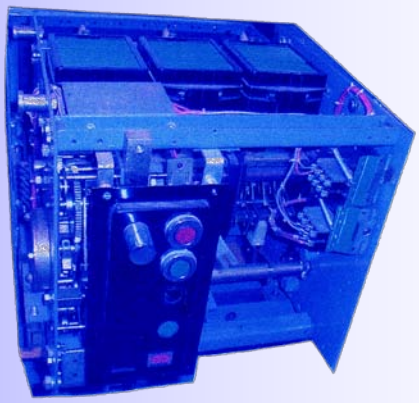
RETROFITTING AND RE-INSTALLATION OF AIR CIRCUIT BREAKERS

KENTAN



Low Voltage Switchboard Equipment

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Use of Air Circuit Breakers

Air Circuit Breakers are installed in switchboards and used as main switches, circuit feeders, bus-tie switches etc. in current ratings from around 630 to 6300 amps.

They are designed to withstand the thermal and electro-dynamic stresses imposed on them when an electrical fault or short circuit occurs on the outgoing side. The amount of fault current available depends upon the size of the supply transformer/s, less the impedance of the conductors. Typical fault currents are in the order of 25-80kA for up to 1 and sometimes 3 seconds duration.

The ACBs are also normally equipped with current sensing devices that can be set to operate alarms, trip the ACB (to pre-determined values in conjunction with other switching/control devices in the electrical installation) and provide data.

In the majority of cases, the ACB’s are designed to be withdrawn from their sub-chassis. This provides for ‘test’ and ‘isolation’ positions as well as removal from the switchboard. This also gives positive isolation as well as rapid replacement for maintenance.

Alternative ACB’s are ‘fixed’. There is no provision for removal from the operating position of the breaker without disconnection from the switchboard

The Problems With Aging Air Circuit Breakers

Many of the ACBs in service are no longer manufactured. Where the original manufacturer still exists, the circuit breaker may have been superseded over time by newer models that are more compact, have faster over-current response times and more accurate control facilities.

Depending on the age and the place of manufacture, parts and servicing may not be available. When parts can be purchased, the price is at a premium. Servicing (when possible) is also expensive and mostly requires the ACB to be worked on at the service company's factory. This does not take into account the down-time of the plant if there is no replacement ACB of a similar type.

Although ACBs are generally reliable devices, they are subject to deterioration over time as is all mechanical/electrical equipment. This also applies to the electronic over-current protection system.

A failure of an ACB is likely to have more effect on a plant, building or process than any other single electrical device.

Repairs and servicing to an old ACB may merely postpone further problems and expenses.

Reasons for Failure/Factors Leading to Failure

- The ACB does not open or close
- It is considered to be unsafe to operate locally
- The ACB is overheating
- Tripping mechanisms are faulty or unreliable
- Electrical contacts or operating mechanical parts are worn
- Aux contacts are unreliable
- Insulation ratings are not up to standard
- Wear and tear on main contacts

Consequences of Failure

Failure of the main switch or circuit feeder is likely to affect a significant portion of the plant or process.

- Cost of loss of production
- Personnel safety issues
- Insurance claims or damages
- Loss of data or communication

The Solution

KENTAN ENGINEERING provides a reliable solution at the preventative stage or after a problem has occurred through its proved and convenient replacement methods.

Retrofitting or Replacement

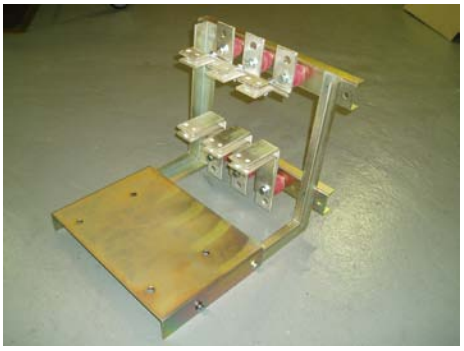
KENTAN ENGINEERING only manufactures retrofitting kits for new withdrawable ACB's into old withdrawable ACB's. The new ACB is not altered or modified in any way. The complete new ACB is installed inside the existing sub-chassis. This is only possible due to the fact that new ACB's are smaller than older breakers. When the new ACB's cannot fit inside the original ACB (sub-chassis) the breaker has to be replaced. There are two ways in which this may be carried out.

- The remaking of connections etc. to suit the new ACB.
- An 'installation kit' which duplicates the connection and fixing points of the original ACB.

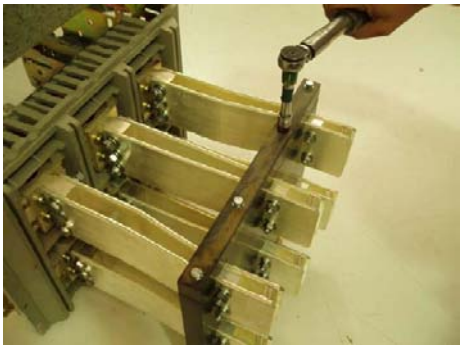
Retrofit Kits

New w/drawable ACB installed into UNELEC C9 3150A ACB

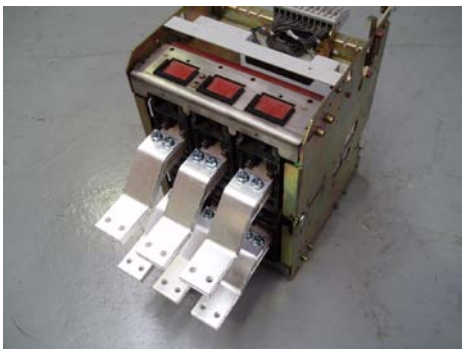
Installation Kits



Adaptor for new ACB to replace HUNDTWEBER LH 1250A ACB



New ACB fitted with extension bars prior to installing into EMAIL DS416 1600A ACB



New ACB fitted with bars to match the termination positions of the existing TERASAKI AT 1600A ACB

Retrofitting Method

Each combination of original and replacement ACB utilizes a specifically designed kit. This comprises a base plate that fixes to the original sub-chassis and provides a platform for the new ACB sub-chassis. A set of extension bars connect between the termination bars on the new sub-chassis to the existing connection stabs on the existing sub-chassis. These bars have the plug-in contacts built into them when the fingers are part of the original ACB. (Very few ACB's have the fingers on the sub-chassis.) No parts of the original ACB (including isolating contact clusters) are re-used.

Extension bar supports and shrouds are provided where needed. All hardware is provided. Each kit comes with a complete, step by step illustrated installation manual.

Advantages of Retrofitting.

- The method of installation of the retrofit has already been proved.
- The likelihood of an un-anticipated problem occurring are minimised.
- The costs and shut-down time can be more closely determined prior to the work being done.
- There is no need for a shut-down for measurements prior to the conversion.
- Work is carried out only from the front of the switchboard.
- The conversion (in most cases) can be done without having to de-energize the switchboard.

Alterations to busbar work (which may affect the fault rating/clearances of the busbar system) are not needed.

Tests

Short-circuit tests have been done at 50 and 65kA for 1 second, proving the extension bars and contact band. Temperature rise tests have been conducted on the contact band, showing that the temperature rise at the connection point is minimal.

Installation

This can be carried out by a qualified electrician.

Installation Method

This is generally reserved for use where the new breaker cannot fit inside the old sub-chassis, or the existing ACB is fixed type, and therefore a retrofit kit is not possible. This particularly applies where the original breaker is relatively new, and where it is being replaced by the current model of the same brand.

This is a set of connection bars and fixing plates provided to adapt the new ACB to match the connection and mounting points of the existing ACB.
The new ACB is mounted on rails or a tray for fixings for both the new and old ACB. The connection bars are in 2 parts so that they are fixed to both faces of the terminal for maximum contact area. These bars are made from copper sheet or bar of appropriate thickness and are silver plated. All hardware is provided in the kit. Instructions are included.

Advantages of an Installation Kit

These are similar to those for a retrofit kit except that shut-down time is longer, rear access may be required and the switchboard must be de-energised.

However, it still removes the risks associated with having to prepare, or make up parts on site for a complete re-connection.

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