

SIEMENS

**Saving Your
Company \$6 Million
Isn't The Only Reason
To Choose Retrofit...**



But It's A Good Place To Start.

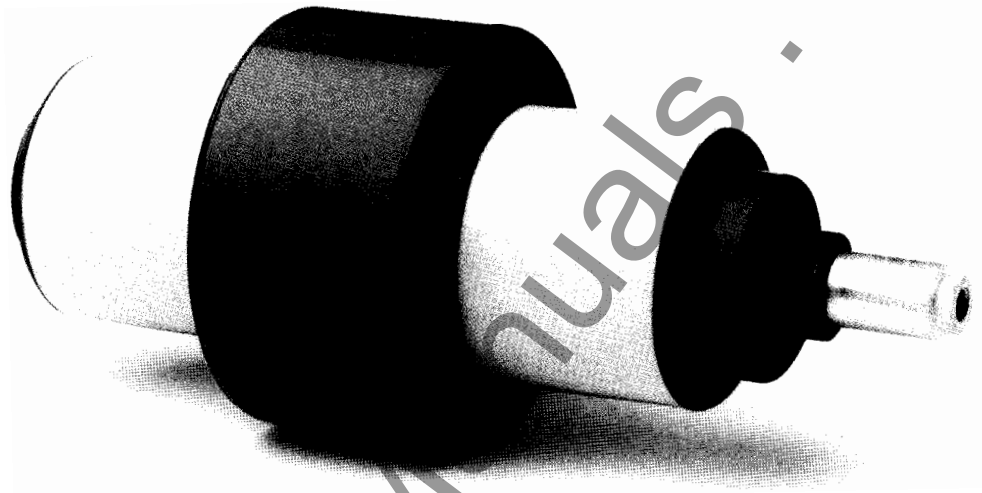
Downtime. Lost time. No matter the cause, downtime means wasted resources - cash down the drain. Thousands of dollars per hour... lost... never to be seen again.

Downtime for any reason is bad. But when downtime occurs because of undependable breakers, nuisance trips, unavailable parts, or routine maintenance that has become tedious and labor intensive - all causes that can be eliminated - unplanned downtime is unforgivable.

Eliminate Malfunction Downtime

Now you can eliminate preventable nuisance outages with reliable, state-of-the-art Siemens retrofit solutions. Just like these companies did:

- A nuclear power plant had low voltage power circuit breakers that failed to operate reliably. The breaker manufacturer's proposal would require a complete plant shutdown and NRC inspections with costs exceeding \$6,000,000. Siemens provided a retrofit/upgrade solution that avoided a shutdown and the NRC red tape.
- To replace motor control equipment at a petrochem research facility would require 16 days of bus outage with downtime costs in excess of \$750,000. Siemens provided a retrofit/upgrade solution that eliminated the bus outage and accomplished the upgrade with limited, scheduled circuit outages lasting less than three days.



- An IOU's 60+ year old oil breakers required complete rebuild after each fault operation. Estimated cost: \$655/operation. Siemens provided a retrofit/upgrade solution using modern vacuum interrupters. Maintenance hassles disappeared and the circa 1930's switchgear now supports contemporary substation automation technologies.

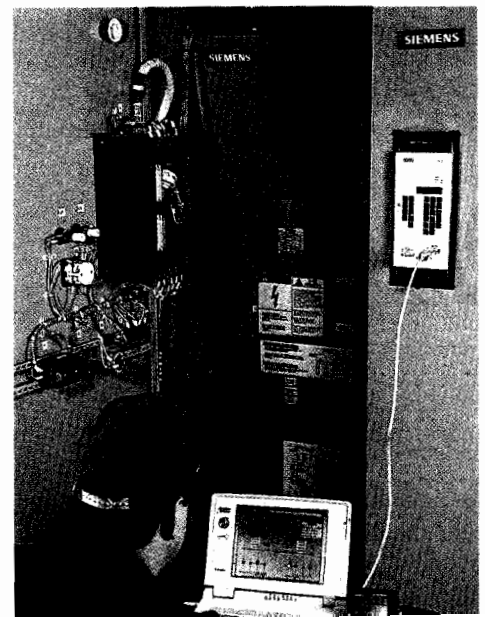
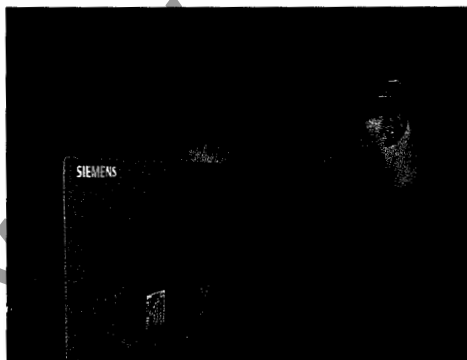
A Solution for Your Specific Needs

A Siemens retrofit solution is unique for your specific needs. Your solution may use today's designs and components in newly manufactured direct replacement units, or may upgrade the primary current path and operator (plus necessary relaying and control) on your existing trucks or carriages.

Retrofit/upgrade designs are available for hundreds of manufacturer/frame/current rating combinations including units manufactured by ABB, Westinghouse, Federal Pacific, GE, ITE, Allis Chalmers, Siemens-Allis and others. Every Siemens retrofit

breaker or controller is as good as, or better than, new. Each unit is better than the original equipment and as good as today's new products.

Your Siemens retrofit solution may require reverse engineering of your specific breaker or rating. And that's not a problem for our modern CAD/CAM design and manufacturing group. Many of the available retrofit designs were originally created to meet the needs of a single customer. We'll be glad to do the same for you.



Maximize uptime.

The process demands it.
Employees demand it.

Coordination had failed.
A simple feeder fault was
taking out the main. Breakers
were difficult to maintain
and good quality parts were
hard to find.

The Westinghouse and
Allis-Chalmers switchgear
had performed well beyond
its 30 year design life, espe-
cially when you consider
the corrosive magnesium
chloride operating environ-
ment. When the 5kV and
15kV power circuit breakers
became unreliable, MagCorp
employees started looking
for a high-value, cost-effec-
tive remedy. They evaluated
new gear, but they chose
a Siemens retrofit solution.

"Siemens showed us how
their retrofit breakers would
be just as good as new gear,"
said Peter Ngai, senior pro-
ject engineer for the world's
largest supplier of magne-
sium. "Going retrofit helped
us keep the process up
because breakers could be
installed during circuit [not
bus] outages. It was a no
brainer for us."

For MagCorp, retrofit saved
time and money. And for
employees fond of a profit
sharing program focused
on low operating costs,
retrofitting made good busi-
ness sense.



Proven Performance. Reliable Protection.

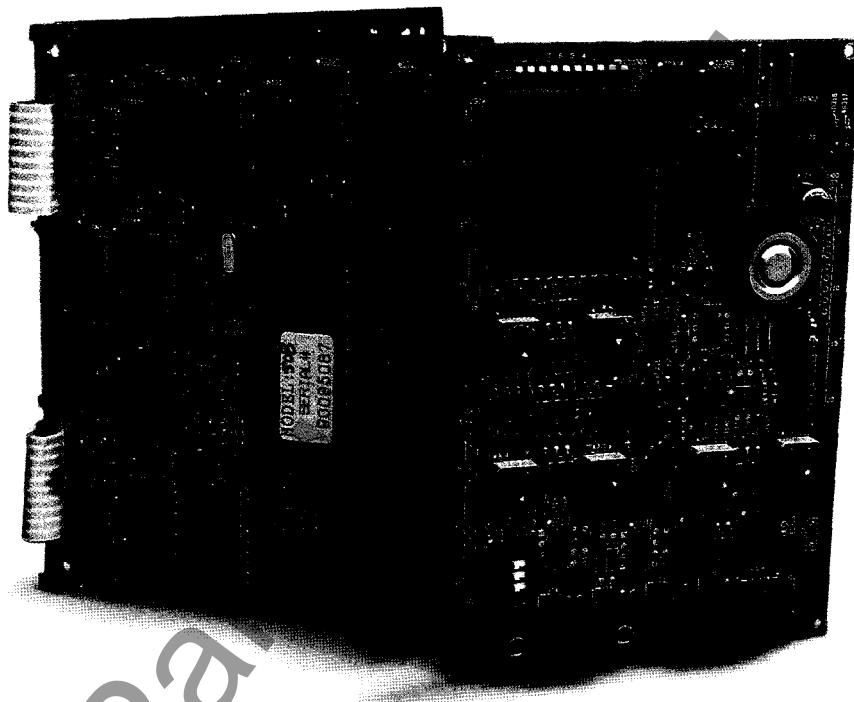
When you choose a Siemens retrofit solution, you get proven performance and reliable protection. Each retrofit breaker design uses primary components from Siemens current product designs. These components are proven each day in thousands of installations worldwide and are backed by Siemens new equipment warranty. And parts availability from inventory is guaranteed for a minimum 10 years.

Retrofit Really Means Upgrade

Every Siemens retrofit solution upgrades protection to today's standards. Siemens upgrades MV air magnetic breakers to contemporary vacuum technology for longer life and improved safety. LV retrofit breakers include contemporary trip units that improve coordination and reliability. Motor control upgrades include state of the art components and control technology. Of course, every design meets ANSI standards and is thoroughly tested for electrical and mechanical performance as well as for proper fit in the existing structure.

In every Siemens retrofit solution, you get reliable, contemporary performance. That means that you can upgrade protection and upgrade reliability within your existing structure easily and cost effectively.

Plus, you can choose to add modern power monitoring and control capability to your old gear as part of your Siemens retrofit solution.



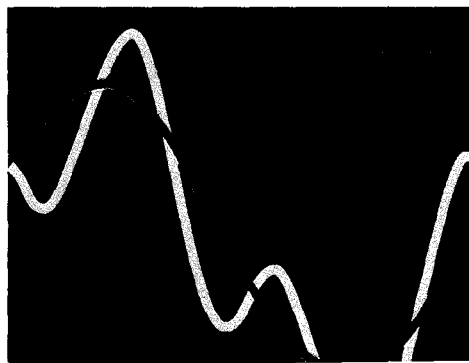
Retrofit/Upgrade Vs. New

The choice is yours. And the facts speak for themselves. If you can afford the physical space a new lineup would require... if you can afford the extended downtime to re-commission your power system... if you can wait six to nine months to fix the problem, then new equipment might be the way to go.

But if you're tired of downtime and want to fix it now, choose a Siemens retrofit solution. If you're tight on space, choose a Siemens retrofit solution. If you want delivery in a reasonable amount of time, choose a Siemens retrofit solution.

Take the First Step Today

Let's start the process. Siemens has the people, experience and financing options to help you plan and implement the best solution for your facility. Call your local Siemens sales engineer, your distributor or the Siemens After Market Switchgear group today.



Medium Voltage Vacuum Circuit Breakers For Retrofit Applications

Application

Replace your worn out medium voltage power circuit breakers with a Siemens retrofit/upgrade solution. You'll get all the advantages of today's modern circuit breaker design in a package that fits the existing cubicles of your switchgear.

Whether your equipment was originally manufactured by Westinghouse, GE, Federal Pacific, ITE, Allis Chalmers, or another manufacturer, call Siemens. We'll help you evaluate the Siemens retrofit/upgrade option and equip you with the tools you need to make the best decision for your company.

With every Siemens retrofit/upgrade solution, you get state-of-the-art protection and quality manufacturing. Each retrofit/upgrade design uses a proven operator module and vacuum interrupter technology.

Each retrofit/upgrade breaker is tested to meet rigorous standards and comes with Siemens full new equipment warranty. Plus, installing Siemens retrofit/upgrade breakers guarantees good availability of first-quality renewal parts for years to come.

Eliminate excessive maintenance and uncertainty about your old breakers' reliability. Choose Siemens retrofit/upgrade power circuit breakers for your facility.

Benefits

Retrofit Saves Time And Money — Your retrofit installation can be implemented in a fraction of the time required to order and install a new lineup. With a Siemens retrofit/upgrade solution, you'll get your protection problems solved quicker, with less cost, less direct labor, and less downtime.

Retrofit Is Custom Designed To Meet Your Needs — The Siemens team works with you onsite to develop the right solution to meet your timetable and technical specifications.

Retrofit Upgrades Your Protection — Every Siemens retrofit/upgrade solution brings protection up to date. But you can also upgrade relaying and metering to enable modern power monitoring and control with the ACCESS system from Siemens. Not only will your protection be state-of-the-art, so will your power information system.

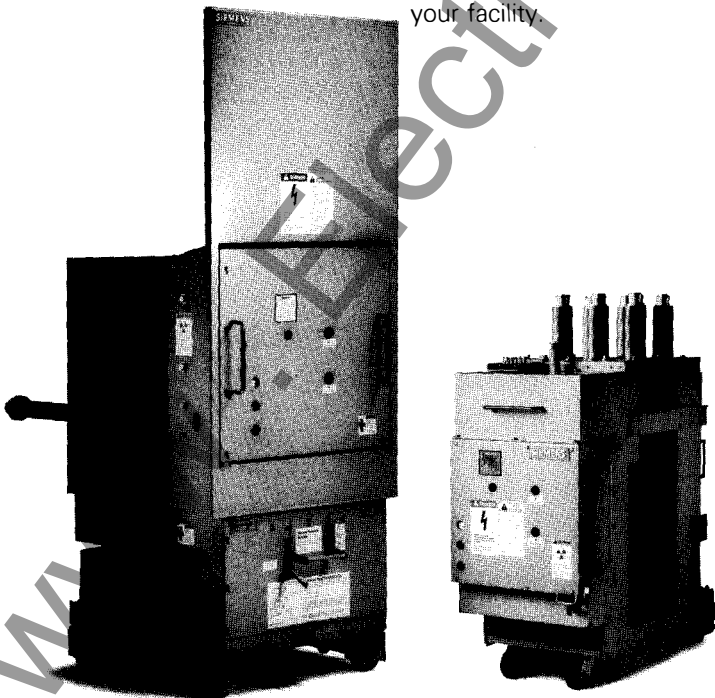
Retrofit Means True Interchangeability — When you choose a Siemens retrofit/upgrade, you maintain interchangeability with other similarly rated breakers in your facility, and, in most cases, avoid making cubicle or bus modifications.

Retrofit Maximizes Uptime During Upgrade — Installing a Siemens retrofit/upgrade breaker allows you to plan individual circuit outages instead of a system or bus outage. You only lose one circuit at a time, when you plan to, rather than taking out an entire substation to install a new lineup.

Your Retrofit Equipment Comes With A Warranty — As with all Siemens quality products, your retrofit upgrade is backed by our responsive and professional customer service – plus a full one-year warranty.

Features

- Ratings from 250MVA to 1500MVA
- Voltages from 5kV to 38kV
- Continuous currents from 1200A to 3000A
- Fully ANSI tested and rated
- Tested as part of cubicle as well as stand alone
- Power circuit breaker modules (including interrupters and operator mechanism) engineered for long service and maintenance-free operation
- Vacuum interrupters rated from 10,000 to 30,000 mechanical operations and 100 full fault current operations



Currently Available Models and Ratings

The following Manufacturer/Model/Rating power circuit breakers are available as pre-engineered designs. Other manufacturers, models and ratings can be reverse engineered by Siemens. Call and ask for details about your specific needs.

Manufacturer	Model	kV	Ratings	
			MVA	A
Allis Chalmers	MA	5	250	1200
			250	2000
			350	1200
			350	2000
			350	3000
Allis Chalmers	AM	5	250	1200
			250	2000
Allis Chalmers	FC/FCV	7.2	500	1200
			500	2000
Allis Chalmers	FC/FCV	15	500	1200
			500	2000
			750	1200
			750	2000
			1000	1200
			1000	2000
			1000	3000
Allis Chalmers	MC	15	500	1200
			500	2000
Allis Chalmers	I-C	38	1500	1200
Federal Pacific	DST	15	500	1200
Federal Pacific	MOP	27	1000	1200
General Electric	Magneblast	5	250	1200
			250	2000
			350	1200
			350	2000
			350	3000
General Electric	Magneblast	7.2	500	1200
			500	2000
General Electric	Magneblast	15	500	1200
			500	2000
			750	1200
			750	2000
			1000	1200
			1000	2000
			1000	3000
General Electric	SD	15	1500	1200
			1500	3000
ITE	HV	5	250	1200
ITE	HK	15	1000	1200
			1000	2000
Westinghouse	DH	5	250	1200
Westinghouse	DHP	5	250	1200
Westinghouse	DHEP	5	250	2000
Westinghouse	DH	15	500	1200
			1000	3000
			1000	3000
Westinghouse	DHP	15	500	1200
			500	2000
			750	1200
			1000	1200
			1000	2000
Westinghouse	DE ION	15	1500	1200
			1500	3000
Westinghouse	CA	38	1500	2500

Siemens Energy & Automation

Technology that serves the customer

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Application News

A Siemens Energy & Automation, Inc. Technical Newsletter

Retrofit Breakers Resolve Trip Failures at CP&L's Shearon Harris Nuclear Plant

George L. Hanna, Wyle Laboratories

Just seven years into the estimated 40-year life of its Shearon Harris nuclear power plant, Carolina Power & Light began retrofitting many of the plant's original 480-volt switchgear circuit breakers. The original breakers were Asea Brown Boveri (ABB) LK breakers. In total, the retrofit program for the plant included 28 breakers. 19 of them were for the Train A *safety-related* installations and the other 9 were for the Train B *non-safety related* switchgear lineups.

CP&L had been experiencing some "failure to open on demand" problems with the ABB units. Fortunately, these problems were discovered during routine maintenance, and not emergency shutdown conditions. After attempting to solve the problem by having ABB make some modifications to the breakers, the problem still persisted. The alternatives were to either replace the switchgear lineups entirely or to retrofit the switchgear housing with newer, more reliable breakers.

In September of 1992, CP&L called a number of major sup-



Carolina Power & Light's Shearon Harris Nuclear Plant, located in New Hill, North Carolina, replaced a large number of its older, failing breakers through a team approach retrofit program with Wyle Laboratories and Siemens Energy & Automation, Inc.

pliers that included Wyle Laboratories, Westinghouse, Square D, GE and ABB. Each vendor was asked to recommend a solution. In evaluating the economics and plant down-time to install the modification, it became obvious that the most expedient and cost-effective solution was to replace the individual breakers. The Siemens RLN breaker was the only one offered which fit into the existing LK breaker enclosure. Wyle recommended the Siemens breaker. Along with a quality assurance program, they proposed the accepted retrofit package.

As part of their risk assessment process, CP&L also conducted an exhaustive review of the Siemens RL breaker's reliability and performance in non-nuclear installations. CP&L then decided to retain the Wyle/Siemens team to retrofit the largest of CP&L's nuclear plants (including the Shearon Harris facility) with the more reliable Siemens RLN breakers. With delivery of 68 custom designed breakers required in less than 8 months, CP&L established a bonus/penalty contract with Wyle/Siemens for early/late delivery.



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POWER ENGINEERING®

Siemens' retrofit breakers resolve trip failures

By George L. Hanna, Wyle Laboratories



Power plants can use advance planning and retrofit equipment to upgrade existing systems while avoiding unnecessary downtime

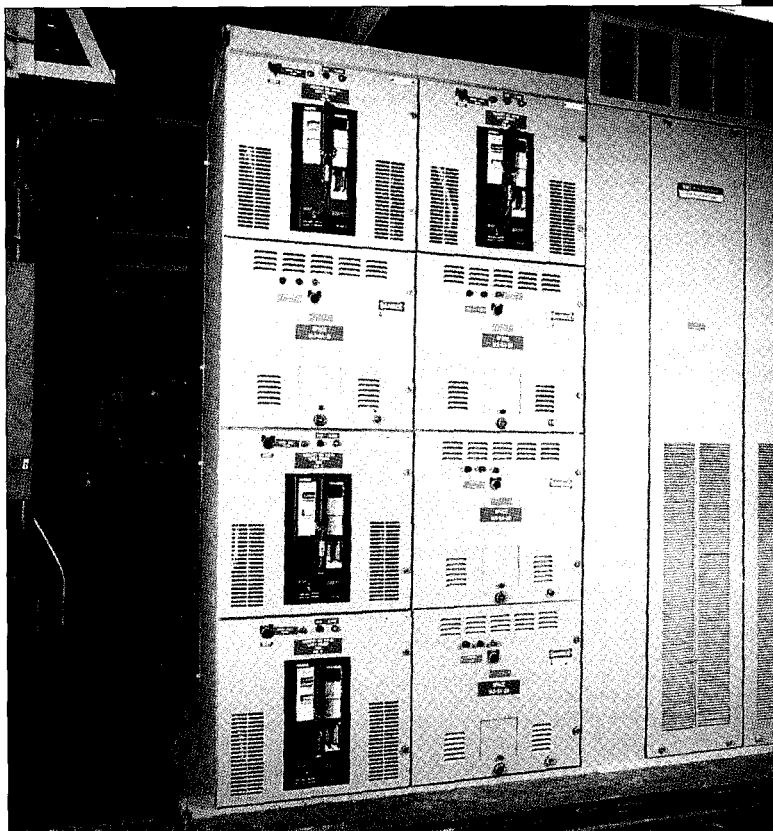


Figure 2. Retrofitted RLN breakers (above) at CP&L power plant

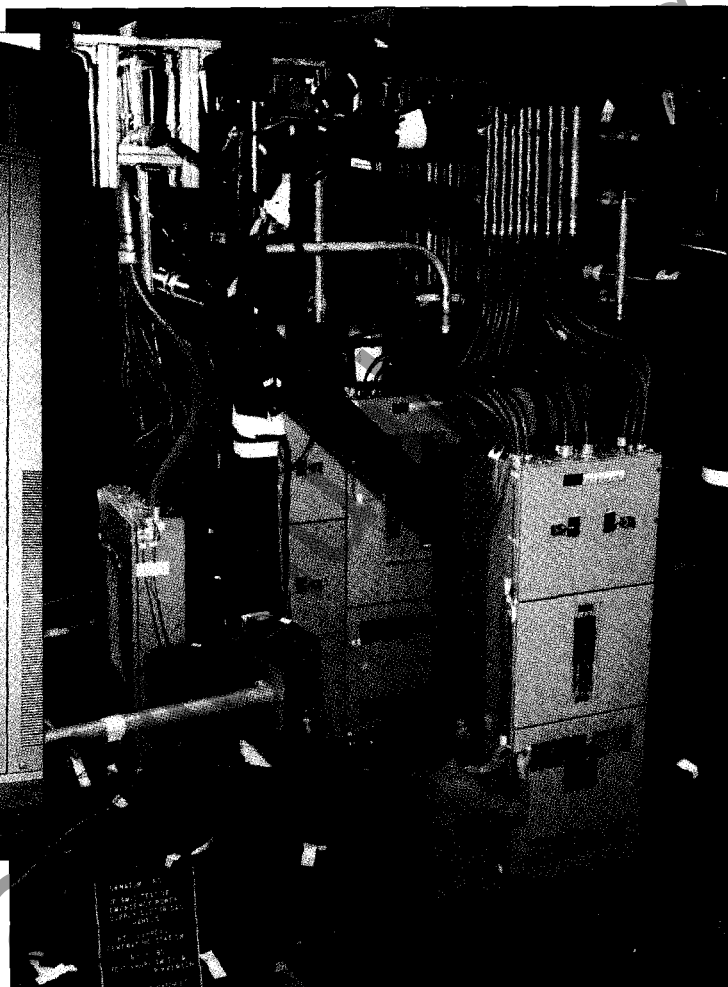


Figure 3. Seismic qualification test of breaker (right) underway on a large biaxial machine

amp breaker and cradle had to be reduced to fit the existing cells. Some means also was needed to ensure that breaker stabs would connect with the existing vertical feeder bus.

In addition, the installation plan called for 28 retrofit breakers to be installed within the 250 hours during the outage when the breakers' buses would be de-energized. To minimize any surprises during installation, the retrofit team proposed taking one of the plant's 480-V buses off-line to permit detailed measurements and trial installations.

The plant operations staff agreed to take a bus out of service before the planned plant outage to allow one breaker to be installed on a trial basis. This was so successful in providing additional information about the retrofit project that two more short bus outages were approved prior to the refueling outage. Installation procedures were refined and a slight bus rework reduced the torque required to rack the breakers into position.

Under NRC rules, the plant may operate with one bus down under a limited condition of operation (LCO) for only 72 hours and nuclear plant operations personnel generally avoid LCOs under any

circumstances. In this case, retrofit breaker designs were checked out during short bus outages prior to taking the plant down for refueling. These dry runs were a key element in achieving a trouble-free installation while protecting the schedule.

Meanwhile, engineers and technicians were qualifying the retrofit designs to applicable nuclear standards. Initial seismic testing revealed that the commercial grade breaker could change state and come out of its cradle during an earthquake. Engineers then developed a cleating system that keeps the system operational and together under extreme seismic conditions.

Supplier training of the CP&L maintenance staff started four months prior to delivery. Siemens supplied CP&L maintenance with a standard RL breaker immediately after the contract award and prior to final design, and CP&L procured three sections of used LK switchgear to be equipped with breakers for use in maintenance training. That allowed formal training for CP&L personnel to begin well in advance of the scheduled installation.

In addition to time savings achieved by quickly completing the retrofit design, this approach kept engineering costs to a

minimum and ensured thorough, complete training before the installation process began.

Advance work pays off

The plan was to work out all kinks before installing the first 28 breakers within the two short windows in March 1994. The plan worked. The early program team meetings, training and trial installations paid off. CP&L maintenance performed the installations without assistance.

The Phase-I breaker replacement project will be followed by retrofits for the Train B safety-related breakers and 22 non-safety breakers during a scheduled refueling outage in the fall of 1995. **END**

AUTHOR

George L. Hanna is the manager of application engineering for electrical equipment retrofits at Wyle Laboratories, Huntsville, Ala. He holds both M.S. and B.S. engineering degrees from Case Institute of Technology, and has more than 30 years of engineering and testing facility management experience.

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Application News

A Siemens Energy & Automation, Inc. Technical Newsletter

An Ongoing Modification Program is Retrofitting Minimum Oil Switchgear with Siemens Vacuum Technology

Jersey Central Power & Light is replacing "minimum-oil" type circuit breakers in 36 lineups of enclosed, truck-mounted 34.5 KV switchgear with new vacuum breakers as part of a five year effort to eliminate costly outages caused by the mechanical failure of drive mechanisms in the obsolete units.

The retrofit program, set for completion in early 1995, is expected to reduce operating and maintenance expense at more than a dozen substations by at least \$70,000 annually.

If the switchgear lineups had to be replaced, Jersey Central's capital requirements would have exceeded \$3.7 million. Instead, two models of Allis-Chalmers 1200A "minimum-oil" type draw-out circuit breakers — IC1000 and IC1500 — are being retrofitted with smaller, more compact 34.5 KV vacuum breakers with 1200A ampacity by the Electrical Apparatus Division of Siemens Energy & Automation, Inc., at its Raleigh, N.C. factory.

Out with the old

Breakers to be retrofitted are removed from service two or three at a time and replaced with spares. JCP&L workers then remove the breaker components and strip the springs, motors and gears from the trucks. Only the trucks and the bayonet-type connectors are shipped to Siemens for reuse. A new Siemens type 3AF circuit breaker operating mechanism measuring about 3x3x2 feet, and weighing about 400 pounds, is installed on the original truck. The breakers are, of course, manufactured at the Raleigh manufacturing facility.



Technician inspects a 1,200 A minimum oil breaker unit being readied for retrofit. The original trucks of the units are stripped of springs, motors and gears, leaving only the bayonette-type connectors.

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When the remanufactured units are returned from Raleigh, Siemens reinstalls them, bolting on protective face plates and shortening the aluminum shutter that formerly covered the front of the switchgear so that it rests on top of the reconfigured truck. With a new operating mechanism and vacuum interrupter installed, the customer is, in effect, receiving a new, warranted breaker. The reactivating process takes six to eight hours.

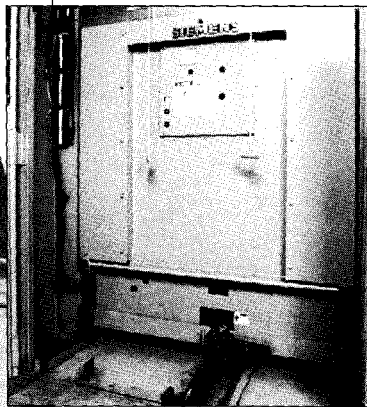
Following an engineering evaluation of a spare by Siemens to confirm that new breakers could be mounted on the old trucks, Siemens retrofitted the first two breakers in October, 1990. As of the end of 1992, a total of 17 breakers had been upgraded. All medium voltage retrofits conform to the ANSI C37.59 standard. Another six to nine retrofits are expected to be completed in 1993, and program completion is scheduled for 1994 or early 1995.



"Retrofitting has allowed JCP&L to defer large capital expenditures. New switchgear would have cost twice that of retrofitting, plus installation", said William Wanner, JCP&L Coordinator, Substation Equipment Operations. The main problem Jersey Central was having with the original 34.5 KV breakers was cold weather hang up, or "trip freeze," of the drive mechanism. "We were experiencing a lot of outages, which often required field service specialists to enter the substation in the middle of winter to manually reset the circuit breakers," said Wanner. "Ninety-nine percent of the problems were mechanical, primarily jams or broken linkages."

Because the equipment was obsolete and parts were no longer available, JCP&L had been replacing parts made by a machine shop to keep it operating. The cost, however, proved excessive. Searching for a cost-effective solution, they contacted Siemens Energy & Automation.

About 70% of Siemens retrofits involve draw-out switchgear. This work is done at the Siemens facility in Raleigh. The JCP&L job was very typical in this respect. All other switchgear is retrofitted in the field, with some custom mounting assembly being designed and built in Raleigh only as required.



The larger photo shown to the left is the new breaker after it has been retrofitted to vacuum technology. The inset shows how the modified breaker fits into the original enclosure. Because retrofitting often makes use of the existing truck and cells, there is little change in outward appearance.

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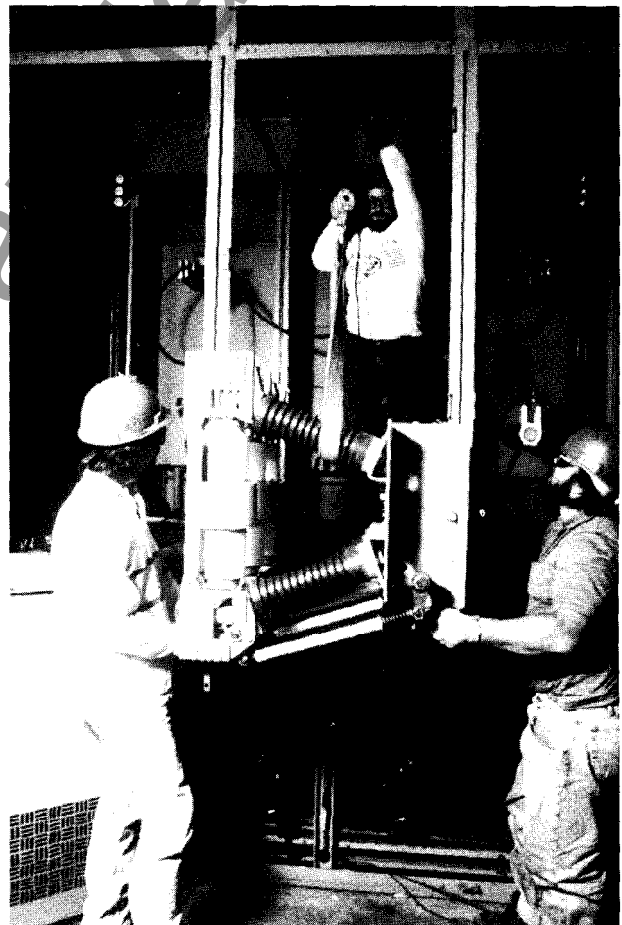
Application News

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Potomac Electric Rejuvenates Outage-Prone 34.5 KV Switchgear

Not every breaker retrofit job is alike. Some are a little more challenging than others. The recent retrofit job at the Bethesda Substation No. 6 of PEPCO is such an example. The old Westinghouse air blast breakers being replaced were thirty years old. Many retrofit jobs are a simple matter of removing the old circuit breakers from their enclosure and replacing the entire circuit breaker in the existing truck. This one presented a little greater challenge. The Raleigh facility had to design a new mounting assembly. It wasn't simply a matter of rolling out the old truck and making the modifications. There was nothing to roll out. Back when these old breakers were installed, breaker maintenance and replacement convenience were not at the top of the list of customer benefits. There were no built-in trucks with wheels. The mounting brackets were of the non-removal type, and a hoist was necessary should the need arrive to replace one of the Westinghouse breakers. And when you consider that one of these Westinghouse three-phase breaker units weighs over 1600 pounds, this was no easy task.

Weight and size are two good reasons for converting these old air blast dinosaurs over to Siemens vacuum technology. A Siemens replacement unit measures only 3x3x2 feet and weighs approximately 400 pounds--about one-fourth the weight of the units it replaced. But the real reason for replacement, of course, is the speed and ability of the vacuum breakers to clear faults. Even **new** air blast units would be no match for the better vacuum technology. Besides, the arc shutes had deteriorated to the point that a band-aid approach had become impractical. Westinghouse parts availability, cost for individual parts replacement, and reliability of the old technology were issues being evaluated. In the final analysis, either total replacement with new switchgear or retrofitting with upgraded vacuum breakers were the only viable alternatives available to PEPCO. From a cost standpoint and downtime considerations, retrofitting became the best solution.



Technicians hoist a new vacuum breaker into a switchgear enclosure during the retrofit procedure. The 400-pound unit is a quarter of the weight of the units being replaced at PEPCO substation.

SIEMENS

Taking a closer look

The Bethesda substation has two lineups of 34.5 KV switchgear. Before the retrofitting, they housed 18 Westinghouse air blast breakers and their associated disconnect equipment. Potomac Electric Power Company asked Siemens to custom design a mounting bracket system that would fit into their existing 9x20 feet switchgear cells, while still using the existing disconnects.

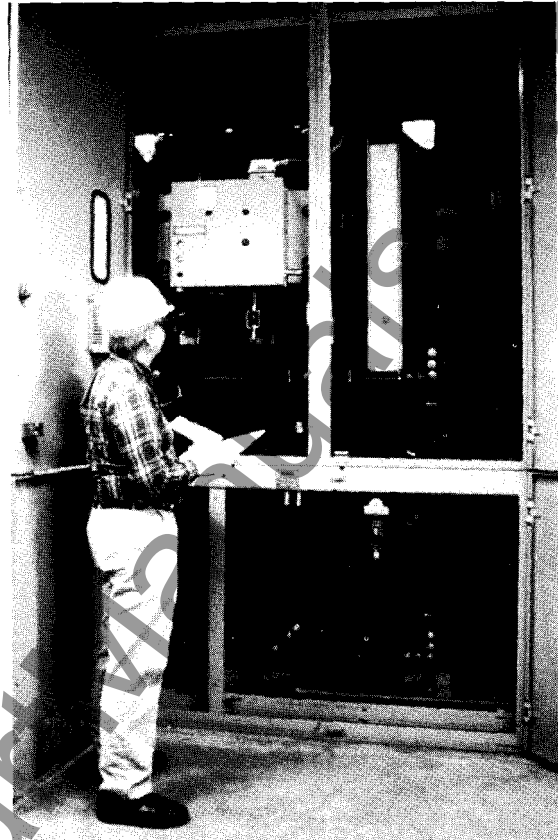
Because the Bethesda substation evolved over a period of time, the original breakers had varied ratings: 1,200A, 2,000A and 3,000A, which necessitated carrying a large inventory of spare parts. By switching over to the Siemens vacuum technology, PEPCO would only need to keep one spare breaker as an emergency backup unit. Getting rid of large parts inventories is a benefit that any customer desires.

This is the first application of Siemens vacuum breakers as replacements for metal-enclosed Westinghouse CA breakers in 34.5 KV switchgear. Siemens also has developed retrofit designs for circuit breakers used in General Electric, Federal Pacific, ITE, Allis-Chalmers and other Westinghouse switchgear.

Another good selling point of the retrofit job is the fact that replacing one of the vacuum units in the future will only take 1 to 2 hours at the most. In the past, PEPCO had spent more than 4 hours for replacement of an air blast breaker.

Not to be overlooked when replacing air blast technology with vacuum, is the fact that a customer may have salvagable equipment that can help to offset some of the cost of the retrofitting. For example, the PEPCO people are selling the air compressors and insulators that were used with the old units.

Downtime is held to a minimum. This job took less than 6 months. The on-site rebuild began in October, 1992, and was completed March of this year. One breaker was retrofitted each week on a planned outage basis. The first breaker took six days to install; but subsequent installations were reduced to only three days as the installation crew gained experience.



A technician does a final inspection on one of the 18 breaker units that have been retrofitted at the PEPCO Bethesda Substation No. 6.

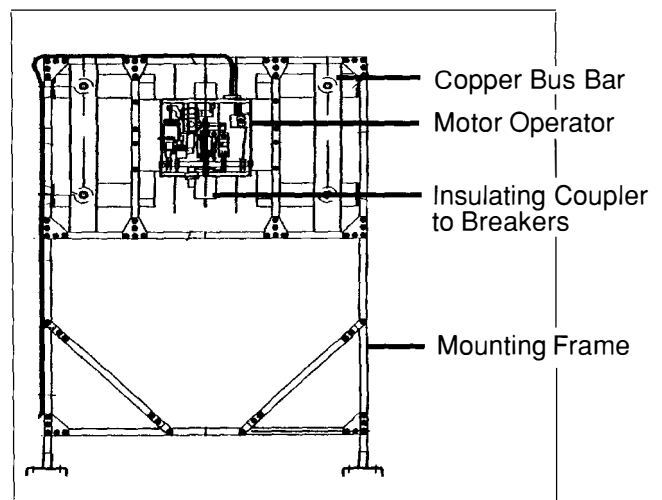


Diagram showing how the breaker and trip mechanism are mounted in the special frame. Compare to picture on the left.

Type LA-C Low Voltage Power Circuit Breaker Ratings at 50/60 Hertz

Voltage Ratings		Frame Size (A)	Breaker Type	Insulation Level Dielectric Withstand (V)	Short Time Rating Symmetrical (kA)	Short Circuit Rating Symmetrical Current		Continuous Current Rating (A)
Rated (V)	Rated Max (V)					With Instantaneous Trip (kA)	Without Instantaneous Trip (kA)	
600	635	800	LA-800C	2200	30	42	30	40-800
		1600	LA-1600C		50	65	50	75-1600
		3200	LA-3200C		65	65	65	600-3200
		4000	LA-4000C		85	85	85	2000-4000
480	508	800	LA-800C	2200	30	42	30	40-800
		1600	LA-1600C		50	65	50	75-1600
		3200	LA-3200C		65	65	65	600-3200
		4000	LA-4000C		85	85	85	2000-4000
240 & 208	254	800	LA-800C	2200	30	42	30	40-800
		1600	LA-1600C		50	65	50	75-1600
		3200	LA-3200C		65	85	65	600-3200
		4000	LA-4000C		85	130	85	2000-4000

Type LAF-C Fused Circuit Breaker Ratings at 50/60 Hertz

Voltage Ratings		Frame Size (A)	Breaker Type	Insulation Level Dielectric Withstand (V)	Short Circuit Symmetrical Amps (kA)	Range of Fuse Ratings (A)	Continuous Current Rating (A)	
Rated Volts	Rated Max (V)							
208 to 600	600	800	LAF-800C	2200	200	250-1600	40-800	
		1600	LAF-1600C		200	800-3000	75-1600	
		3000	LAF-3000C		200	2000-5000	600-3000	
		CLF-3000C Fuse Carriage						
		4000	LAF-4000C		200	4000-6000	2000-4000	
CLF-4000C Fuse Carriage								

Low Voltage Power Circuit Breakers for Retrofit Application

We've got a few reasons why you should upgrade your type ME switchgear with Siemens new type LA-C power circuit breakers:

- Eliminate long waits for new replacement breakers of the type LA design.
- Cut the high cost of new type LA replacement breakers
- Reduce your need to inventory hard to find type LA breaker parts

Plus you can...

- Extend your routine maintenance interval to five years.
- Eliminate nuisance trips caused by harmonics.
- Add contemporary power monitoring and control capabilities with the ACCESS™ system

Upgrading with type LA-C breakers is cost-effective.

Continuous production of type LA breakers stopped in 1982. Today, we produce type LA breakers one at a time and that's expensive for us and for you. So we've designed the type LA-C replacement breaker. It is manufactured on our current production lines using many of the same parts and components as our type RL power circuit breakers. That means you get a breaker of current design (with readily available parts) that fits your existing switchgear without modifications. You'll save on equipment costs up front as well as over the life time of the breaker.

Improved mechanism reduces maintenance.

The proven stored-energy mechanism used in type RL low voltage power circuit breakers now exceeds ANSI and UL

endurance requirements without periodic servicing for adjustment or lubrication. Your type LA-C breakers will be built using this same, durable mechanism. Recommended service interval is five years under normal conditions.

Enhanced Static Trip III™ system offers powerful options.

Every type LA-C power circuit breaker comes with a proven Static Trip III trip unit. The Static Trip III tripping system provides superior protection using RMS sensing - a technology first introduced by Siemens. With Siemens trip units, you get accurate protection, not over-protection or under-protection. Plus Siemens allows you to specify advanced capabilities.

Use your Static Trip III trip unit as an ammeter by adding digital communications and a local Breaker Display Unit. With communications installed, your trip unit can send its data to an ACCESS supervisory computer at a remote location. Specify power metering and your trip unit provides comprehensive real-time and min/max data for 17 power functions. Add extended protective relaying and your Static Trip III trip unit becomes a powerful eight function protective relay.

With Static Trip III trip units, you'll have the sophisticated and proven protection you need... plus you'll have the backbone to the power monitoring and control system you want.

Expanded ratings capabilities available.

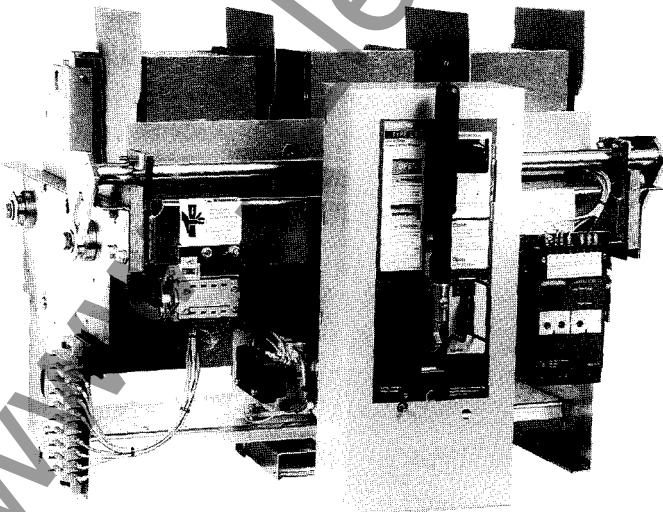
The new type LA-C power circuit breakers can extend the capability of your switchgear installation to handle changing requirements in your facility. Type LA-C power circuit breakers offer higher interrupting ratings. These higher interrupting ratings are matched by increased short time ratings. Now you can use selective coordination of type LA-C low voltage power circuit breakers to minimize costly power outages.

Specify type LA-C power circuit breakers.

Specify type LA-C replacement breakers to rejuvenate, expand and upgrade your type ME switchgear. You'll extend the life of your equipment, improve reliability, and dramatically reduce maintenance costs for years to come. Call the Siemens After Market Switchgear group today.

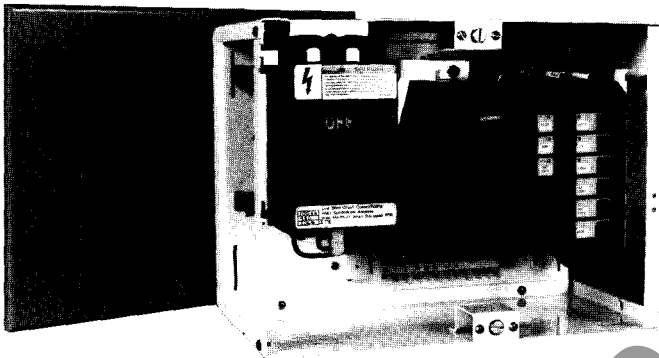
Features

- Complete interchangeability with type LA breakers from 1961 to present
- Short circuit ratings from 30kA to 130kA unfused; 200kA fused
- Continuous current ratings from 75A to 4000A
- Voltages from 208V to 600V
- Fully ANSI tested and rated
- UL listed



SIEMENS

Series 5600 Motor Control Center Retrofit Pans



New motor control pan assemblies for use in type 5600 Motor Control Centers.

Application

Model 5600 Motor Control Centers were manufactured under various company names between 1971 and 1992. These companies were ITE Imperial Corporation (with Rowan Control), Gould, Inc. and Telemecanique. Production of the 5600 MCC ceased in 1992.

The 5600 MCC retrofit pan was designed to fit directly into the 5600 MCC currently in the field. Pans are available up to NEMA size 5 ratings and are constructed with all new materials and components. These are not rebuilt units, and trade-in of existing pans is not necessary. These Siemens retrofit 5600 pans are fully UL Listed.

Features

- All circuit protective devices and control products used in Siemens Series 5600 pans are either UL Listed or UL Recognized. These are the same components used in Siemens modern Model 95 Motor Control Centers which are UL Listed per UL file number E53551.



Siemens Advanced Motor Master System (SAMMS™) unit for the industry's only combined protection, logic and control system.

- Linear disconnect operator that is an integral part of the drawout unit.
- Hot rolled steel construction, with electrostatically applied polyester powder paint. All units painted white for ease of visibility. Doors are painted ANSI 61 light gray.
- Spring reinforced, self-aligning, silver plated disconnect stabs provide 4-point, high pressure contact per phase.
- Circuit breaker feeder units through 400 amps and fused feeder units through 200 amps.
- Starter units available through NEMA size 5 in circuit breaker styles, and through NEMA size 4 in fusible switch styles.
- Siemens Advanced Motor Master System (SAMMS) is available as an option. SAMMS give the user communications, protection and control logic in one electronic unit for state-of-the-art motor control. Electrical system data communications are provided through Siemens ACCESS™ system.

Series 5600 Motor Control Center Retrofit Pans

Catalog Numbering System

5642 C - FVNR - 50 B L

Motor Starter Combination Type	
Code	Type
5642	Circuit Breaker
5641	Fusible

Motor Starter Line-to-Line Voltage	
Catalog Code	Line Voltage
A	208 Volt
B	230 Volt
C	460 Volt
D	575 Volt

Motor Starter Type	
Code	Starter Type
FVNR	Full Voltage Non-Reversing
FVR	Full Voltage NonReversing
2S1WVT	Two Speed One Winding Variable Torque
2S1WCT	Two Speed One Winding Constant Torque
2S2WVT	Two Speed Two Winding Variable Torque
2S2WCT	Two Speed Two Winding Constant Torque

Indicating Lights	
Code	Option
[Blank]	No Lights
L	With Lights

Local Control Options	
Code	Option
A	None
B	Selector Switch
C	Push Button

Starter Type	
Catalog = Horsepower	
1/4	20
1/3	25
1/2	30
3/4	40
1	50
1-1/2	60
2	75
3	100
5	125
7-1/2	150
10	200
15	

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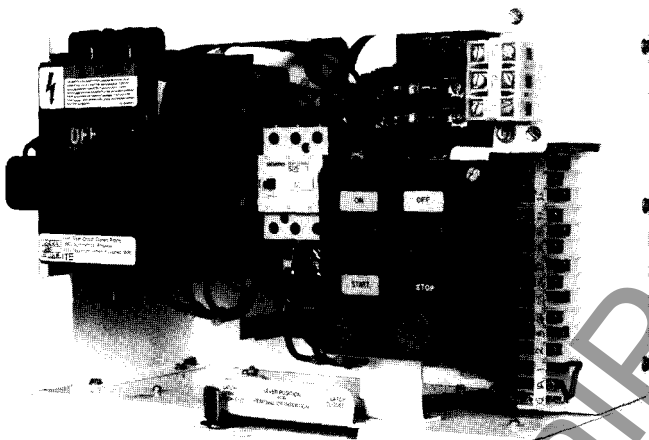
Technology that serves the customer

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SG-5031 20MDG1195 Printed in USA

SIEMENS

Series 9600 Motor Control Center Retrofit Pans



New motor control pan assemblies for use in type 9600 Motor Control Centers.

Application

Siemens Series 9600 MCC retrofit pans were designed to install directly into the 9600 Series of motor control centers produced by ITE Imperial between 1964 and 1972. (Series 5600 motor control centers were manufactured after this date.)

Pans are available up to NEMA 5 ratings and are constructed with all new materials and components. These are not rebuilt units, and trade-in of existing pans is not necessary.

Features

- All circuit protective devices and control products used in Siemens Series 9600 pans are either UL Listed or UL Recognized. These are the same components used in Siemens modern Model 95 Motor Control Centers which are UL Listed per UL file number E53551.
- Linear disconnect operator that is an integral part of the drawout unit.



Siemens Advanced Motor Master System (SAMMS™) unit for the industry's only combined protection, logic and control system.

- Hot rolled steel construction, with electrostatically applied polyester powder paint. All units painted white for ease of visibility. Doors are painted ANSI 61 light gray.
- Spring reinforced, self-aligning, silver plated disconnect stabs provide 4-point, high pressure contact per phase.
- Circuit breaker feeder units through 400 amps and fused feeder units through 200 amps.
- Starter units available through NEMA size 5 in circuit breaker styles, and through NEMA size 4 in fusible switch styles.
- Siemens Advanced Motor Master System (SAMMS) is available as an option. SAMMS give the user communications, protection and control logic in one electronic unit for state-of-the-art motor control. Electrical system data communications are provided through Siemens ACCESS™ system.

Series 9600 Motor Control Center Retrofit Pans

Catalog Numbering System

9642 C - FVNR - 50 B L

Motor Starter Combination Type	
Code	Type
9642	Circuit Breaker
9641	Fusible

Motor Starter Line-to-Line Voltage	
Catalog Code	Line Voltage
A	208 Volt
B	230 Volt
C	460 Volt
D	575 Volt

Motor Starter Type	
Code	Starter Type
FVNR	Full Voltage Non-Reversing
FVR	Full Voltage NonReversing
2S1WVT	Two Speed One Winding Variable Torque
2S1WCT	Two Speed One Winding Constant Torque
2S2WVT	Two Speed Two Winding Variable Torque
2S2WCT	Two Speed Two Winding Constant Torque

Indicating Lights	
Code	Option
[Blank]	No Lights
L	With Lights

Local Control Options	
Code	Option
A	None
B	Selector Switch
C	Push Button

Starter Type	
Catalog = Horsepower	
1/4	20
1/3	25
1/2	30
3/4	40
1	50
1-1/2	60
2	75
3	100
5	125
7-1/2	150
10	200
15	

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RLN-RLK Low Voltage Retrofit Breakers

Type RLK and RLN Low Voltage Power Circuit Breaker Ratings at 50/60 Hertz

Voltage Ratings		Type	Frame Size Amperes	Insulation Level Dielectric Withstand Volts	Short Time Rating Symmetrical Amps	Short Circuit Rating Symmetrical Current		Continuous Current Rating Amperes
Rated Voltage	Rated Max Volts					With Instantaneous Trip	With Instantaneous Trip	
600	635 508 254	RLK-800	800	2200	30,000	30,000	30,000	75-8700
		RLN-1600	1600	2200	50,000	65,000	50,000	75-1600
		RLN-3200	3200	2200	65,000	85,000	65,000	600-3200
		RLN-4000	4000	2200	85,000	100,000	85,000	800-4000
480		RLK-800	800	2200	30,000	30,000	30,000	75-8700
		RLN-1600	1600	2200	50,000	65,000	50,000	75-1600
		RLN-3200	3200	2200	65,000	85,000	65,000	600-3200
		RLN-4000	4000	2200	85,000	100,000	85,000	800-4000
240 & 280		RLK-800	800	2200	30,000	30,000	30,000	75-8700
		RLN-1600	1600	2200	50,000	65,000	50,000	75-1600
		RLN-3200	3200	2200	65,000	85,000	65,000	600-3200
		RLN-4000	4000	2200	85,000	100,000	85,000	800-4000

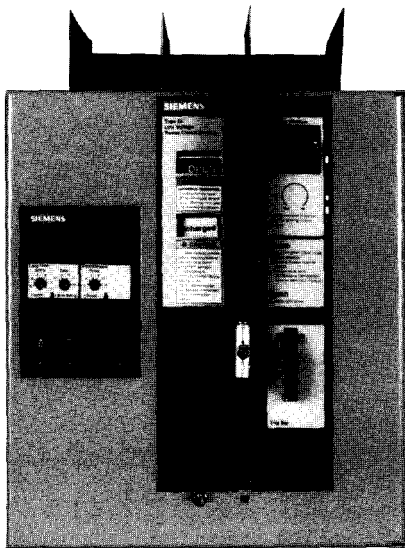
For additional information on the Static Trip III trip units, ask your local Siemens sales person for Tech Sheet No. SG-3191.

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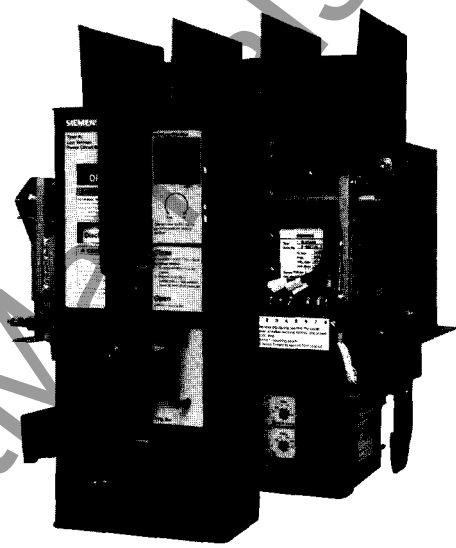
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RLN-RLK Low Voltage Retrofit Breakers



RLK Low Voltage Power Circuit Breaker, available in 800 ampere frame size.



RLN Low Voltage Power Circuit Breaker, available in 1600, 3200 and 4000 ampere frame sizes.

Application

Siemens RLN and RLK low voltage power circuit breakers (LVPCBs) are the ideal replacement for any existing power breaker in this class, regardless of the original manufacturer. These are new circuit breakers, not rebuilt or refurbished, and they are fully ANSI rated. Backed by over 15 years of successful applications, Siemens RLN and RLK circuit breakers will improve the reliability and extend the useful life of your vintage low voltage switchgear.

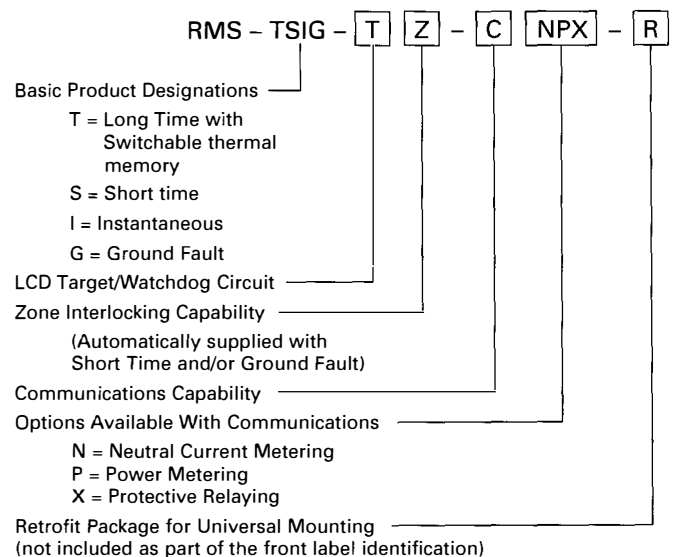
Whether the present switchgear installation is a commercial, industrial, institutional or utility facility, Siemens RLN and RLK breakers and trip units can make your power distribution equipment part of a modern facility management system. The Static Trip III® protection system is fully compatible with the Siemens ACCESS™ electrical distribution data communication system, allowing for complete power monitoring and control.

Features

- Compact physical size, allowing for retrofit into existing cubicles from 600A to 4000A.
- Fully tooling, new production circuit breakers for maximum reliability.
- Equipped with Siemens Static Trip III digital trip systems, with a full range of options including communications, power metering and energy management. (See table for full range of options).

- Full ANSI rated.
- Electrical and mechanical operating mechanisms are available to meet your operating needs.
- Frame sizes from 800 to 4000 amps.
- Fusible models available to meet high interrupting capacity needs.

TableTrip Unit Catalog Numbers



The Right Solution, Just In Time.

How would you like to drain 240 gallons of arc-quenching oil after every fault interruption? Well, for the maintenance personnel at the 82 breaker Buzzard Point distribution station, it became a regular chore. Until they chose a Siemens retrofit solution.

Buzzard Point was built in the 1930's as a generating station. In 1981, it was converted to an important distribution station in the PEPCO system, supplying four substations as well as government and network customers in the Washington, DC, area.

Replacing the facility would require an enormous capital investment and the construction of three new substations: 230kV breaker and a half; 230/13.8kV station; and 230/34.5kV station.

The Siemens retrofit solution brought new life to Buzzard Point and saved PEPCO more than \$12,000,000.

Using current production breaker operators and vacuum interrupters, Siemens reverse engineered new replacement breakers, bus extensions, safety and rating interlocks, cell doors and view ports to fit the concrete cubicles. Each cell was modified and breaker installed in just under three days. It was a team effort between PEPCO, their contractor and Siemens.



Retrofit/Upgrade Vs. New Cost Worksheet and Template

Use this analysis as your starting place to analyze the pros and cons of a Siemens retrofit solution for your business. Then call your Siemens representative for a quotation.

	RETROFIT/UPGRADE	NEW
Equipment/Parts Cost Analysis		
To evaluate the retrofit option, consider equipment costs to be equal	Equivalent	Equivalent
Physical Plant Cost Analysis		
Additional space required for new	_____ sf	
Construction cost/sf	\$ _____ /sf	
Estimated construction costs	\$ _____ 0	\$ _____
Other facility modifications required	\$ _____ 0	\$ _____
Lost value of space required for new	\$ _____ 0	\$ _____
Gained value of space recovered	-\$ _____ 0	-\$ _____
A. TOTAL PHYSICAL PLANT COSTS	\$ _____ 0	\$ _____
Labor/Contractor Cost Analysis		
Installation costs	\$ _____	\$ _____
Removal/disposal of replaced parts	\$ _____	\$ _____
Training maintenance personnel	\$ _____	\$ _____
Annual maintenance labor costs	\$ _____	
% improved use of manpower	x _____ %	
Labor cost savings next year	-\$ _____	-\$ _____
B. TOTAL LABOR/CONTRACTOR COST	\$ _____	\$ _____
Downtime Cost Analysis		
Estimated hourly cost for complete substation outage	\$ _____ /hr	
Estimated length of bus outage including inspections	x _____ hrs	x _____ hrs
Bus outage costs	\$ _____	\$ _____
Estimated hourly cost for individual circuit outage	\$ _____ /hr	
Estimated length of individual circuit outages	x _____ hrs	x _____ hrs
Circuit outage costs	\$ _____	\$ _____
C. TOTAL ESTIMATED DOWNTIME COSTS	\$ _____	\$ _____
TOTAL OF ALL COSTS ABOVE (A + B + C)	\$ _____	\$ _____
Funds Available		
Maintenance budget	\$ _____	\$ _____
Capital budget	\$ _____	\$ _____
Total Funds Available	\$ _____	\$ _____
Approval Cycle In Months	months	months

Suggestion: Before starting to calculate the relative value of the Siemens retrofit/upgrade option, make several photocopies of this form so

**For more information
contact:**

After Market
Switchgear Group
Free: 800-347-6659
Fax: 919-365-2598
Voice: 919-365-2200

If disk is missing
and you would like
a replacement, contact
the After Market
Switchgear Group.

SIEMENS

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