357.9 (or later) software and Ekip T&P unit.

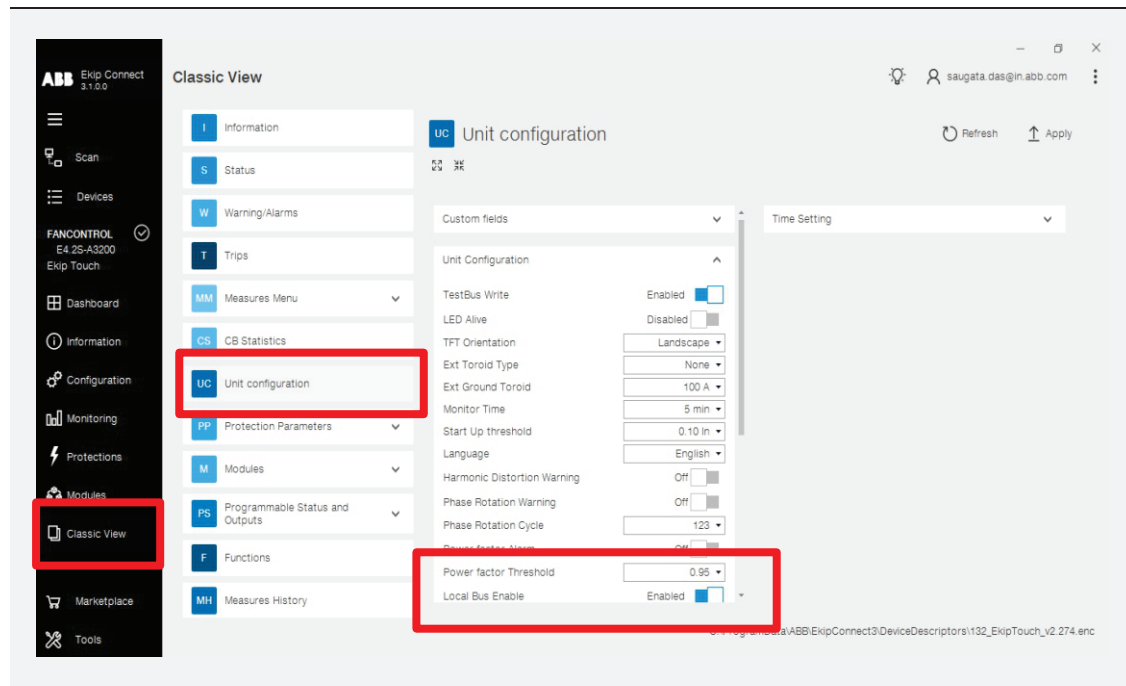
Figure 86



40 - Synchronizing 2K-1 signalling module with the trip unit

- The activation of local bus — essential to start the communication between the module and the Trip unit

Figure 87



- Once the local bus is activated 2k module should synchronize with the Ekip touch trip unit.

Check the following for synchronization status.

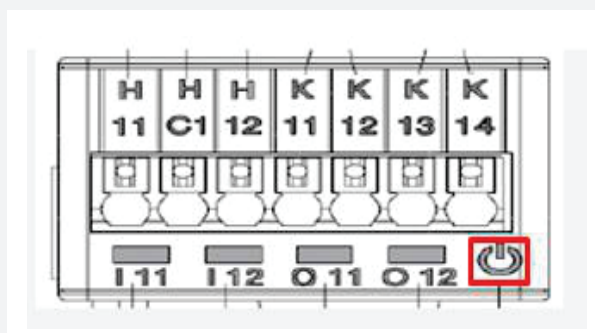
Power LED reports ON status and correct communication with Ekip Touch :

- Off: module off
- Fixed or flashing light synchronized on power LED of Ekip Touch: module ON and communication with Trip unit present
- Flashing not synchronized with power LED of Ekip Touch (two fast flashes per second): module ON and communication with Trip unit absent

If the Ekip Signalling 2K module is detected correctly by Ekip Touch the specific configuration area in the Modules Settings menu is activated.

For each Ekip Signalling 2K module detected by Ekip Touch, a specific menu is available containing the submenus of all the available and configurable inputs and outputs.

Figure 88



41 - Configuring threshold currents for Fan control

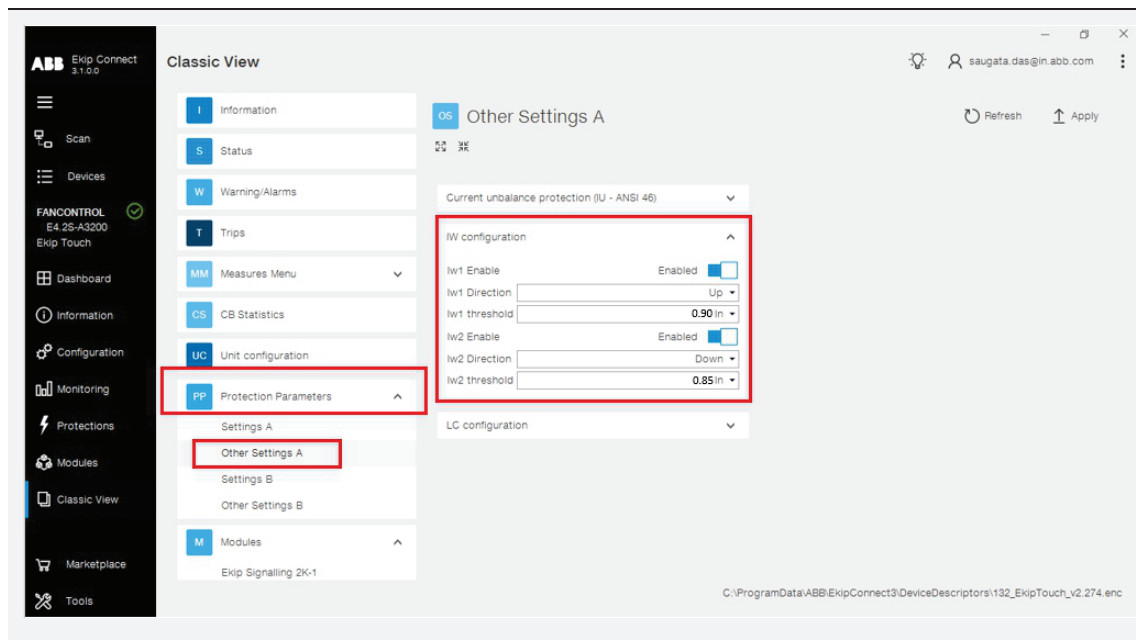
The current thresholds allow you to set controls on current lines, to be combined with the programmable contacts of the Ekip Signalling modules.

Two pairs of programmable contacts are available:

- Threshold 1 I1 and Threshold 2 I1, with control referred to I1
- Threshold Iw1 and Threshold Iw2, with control referred to In

For Fan control configure Iw1 and Iw2.

Figure 89



Considering 4000A as a rated current (I_n), fans will activate when the current crosses 3600 amps & will stop if the current drops below 3400 amps.

Threshold Iw1	<i>Enable:</i> Activate protection and availability of protection threshold on menu	OFF
	<i>Direction:</i> enables you to choose to have the signal when the current is higher (Up) or lower (Down) than the threshold.	Down
	<i>Threshold:</i> The value is expressed both as an absolute value (Ampere) and as a relative value (I_n), settable in a range: 0.1 I_n .. 10 I_n , with 0.01 step I_n	3 I_n
Threshold Iw2	<i>Enable:</i> Activate protection and availability of protection threshold on menu	OFF
	<i>Direction:</i> enables you to choose to have the signal when the current is higher (Up) or lower (Down) than the threshold.	Up
	<i>Threshold:</i> The value is expressed both as an absolute value (Ampere) and as a relative value (I_n), settable in a range: 0.1 I_n .. 10 I_n , with 0.01 step I_n	3 I_n

42 - Programing 2K-1 signaling contacts output

The output of 2K-1 module consists of 2 contacts K11-K12 and K13-K14. Configure these two output contacts as per following to control the fans.

Figure 90

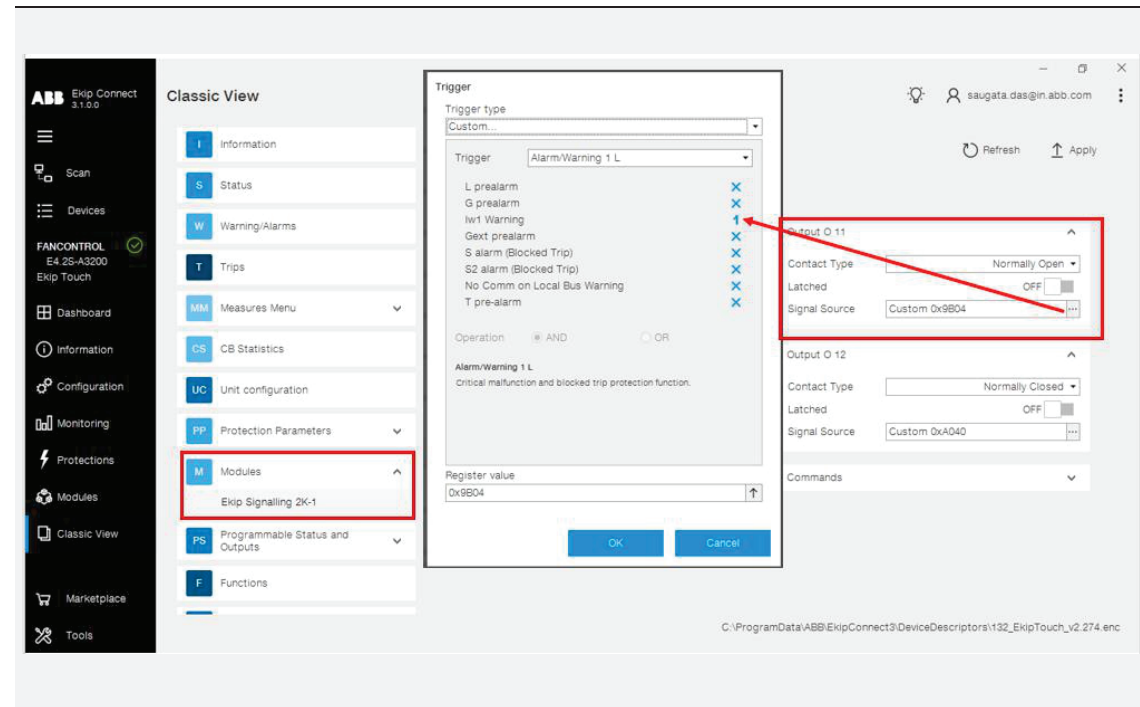
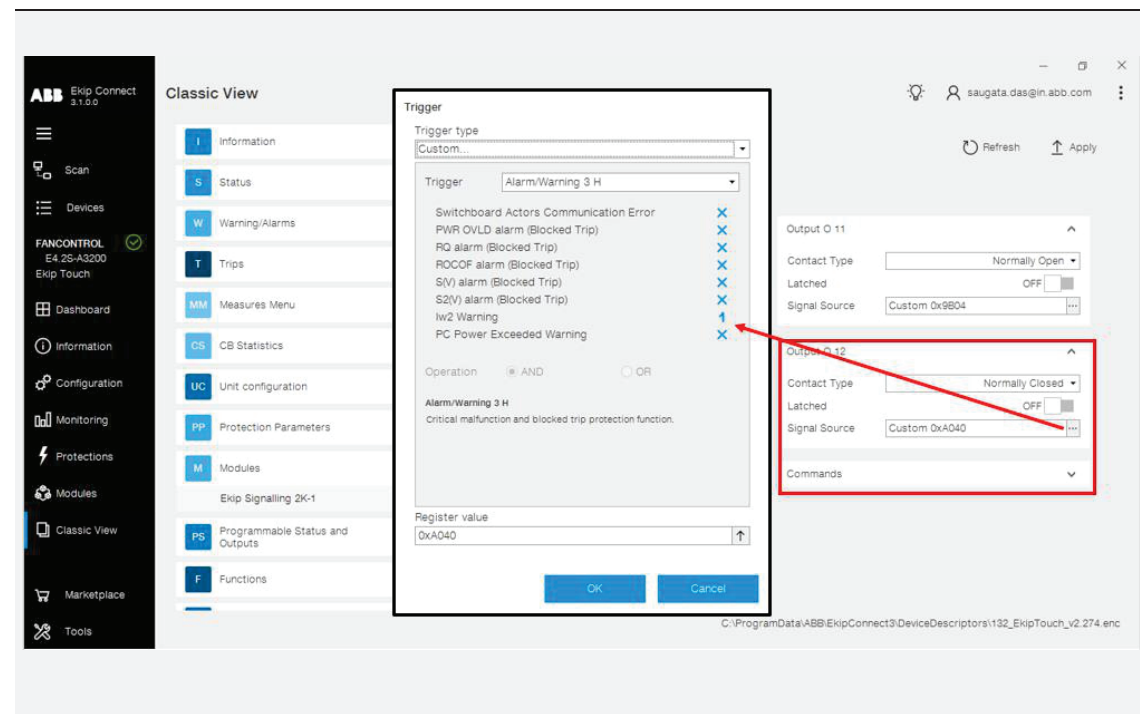


Figure 91



43 - Contact readiness Auto Test

The output of 2K-1 module consists of 2 contacts K11-K12 and K13-K14. Configure these two output contacts as per following to control the fans.

Figure 92

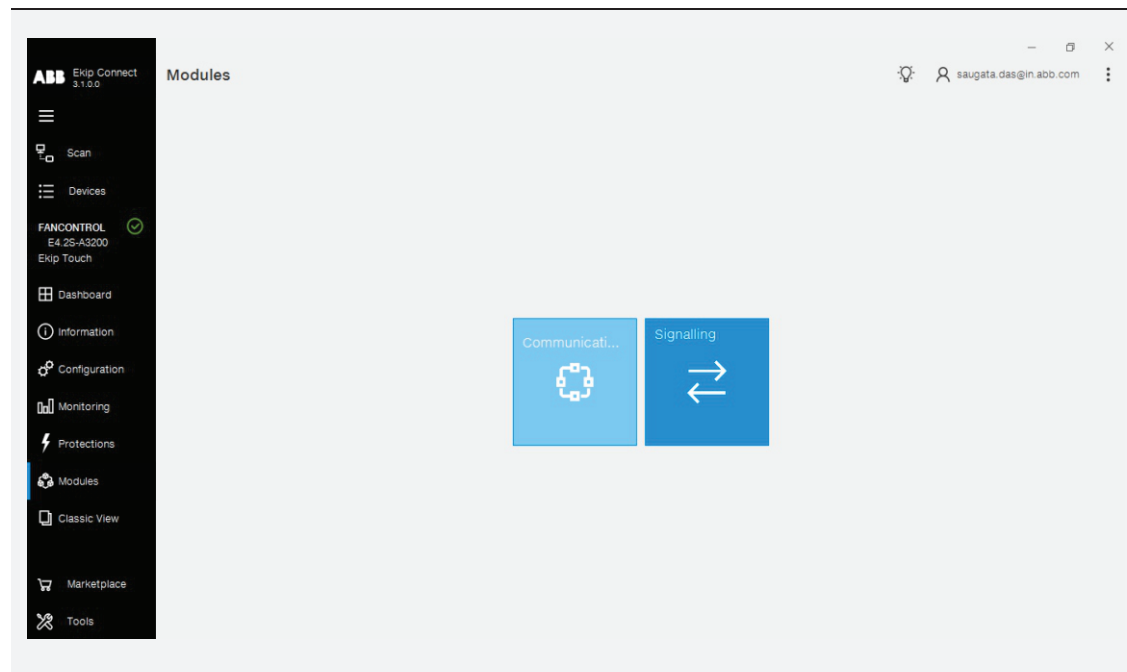
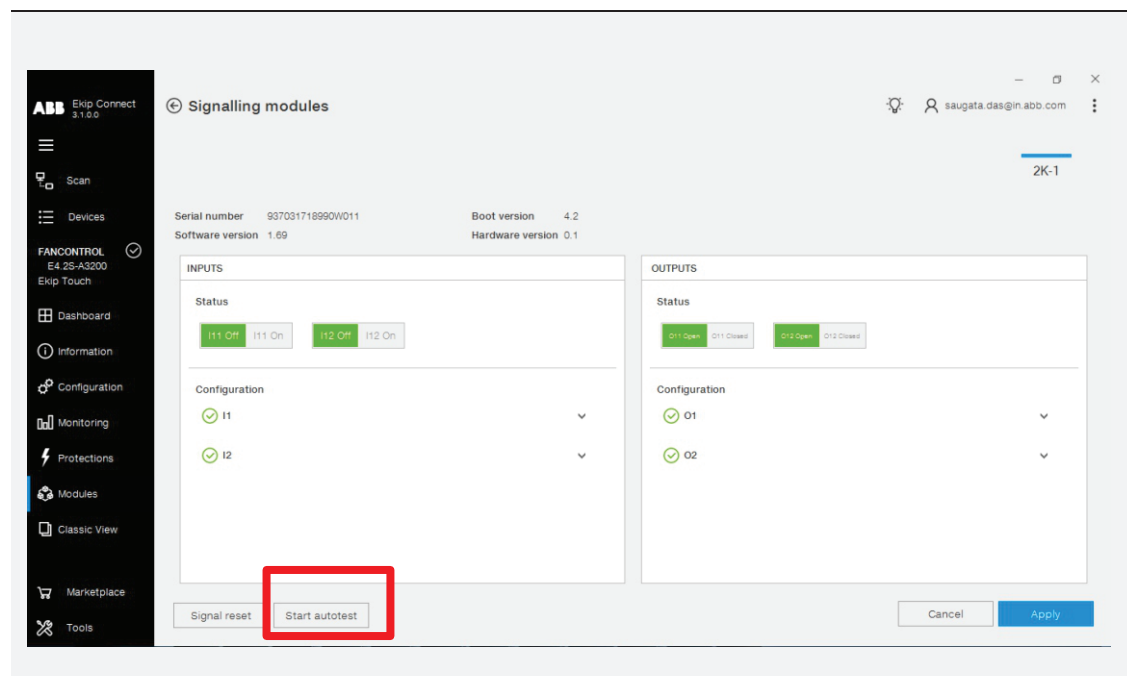


Figure 93



Autotest command that activates the automatic sequence of output tests (contacts and LEDs) and input test (LED), and includes the following operations:

1. Reset output contacts (= open) and LEDs (= off).
2. Turn on all the LEDs in sequence (output and input)
3. Closure and shutdown of the two output contacts in sequence, switching on the relative LEDs.
4. Restore initial conditions

The Autotest command closes the contacts regardless of the configuration set by the user

Fused Retrofill Breaker

Danger



- It must be ensured that the supply power to the compartment is turned off/ compartment is deenergized for all the incoming and outgoing circuits of the LVS prior to any work being conducted on it..
- During the installation and related work on the equipment, it must be ensured that the operator is using the prescribed PPE for the specified tasks

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

There are two types of fused breakers; AKRU 30, 800 ampere frame and AKRU 50, 1600 ampere frame. Except for the open fuse lockout device and the integrally mounted fuses on the upper studs, the AKRU-30 and AKRU-50 breakers are identical to the unfused AKR-30 and AKR-50 models. Overcurrent trip devices are the same for both types.

44 - Fuse size and mounting

Figure 94

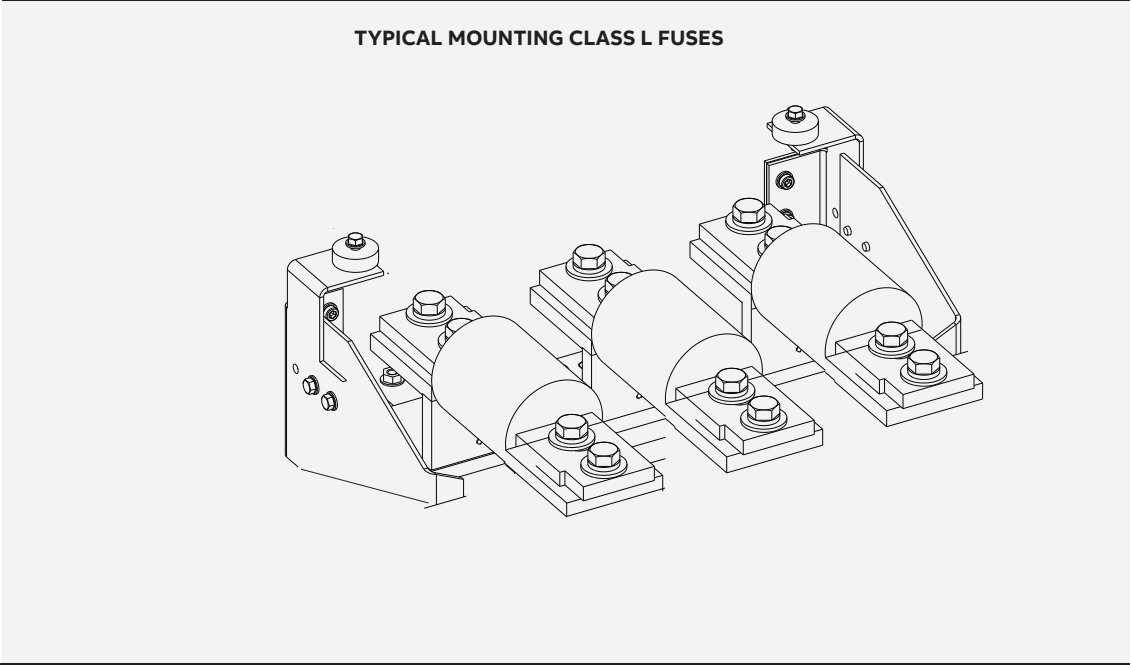


Table 6 lists the range of fuse sizes available for these breakers. The Class L fuses are mounted as shown in Fig.94. Other than the 800A size, which has a single mounting hole per tang, each Class L fuse tang has two holes sized for one-half inch diameter bolts. Class J fuses rated 300 thru 600A have one mounting hole per tang. The 300, 350 and 400A sizes require copper adapter bars per Fig. 95. All 1/2-13 fuse mounting bolts should be torqued to 200-350 in.-lb. The 5/8-11 bolts which attach the C shaped fuse adapters to the breaker studs should be torqued to 300-525 in.-lb.

Table 6

Fuses For AKRU Breakers

SwitchGear	Breaker Type	Frame Size	Sensor Rating	Rating Plug	Fuse Sizes (Amps)											
					300	350	400	450	500	600	800	1000	1200	1600	2000	2500
AKD-8	AKRU-30S	800	225 and Below	225 and Below												
			300	300												
			400	400												
			600	600												
			700	700												
			800	800												
	AKRU-30	800	300	300												
			350	350												
			400	400												
			450	450												
			500	500												
			600	600												
	AKRU-50	1600	800	800												
			400	400												
			500	500												
			600	600												
			700	700												
			800	800												
			1000	1000												
			1200	1200												
			1600	1600												

45 - Special 2500A Fuse for AKRU-50

This fuse provides a melting time-current characteristic that coordinates with 1600A trip devices. Compared physically with a 2500A NEMA Class L fuse, the special fuse is more compact (shorter); its tangs are specially configured and offset to achieve the required pole-to-pole fuse spacing; a special primary disconnect assembly mounts directly on the outboard tang of the fuse. Considering their unique mounting provisions, when replacing these fuses the following procedure should be adhered to (Refer to Fig. 96):

a) Using proper safety procedures and wearing required Personal Protective Equipment (PPE), remove breaker from compartment, and place it on a solid work surface in a well lit location.

b) Procedure to uninstall Primary Disconnects:

1. To uninstall the primary disconnects, remove the Adjusting nut from one of the long bolts holding the primary disconnect assembly together
2. Carefully slide out the bolt while removing the flat washer, spring, upper retainer, bowtie spacers, lower retainer, and fingers from the bottom of the assembly.
3. Do the same for the other assembly bolt and components.
4. Slide off the retainer clips.
5. Take off the main retainer from the stud.
6. Slide the main retainer over the stud.
7. Set a pair of bow-tie spacers into a pair of fingers, place a pressure plate retainer over the spacers to hold them in position, and then turn the subassembly over. Hook them into the main retainer.
8. Slide a long bolt through the hole in the retainer, between the finger, and then through the clip and stud spacer.
9. Hold the bottom finger subassembly in place.
10. Place two fingers around the bolt from the top, hooking the fingers into the main retainer. Then place a bow-tie spacer in each finger and hold them in position with a pressure plate retainer.
11. Place a spring, bushing, and flat washer over the bolt, then secure with the Adjusting nut.
12. Repeat Steps 7 through 13 for each set of fingers.
13. Adjust the nut to get a spacing of 0.766—0.797 inch for AKRU-50 between the top of the upper retainer and the bottom of the flat washer.

14. Clean finger assemblies, if necessary, with a clean, lint-free rag and isopropyl alcohol or acetone.
15. Be sure to apply a thin film of Mobilgrease 28 (DS50HD38) to the contact areas which slide on to the switchgear stabs. This product is available in a 1-0ztube, ABB Part #193A1751P1. Refer manual 2TSA451015P0000
- c) Remove the upper barrier.
- d) Detach the inboard end of the fuse by removing the two 1/2 inch - 13 bolts. A ratchet and socket with a short extension will be required.
- e) Remove the fuse.
- f) Install the new fuse by reversing the disassembly procedure. Ensure that the mating faces of the fuse are clean.

Figure 95

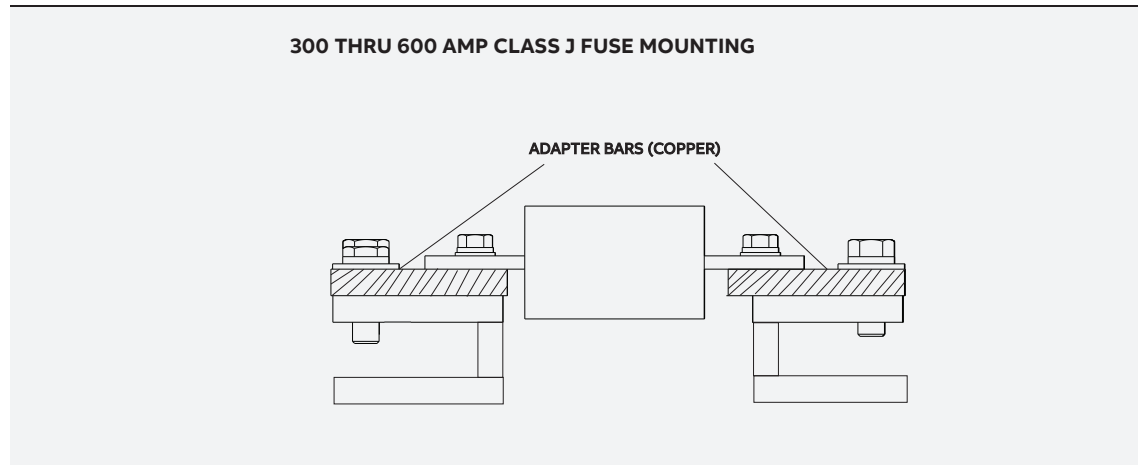


Figure 96

AKRU-50 with special 2500A Fuse

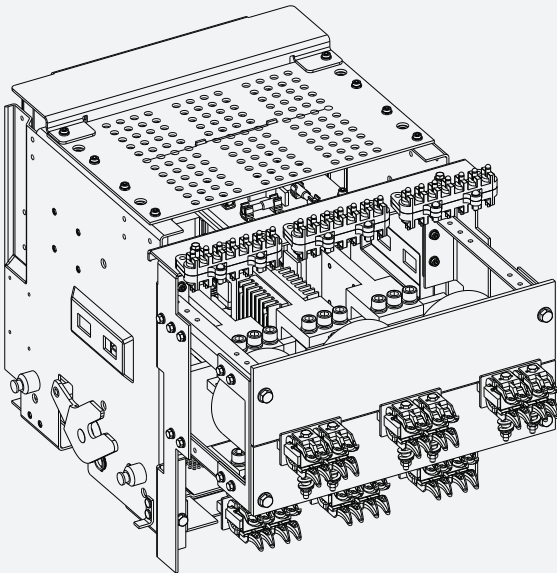
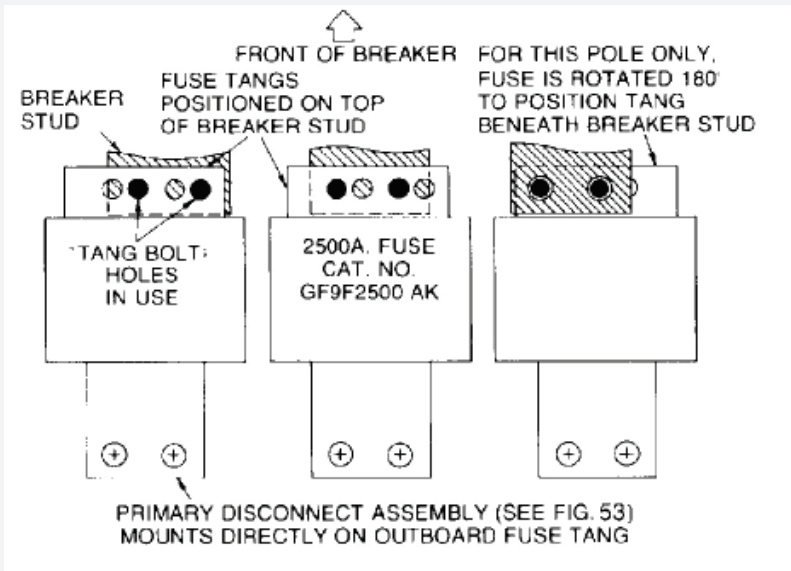


Figure 97

AKRU 50-2500A Fuse Tang Positions



Open Fuse Lockout Device

This device automatically trips the fuse breaker if one of the fuses opens. When this happens, the breaker is locked open until the reset button of the phase involved is pushed. The breaker should not be reclosed, of course, until the opened fuse is replaced.

1. Six UL recognized #18 awg, 150 degree C minimum, 600V control wires. One is connected at each end of the Class "L" fuse mounting busbars. Each wire is attached to a ring terminal which is attached with a screw to the busbar.
 2. This accessory is meant to work with a pin-wheel style Blown Fuse Detector equipped with 3 trigger fuses. Wiring of the Retrofill Breakers with UL recognized high temperature control wire is provided with the kit.
 3. All these wirings are installed at factory.
- Refer manual 2TSE432409P1000 , 2TSE432408P1000 , 2TSA1028P0000.
4. For Fused breakers Above 1600a(2000A-5000A) fuses are mounted in a separate fuse roll-out element. Breakers can be used in series with the fuse roll out element when OFLO (Open Fuse Lock Out) is installed on breaker.

Figure 100

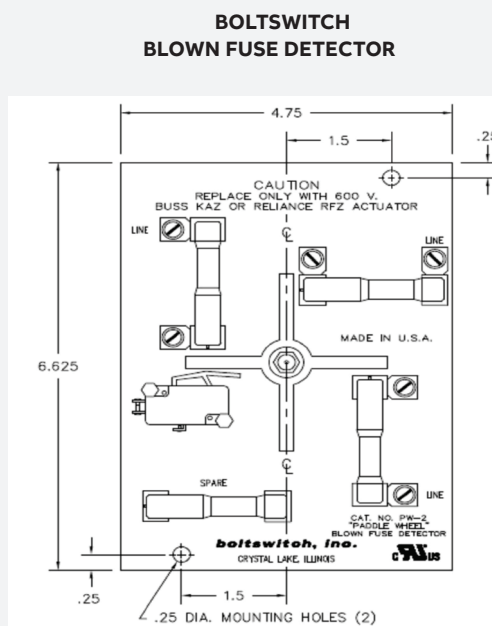


Figure 101

AKD8 AKRU-30S WITH 800A FUSES Horizontal orientation

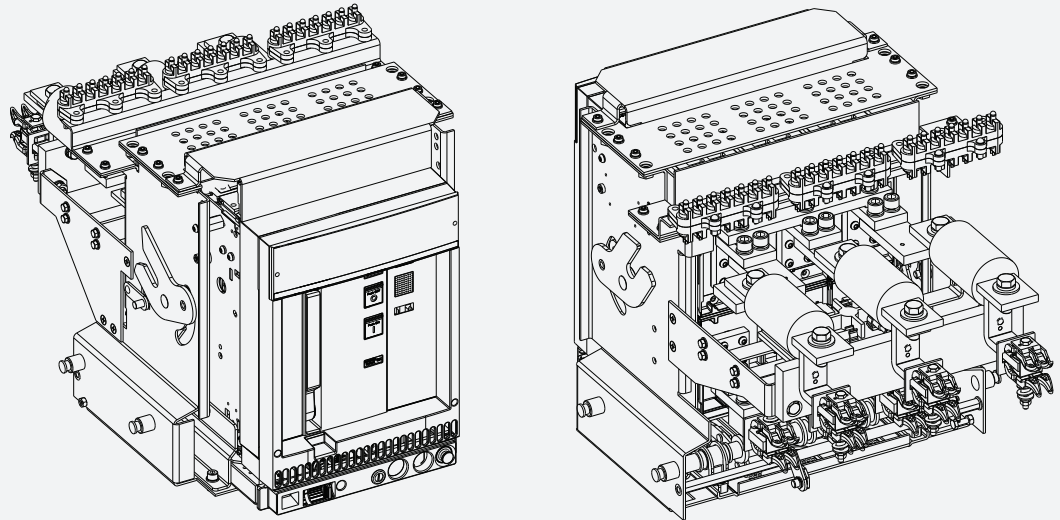


Figure 102

AKD8 AKRU-30 WITH 800A FUSES Horizontal orientation

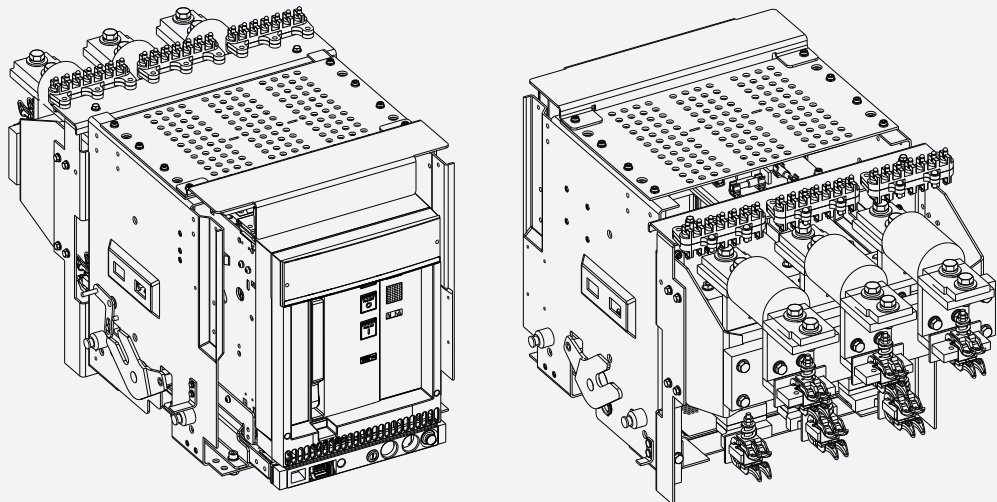


Figure 103

AKD8 AKRU-50 WITH 1600A FUSES Horizontal orientation

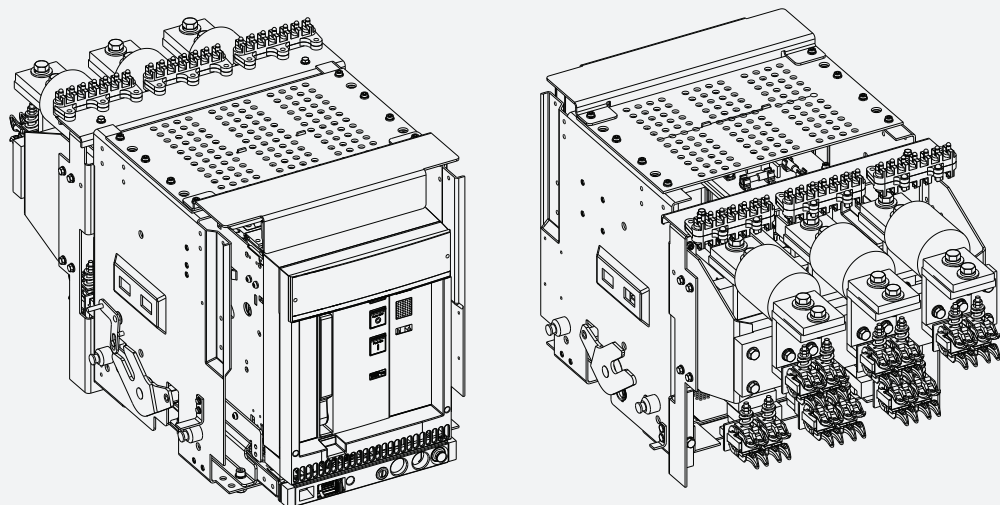


Figure 104

AKD8 AKRU-50 WITH 2500A FUSES Horizontal orientation

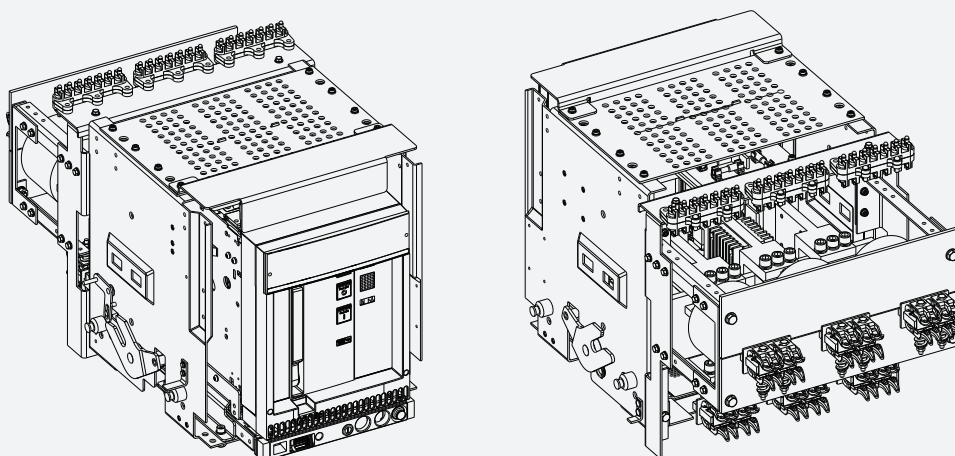


Figure 105

AKD8 AKRU-30 WITH 800A FUSES Vertical orientation

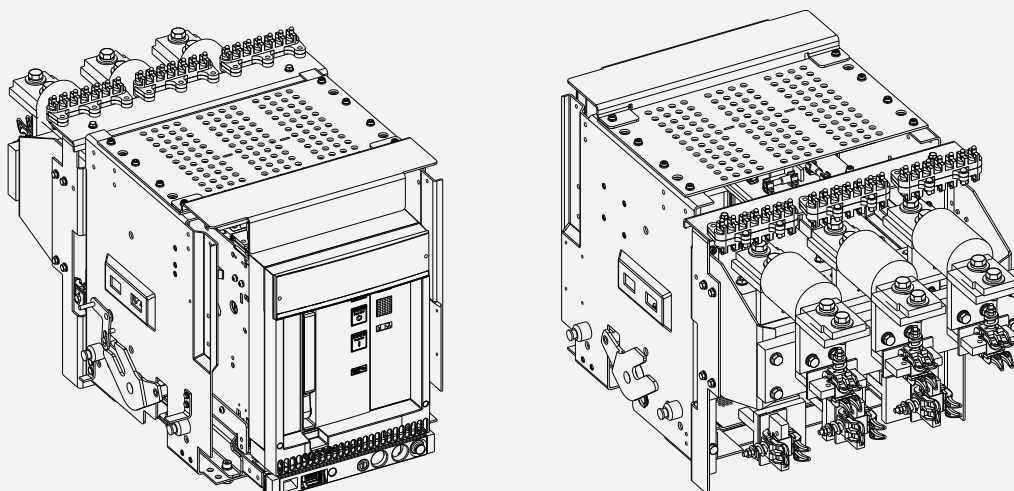


Figure 106

AKD8 AKRU-50 WITH 1600A FUSES Vertical orientation

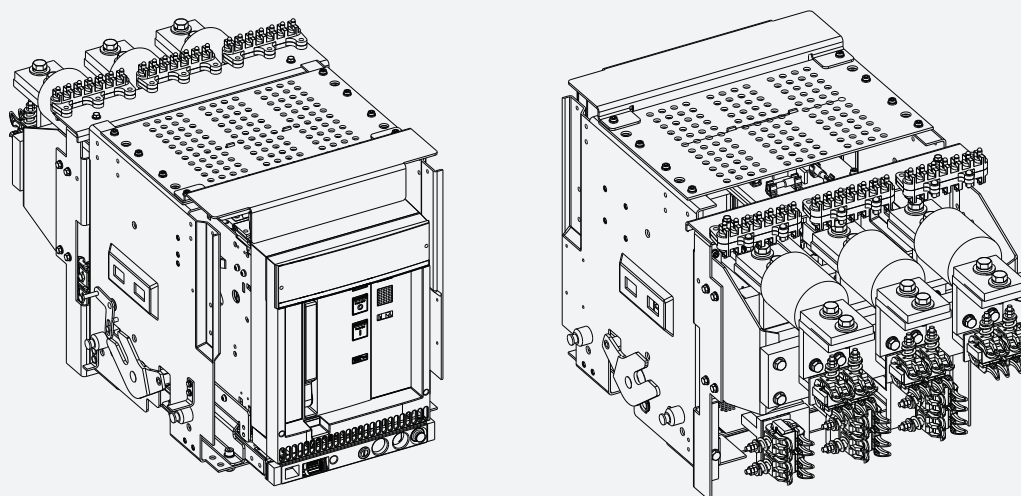
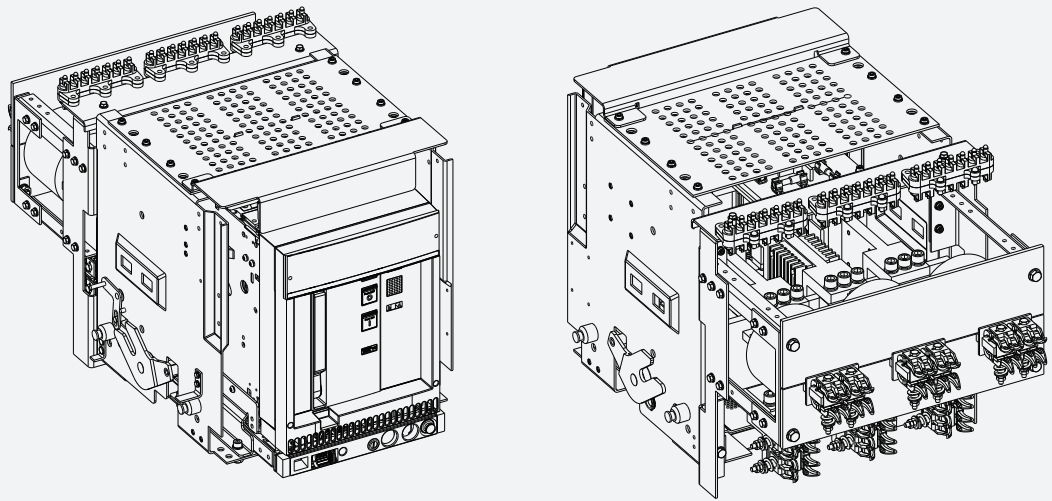


Figure 107

AKD8 AKRU-50 WITH 2500A FUSES Vertical orientation





ABB

Electrification Smart Power

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United States (US)

You can find the address of your local
sales organisation on the ABB home page.



<http://new.abb.com/low-voltage/service/service-breakers-switches>

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