

DS Low Voltage Switchgear



DHP Medium Voltage Switchgear



17 Switchgear

Low Voltage Switchgear

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Assemblies and Power Circuit Breakers



DS Switchgear



DSII Switchgear Assembly



Magnum DS Switchgear

Product Description

Cutler-Hammer® low voltage switchgear assemblies from Eaton’s electrical business are metal enclosures that typically contain power circuit breakers, control/measuring devices such as relays and meters, and the power bus work. The rated maximum voltage is 600V, for AC power systems. Low voltage switchgear is used to protect, control and monitor the electrical power system. Present design low voltage switchgear conforms to the following standards: ANSI C37.20.1, C37.51, UL® 1558, NEMA® SG3, NEMA SG5 and CSA®.

Perhaps the most unique benefit of switchgear is the power circuit breakers within—they have a “withstand rating” and more flexible trip units, all which provide better coordination of downstream

circuit breakers. It is also common to find this switchgear coupled to a power distribution transformer, making the entire assembly called a secondary unit substation.

Product History

It is very uncommon to find any more installed-base of the Westinghouse® DA or DK vintage switchgear—both vintages preceded the Westinghouse DB switchgear design dated 1950.

It is very common to find DB switchgear with hundreds of thousands of DB circuit breakers still in operation.

In 1967, Westinghouse introduced DS switchgear along with the DS and DSL circuit breakers. The first DS breakers used the original solid-state trip unit called the Amptector®. The Amptector was later replaced by the microprocessor-based, true rms sensing, Digitrip™ trip unit models 500, 600, 700 and 800.

In 1994, the DS breaker became available in the new DSII switchgear assembly. DSII switchgear is designed to be much easier to install and to maintain. It also uses new “U” shape vertical bus design. Perhaps the most noticeable external difference

is the removable control circuit terminal block tray, which is charcoal-gray and located above each breaker door. Upon its arrival in 1996, the DSII breaker became the standard offering in DSII switchgear assemblies. The DSII breaker was the first breaker to use the newer family of Digitrip trip unit models 510, 610, 810, 910, OPTIM™ 750 and 1050. DSII breakers also provide genuine standardization of breaker wiring, particularly the secondary contact points, without reducing features and options.

In 1998, the Magnum™ DS switchgear along with the new Magnum DS breaker was introduced. One major advantage of the Magnum DS design is higher ratings in less space. Perhaps the most visible difference with Magnum is the “through-the-door” design, permitting visibility of the breaker’s trip unit without opening the door. Another new feature of the Magnum design is the secondary contact block location at the top-front of each cell, rather than in the rear as with previous designs. Magnum DS switchgear assemblies also have an isolated secondary control wireway, uniquely located at the side of each structure.

Product History Time Line

Page	Product	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	Present
V12-T17-3	DB Switchgear—East Pittsburgh	[Timeline bar from 1950 to 1980]											
V12-T17-4	DS Switchgear—East Pittsburgh (Vintage 1)	[Timeline bar from 1970 to 1975]											
V12-T17-4	DS Switchgear—East Pittsburgh (Vintage 2)	[Timeline bar from 1975 to 1980]											
V12-T17-4	WPA Switchgear—St. Louis	[Timeline bar from 1975 to 1985]											
V12-T17-4	DS Switchgear—St. Louis (Vintage 3)	[Timeline bar from 1985 to 1988]											
V12-T17-4	DS Switchgear—St. Louis (Vintage 4)	[Timeline bar from 1988 to 1995]											
V12-T17-4	DS Switchgear—Asheville (Vintage 5)	[Timeline bar from 1995 to 2000]											
V12-T17-6	DSII Switchgear with DS Breaker—Asheville	[Timeline bar from 2000 to Present]											
V12-T17-6	DSII Switchgear with DSII Breaker—Asheville	[Timeline bar from 2000 to Present]											
V12-T17-8	Magnum DS Switchgear	[Timeline bar from 2000 to Present]											

DB Assemblies and Power Circuit Breakers



DB Switchgear with DB Air Circuit Breakers

Product Description

DB switchgear should be found only with the Westinghouse logo and nameplates. The last assembly shipped about 15 years before the acquisition by Eaton.

Many breakers were originally shipped with electromechanical trip units, but it is common to find many of them retrofitted with Amptector or Digitrip trip units.

One characteristic of this switchgear is the viewable, through-the-door breaker handle, which could be operated without opening the door.

DB assemblies were offered with either “Fixed-Mounted” breakers or “Drawout (three-position) type. Fixed breakers have no test position.

The breakers in this switchgear design include:

- DB15, DB25, DB50, DB75, DB100 (standard)
- DBL15, DBL25, DBL50 (current limiting)

Special application breakers include:

- DBF6, DBF16, DBF40 (DC field discharge)
- DBW15, DBW25, DBW50 (resistance welding)

The DB switchgear structures were approximately 90 3/8-inch high construction with a universal frame that accommodated breaker compartment widths of 18.00, 26.00, 30.00 and 36.00 inches. All main bus joints and tap connections are silver plated and tightly clamped with through-bolts to ensure maximum conductivity. The outdoor switchgear was a walk-in type with rear hinged doors for easy access to connections.

Ratings

- DB switchgear bus 800–4000A
- DB breaker 15–4000A
- Voltage 208–600V
- Interrupting capacity 15–150 kA

Chronology

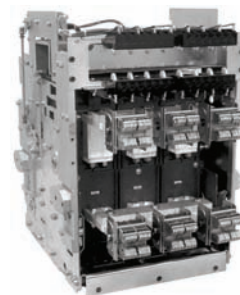
This switchgear was manufactured in East Pittsburgh, PA, from 1950 to 1980.

Replacement Capabilities

DB-AR Replacement Breakers



DB25-AR600NM—Front View



DB25-AR600NM—Rear View

The DB-AR breakers are brand new air replacements (AR-Series) designed to replace the original DB breaker. This solution is available for most three-position drawout DB breakers within original Westinghouse switchgear. The new AR-Series breaker permits DB switchgear modernization by using state-of-the-art Eaton Magnum breaker technology. The DB-AR is designed, manufactured and tested to applicable IEEE/ANSI standards.

Class 1 Reconditioning

Reconditioning Service is available for most frame sizes of the DB breaker. Class 1 Reconditioning is Eaton’s process of maintaining low voltage power breakers to their fullest capability. We disassemble each breaker, clean and test each part using component-specific methods, then reassemble and perform final testing to ensure that each breaker is restored to operating condition—all using the original manufacturer’s instructions and parts. New trip units can also be retrofitted during this process.

DB Breaker Parts

DB breaker replacement parts are available built from the original drawings and design specifications. Among the items stocked are asbestos-free arc chutes, complete pole units, contacts, primary disconnects and coils.

DB Air Circuit Breakers

New factory manufactured breakers are available in three-position drawout configurations only for the DB15, DBF6 and DBF16. Fix-mounted and single-position configuration breakers are available for the DB15, DB25, DBL25, DB50 or DBL50.

Technology Upgrades

Digitrip Trip Unit Retrofit Kits

Available for all DB breaker frame sizes. Please see the switchgear trip unit retrofit kits on **V12-T17-17** through **V12-T17-51** for more detail.

DB-VSR (Vacuum Starter Retrofits)

For FVNR, motor-starting applications ONLY—this solution significantly lengthens the life-span of the “motor starter” and provides better motor overload protection. The DB25-LV-VSR contains the V201 vacuum contactor and the C440 motor overload relay.



DB25-LV-VSR

DS Switchgear Assemblies General Information

Description	Ratings	Chronology
DS Switchgear Vintage I and II, 1969–1984 at East Pittsburgh, PA		
<p>The first vintage of DS switchgear was the first switchgear that incorporated the DS breaker with a solid-state trip unit (Amptector). During this time, the DS532 breaker was used. The DS532 breaker was a 3000A frame breaker with an interrupting rating of 50,000 symmetrical amperes. The structures themselves were of a stepped roof design that incorporated a standard bolted copper or flash welded aluminum bus design. Other characteristics of this switchgear include the following: rear frame height was 87.50 inches, flat roof sheets, ventilated front doors, wire ducts, removable instrument modules and a welded frame design. The breaker compartments were also different with fuse trucks stacked above the mains, the DS840, DS532 and the newly developed DS632. The outdoor design incorporated the use of a walk-in type side door entry.</p> <p>The second vintage of switchgear was a new design that incorporated the use of both bolted copper and welded extruded aluminum rise bus. It is basically the same as the first vintage but with a revised bus design.</p>	800–4000A 208/600V	<p>The first vintage was built from September of 1969 to approximately September of 1973 in East Pittsburgh, PA, using the shop order numbers with a prefix of 24Y. The second DS vintage was also built in East Pittsburgh, which used the 27Y prefix on shop orders. This vintage was built the same time as the WPA design in St. Louis, MO. The switchgear in East Pittsburgh was designed to be used for industrial applications, whereas the St. Louis design was built for commercial applications.</p>
WPA Switchgear, 1973–1984 at St. Louis, MO		
<p>The WPA switchgear was designed for commercial applications that also used DS breakers, which was similar to the East Pittsburgh design for industrial applications. The two designs differed structurally but used the same breakers. Some characteristics of the WPA design are as follows: riser bus was tapered design, frames were bolted and not welded, height of 9.00 inches, neutral bus mounted on rear frame, did not use removable instrument compartments and outdoor design had front and rear doors. In all, the WPA design differed extensively compared to the East Pittsburgh design.</p>	800–4000A 208/600V	<p>This vintage was built from February of 1973 to approximately October of 1984 in St. Louis. Usually the switchgear is identified by General Order and Item numbers. Shop order numbers were not used.</p>
DS Switchgear Vintage III, 1984 at St. Louis, MO		
<p>The third generation of DS switchgear was introduced due to the change of plant locations. It is classified as a vintage because it was the beginning of the merge between two plants (St. Louis and East Pittsburgh). The engineering was completed in East Pittsburgh and the assembly was built in St. Louis, along with the Cincinnati, OH, plant to help pick up the slack until full production in St. Louis. This vintage was similar to the previous 27Y style with a few modifications. It was the first time that both DS and DSL were used in switchgear by the use of a conjunction box. The physical appearance also changed by increasing the height to 92.00 inches and adding top hat vents that protruded 4.00 inches above the switchgear. Internally the neutral bus was located in the bus compartment along with unified breaker compartments for the variety of breakers.</p>	800–4000A 208/600V	<p>This vintage lasted from May of 1984 to approximately October of 1984 in East Pittsburgh. Usually the switchgear shop order number is defined by a prefix of 28Y.</p>
DS Switchgear Vintage IV, 1984–1990 at St. Louis, MO		
<p>This vintage of switchgear was a combination of the St. Louis WPA and East Pittsburgh design. The design was classified as a hybrid between the two that consisted of the East Pittsburgh design in the front compartments that held the DS breaker, and the St. Louis design in the rear compartment that housed the bus. The rear compartment still used the tapered riser bus (a characteristic of the St. Louis design), which was used right up until the DS switchgear moved to Asheville, NC. The design was very similar to the design today except for the different riser bus along with the height being 92.00 inches.</p>	800–4000A 208/600V	<p>This vintage was built from October of 1984 to approximately May of 1990 in St. Louis. Usually the switchgear is identified by general order and item numbers. 28Y shop order numbers started in 1987 and continued into the Asheville design.</p>
DS Switchgear Vintage V, 1990–1996 at Asheville, NC		
<p>The vintage was built from May of 1990 to the end of 1996 in Asheville. The switchgear is identified by shop order number 28Y. The switchgear incorporates both designs with the option for the variety of IQ products. The riser bus went back to a full rated type that is bolted copper only. Aluminum bus work was initially done only on special orders at customer request. The switchgear also has many improvements such as the design of an instrument panel door that was able to accommodate three device panels across DS632 in the C and D compartments and a variety of communication capabilities with IMPACC. The outdoor design changed with the concept of a side walk-in enclosure.</p>	800–4000A 208/600V	<p>This vintage was built from May of 1990 to the end of 1996 in Asheville. The switchgear is identified by shop order number 28Y.</p>

DS Assemblies and Power Circuit Breakers



*DS Switchgear Assembly
Typical Design, 1991*

Product Description

DS switchgear was introduced in 1969 and would be found mostly with the Westinghouse logo and nameplates. However, some assemblies shipped after the 1994 acquisition by Eaton could likely have product labels with both Westinghouse and Cutler-Hammer product names.

DS switchgear uses the drawout version of the DS and DSL low voltage power breakers. Each breaker is located within an individual compartment. Each compartment has extension rails for supporting the breaker while removing it from the compartment. The breaker can be in either of the following positions with the door closed:

- Connect
- Test
- Disconnect
- Remove

The original DS breaker contained the original solid-state trip unit—Amptector. The Amptector was later replaced by the original family of microprocessor-based, true rms sensing, Digitrip trip unit models 500, 600, 700 and 800. In the late 1990s, DS breakers started shipping with Digitrip models 510, 610, 810 or 910.

The breakers in this design included:

- DS206, 206H, 206E, 416, 416H, 416C, 420, 532, 632 or 840
- DSL206, 416, 420, 632 or 840

DS metal-enclosed switchgear was designed to meet the following standards:

- ANSI C37.20.1
- UL 1558
- NEMA SG5

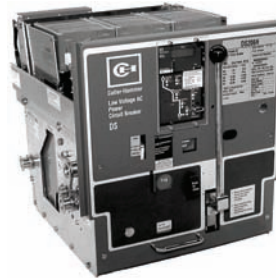
DS low voltage power air circuit breakers (LVPACB) were designed to meet the following standards:

- ANSI C37.13, C37.16, C37.50 and C37.51
- UL 1066
- NEMA SG3

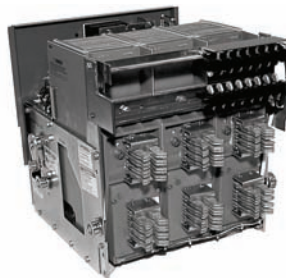
Chronology

There are five vintages of DS switchgear. Please see General Information on **Page V12-T17-4** for more detail.

Replacement Capabilities



DS206H—Front



DS206H—Rear



DS Cell Provisions

New DS Air Circuit Breakers

New DS circuit breakers are available for replacement or to fill existing vacant cells. All breakers are newly manufactured and are mechanically and electrically the same as the breakers as originally specified and supplied.

DS Circuit Breaker Cell Provisions

Breaker provisions are required in switchgear when there is an existing space in a structure that is to be filled with a breaker. Provisions are available for all ratings and include all parts required to complete the cell in accordance with the switchgear as originally supplied in vintages IV and V only.

DS Breaker Parts

An extensive inventory of newly manufactured renewal parts for DS and DSL power circuit breakers are available.

DS Switchgear Structure Parts

DS switchgear parts are available for most DS designs. Newly manufactured replacement parts (such as doors, breaker provisions, lift trucks, metering, etc.) are available.

Class 1 Reconditioning

Reconditioning Service is available for the entire family of DS breakers. Class 1 Reconditioning is Eaton's process of maintaining low voltage power breakers to their fullest capability. We disassemble each breaker, clean and test each part using component-specific methods, then reassemble and perform final testing to ensure that each breaker is restored to operating condition—all using the original manufacturer's instructions and parts. New trip units can also be retrofitted during this process.

Technology Upgrades

IQ and PowerNet™ Communications

Digital IQ-type products can be used to upgrade existing analog devices such as meters. The new IQ-type products can be furnished as loose, individual components for field retrofitting or can be furnished on new replacement doors, such as in the photo to the left. The new instrument compartment door will fit all vintages of DS assemblies from 1968 to the present. Please see IQ products **Tab 10** for further details on the latest offerings.

Digitrip Trip Unit Retrofit Kits

Retrofit kits are available for all DS breaker frame sizes. Please see the switchgear trip unit retrofit kits on **Pages V12-T17-17–V12-T17-51** for more detail.

DSII Assemblies and Power Circuit Breakers



DSII Switchgear Assembly

Product Description

The DSII low voltage switchgear design was first introduced in 1994 but was originally available with only the DS or DSL breakers. Upon its arrival in 1996, the DSII breaker became the standard offering in DSII switchgear assemblies.

The DSII switchgear design uses only the drawout version of the power breakers. Each breaker is located within an individual compartment. Each compartment has extension rails for supporting the breaker while removing it from the compartment. The breaker can be in either of the following positions with the door closed:

- Connect
- Test
- Disconnect
- Remove

The DSII switchgear is basically designed for easier installation and maintenance. Control circuit terminal blocks are mounted in a completely removable tray located at the front of the assembly above each circuit breaker—helping customers perform routine inspection of control wires. This tray is charcoal-gray and is perhaps the most noticeable external difference between the DSII and the DS designs.

The DSII breaker is very similar to the DS. In fact, the DSII breaker uses most of the same internal components—renewal parts can often be shared. The DSII breaker was the first to include the newer family of Digitrip RMS trip units: model 510, 610, 810, 910, and OPTIM 750 or 1050. Unlike the DS breaker, however, the DSII breaker provides genuine standardization of breaker wiring, including secondary contact points—without reducing features and options. This is achieved with a larger secondary contact block. The DSII breaker has up to four 12-point, white secondary contact blocks whereas the DS breaker, has up to four 8-point, black secondary contact blocks. DSII breakers therefore cannot be installed into a DS breaker cell.

DSII metal-enclosed switchgear was designed to meet the following standards:

- ANSI C37.20.1
- UL 1558
- NEMA SG5

DSII low voltage power air circuit breakers (LVPACB) were designed to meet the following standards:

- ANSI C37.13, C37.16, C37.50 and C37.51
- UL 1066
- NEMA SG3
- CSA

Ratings of DSII Switchgear

- 2000–5000A vertical and cross bus
- 6000A cross bus option
- 600V maximum
- 100,000A bus bracing standard
- 200,000A bus bracing optional

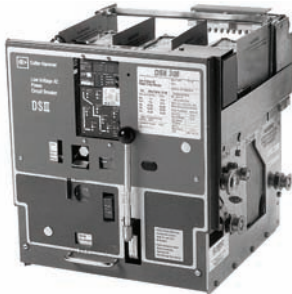
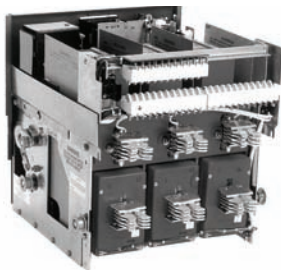
DSII Switchgear Assemblies Dated 1994–Present with Shop Order Numbers Ranging from 82Y1000 to 82Y3000

- Built from April of 1994 to the present, these assemblies contain the following DS breakers:
 - DS-206, DS-206H, DS-206E, DS-416, DS-416H, DS-420, DS-632 or DS-840
 - DSL-206, DSL-416, DSL-420, DSL-632 (with fuse truck) or DSL-840 (with fuse truck)
 - DSII switchgear assemblies dated 1996–present with shop order numbers 82Y3001 and larger

DSII Switchgear Assemblies Dated 1994–Present with Shop Order Numbers 82Y3001 and Larger

- Built from April of 1996 to the present, these assemblies contain the following DSII breakers:
 - DSII-308, DSII-508, DSII-608, DSII-516, DSII-616, DSII-620, DSII-632, DSII-840 or DSII-850
 - DSLII-308, DSLII-516, DSLII-620, DSLII-632 (with fuse truck) or DSLII-840 (with fuse truck)

DSII Low Voltage Assemblies and Power Circuit Breakers

Replacement Capabilities**DSII308—Front****DSII308—Rear****DSII Cell Provisions****New DSII Air Circuit Breakers**

New DSII circuit breakers are available for replacement or to fill existing vacant cells. All breakers are newly manufactured and are mechanically and electrically the same as the breakers originally specified and supplied.

DSII Circuit Breaker Provisions

Breaker provisions are required in switchgear when there is an existing space in a structure that is to be filled with a breaker. Provisions are available for all ratings and include all parts required to complete the cell in accordance with the switchgear as originally supplied.

Class 1 Reconditioning

Reconditioning service is available for the entire family of DSII breakers. Class 1 Reconditioning is Eaton's process of maintaining low voltage power breakers to their fullest capability. We disassemble each breaker, clean and test each part using component-specific methods, then reassemble and perform final testing to ensure that each breaker is restored to operating condition—all using the original manufacturer's instructions and parts. New trip units can also be retrofitted during this process.

Please see **Page V12-T17-9** for breaker accessories.

DSII Breaker Parts

An extensive inventory of newly manufactured renewal parts for DSII and DSLII circuit breakers are available.

DSII Switchgear Structure Parts

DSII switchgear parts are available for most DS designs. Newly manufactured replacement parts (such as doors, breaker provisions, lift trucks, metering, etc.) are available.

Technology Upgrades**DSII-VSR—Front****DSII-VSR (Vacuum Starter Replacement)**

For FVNR, motor-starting applications ONLY—this solution might be available to significantly lengthen the life-span of the "motor starter" as well as to provide better motor overload protection. The DSII-VSR is manufactured as a new assembly and is designed to rack into the same switchgear cells that a DSII breaker is removed from. It will physically fit into any of the "quarter-high" cells ranging from the DSII-308 to the DSII-620. However, the maximum FLA rating is currently 425A. The current design DS-VSR contains the V201 vacuum contactor and appropriate overload protection.

Digitrip Trip Unit Retrofit Kits

Retrofit kits are available for all DSII breaker frame sizes. Please see the switchgear trip unit retrofit kits on

Pages V12-T17-17–V12-T17-51 for more detail.

Magnum DS Assemblies and Power Circuit Breakers



Magnum DS Switchgear

Product Description

Cutler-Hammer Magnum DS switchgear started shipping in 1998. Perhaps the most distinctive feature when compared to the original DS vintage is the “through-the-door” design.

The following functions may be performed without opening the circuit breaker door: levering the breaker between positions; operating manual charging system, including viewing of the spring charge status flag; closing and opening the breaker; viewing/adjusting the trip unit and reading the breaker rating nameplate.

The breakers are four-position drawout design—connected, test, disconnected or removed.

The breakers can also be equipped with ARMs technologies, which will reduce arc flash energy available at downstream devices during maintenance periods.

A unique vertical and cross bus configuration provides an optional industry-leading short-circuit withstand rating of 200,000A without the need for upstream current-limiting fuses.

Vertical and cross bus ratings are based on a UL and ANSI standard temperature rise of 65°C above a maximum ambient air temperature of 40°C.

Magnum DS switchgear and breakers conform to the following standards:

- ANSI C37.20.1, C37.51
- UL 1558, UL 1066
- NEMA SG5, SG3
- CSA

The assemblies have undergone an extensive seismic qualification program. The test program used ANSI standard C37.81, the Uniform Building Code (UBC®) and the California Building Code (CBC) as a basis for the test program. The assemblies have been tested and qualified to exceed these requirements.

Magnum DS Switchgear Ratings

- Cross bus ampacity
 - 2000, 3200, 4000, 5000, 6000
- Vertical bus ampacity
 - 2000, 3200, 4000, 5000
- Bus bracing
 - 100, 150 or 200 kA

Magnum DS Without Current Limiters

Maximum Amperes	Breaker Designation	Interrupting Rating (kA)	Short-Time Rating (kA)
800	MDS-408	42	42
800	MDS-608	65	65
800	MDS-808	85	85
800	MDS-C08	100	85
1600	MDS-616	65	65
1600	MDS-816	85	85
1600	MDS-C16	100	85
2000	MDS-620	65	65
2000	MDS-820	85	85
2000	MDS-C20	100	85
3200	MDS-632	65	65
3200	MDS-832	85	85
3200	MDS-C32	100	85
4000	MDS-840	85 ①	85
4000	MDS-C40	100 ①	100
5000	MDS-850	85 ①	85
5000	MDS-C50	100 ①	100

Replacement Capabilities



800–3200A Drawout Breaker

New Magnum DS Breakers

New breakers are readily available for all frame sizes and interruption ratings.

Renewal Parts and Accessories

New breaker parts and accessories are readily available for all frame sizes and interrupting ratings.

Cell Provisions and Upgrades

Switchgear cell provisions are required when an existing structure blank space needs to be filled with a new Magnum DS circuit breaker. Cell upgrades are required when the provision already exists, but the need to upgrade ampacity and/or interrupting rating is necessary. Sometimes, new riser bus must also be installed with this offering.

Class 1 Reconditioning

Reconditioning service is available for the entire family of Magnum DS breakers. Class 1 reconditioning is Eaton’s process of maintaining low voltage power breakers to their fullest capability. We disassemble each breaker, clean and test each part using component-specific methods, then reassemble and perform final testing to ensure that each breaker is restored to operating condition—all using the original manufacturer’s instructions and parts.

Note

① Interrupting rating is 130 kA at 240V.



Breaker Cell

Magnum DS Low Voltage Assemblies and Power Circuit Breakers

Breaker Accessories

Breaker Test Kits

Test Kit Unit



Test Kit

This test kit can be used for testing DS, DSII and Magnum breakers that are equipped with either Amptector or Digitrip RMS trip units. Test kit2 includes test unit and adapter.

Note: Each kit contains the 140D481G03 basic tester (Amptector-Ready) and the adapter for the selected breaker Digitrip style.

Test Kit

Description	Catalog Number
DS/DSII Digitrip test kit	8779C02G02
Magnum Digitrip test kit	8779C02G05

Adapters



Adapter

In May of 1993, the test port changed on DS circuit breakers that have Digitrip RMS trip units. The test port was moved from the front cover to the left-hand side, as you face the front of the breaker. The port was also changed from an 11-pin banana plug to a 9-pin plug. The adapter is for using a 140D481(G02R), (G02RR) or (G03) tester to test DS breakers with Digitrip that have the side-mounted, 9-pin plug. The adapter converts the banana plugs on the tester to a 9-pin plug. DO NOT use the adapter with the old 140D481G01 or 140D481G02 tester.

On Magnum breakers, the test port is located on the front cover of the trip unit. The port is a 14-pin plug; the adapter converts the banana plugs on the tester to a 14-pin plug.

Adapters

Description	Catalog Number
DS/DSII	8779C02G03
Magnum	8779C02G05

Breaker Test Cabinet



Breaker Test Cabinet

Test cabinet for electrically operated breakers, with pushbuttons, control cable and receptacle, for separate mounting.

Breaker Test Cabinet

Description	Catalog Number
DS	
120 Vac/125 Vdc	6500C57G01
240 Vac/125 Vdc	6500C57G02
DSII	
120 Vac/125 Vdc	6500C57G03
240 Vac/125 Vdc	6500C57G04
Magnum	
120 Vac/125 Vdc	9253C25G01
240 Vac/125 Vdc	9253C25G02
120 Vac capacitor trip	9253C25G03
Test breaker plug	9253C25G04

Background Information on Trip Unit Test Kits

Description	Catalog Number
Obsolete test unit, only for use with Amptector	140D481G01
Obsolete test unit, only for use with Amptector	140D481G02
Same as 140D481G02, except retrofitted to test both Amptector and Digitrip	140D481G02R
Same as 140D481G02, except retrofitted to test both Amptector and Digitrip	140D481G02RR
Obsolete Test Kit Adapter, superseded by 8779C02G03	8779C02G01
Wire harness with female banana plugs for temporary connection direct from tester to the auxiliary CT module on the retrofitted breaker ①	6503C53G01
Adapter harness for converting banana from the tester to a 12-pin plug for retrofitted breakers equipped with a 6503C55G01 ①	6503C54G01
New adapter for converting 12-pin plug on 6503C55G01 into 9-pin plug for connecting to the test unit adapter style # 8779C02G03 ①	6503C54G02
Wire harness with 12-pin plug for permanent connection to auxiliary CT module on the retrofitted breaker; plug connects to 6503C54G01 or 6503C54G02 ①	6503C55G01
Current auxiliary power module for supplying power to Digitrip trip unit during test procedures; also identical to catalog number PRTAAPM ①	1267C16G01

Note

① These parts are used with any breaker that was upgraded with "Digitrip Retrofit Kits."

Procedure for Identifying Renewal Parts

For all switchgear requests, include information from the list below to ensure that parts and breakers supplied will consist of correct options and settings. With the variety of switchgear vintages, the information is needed to supply the correct parts. There might be modifications needed to the breaker cell or to the bus work to accommodate the breaker that will only be recognized by the drawings.

For all requests include the following:

- Shop order number
- Front view drawing number
- General order number (GO#)
- Manufacturing date
- Item number
- Metering required
- Optional relays
- CTs
- What changes have been made since equipment was originally installed in the field?

Requests requiring additional or replacement breakers also require the following information:

- Breaker type
- Trip rating
- MO or EO
- Trip unit
- Three-wire or four-wire
- Trip settings (LSIG)
- Fixed or drawout
- Which compartment
- Any new options

Further Information

Publication Number	Description
DB Breakers	
RPD 32-254	Renewal Parts Data for DB, DBL, DBF breakers
SA-11745	Sales Aid for custom fluidized switchgear bus
DS Breakers	
RP.22B.01.TE	Renewal Parts Data for DS breakers
PL.22G.01.PE	Price List for DS breakers and accessories, discount symbol DS-1
DSII Breakers	
RP.22B.02.TE	Renewal Parts Data for DSII breakers
IB 694C694-02	Instruction, operation and maintenance for DSII/DSLII breakers
IL 32-691C	Instructions for DS-DSII (trip units 500-910) tester
PL.22B.01.PE	Price List for DSII breakers and accessories
DS/DSII Switchgear Assemblies	
RP.44B.01.TE	Renewal Parts Data for DS/DSII switchgear accessories
DSII Switchgear and Breaker	
SA-32-610A	Sales Aid for DSII low voltage switchgear
AD 32-650A	Application Data for DSII switchgear
DS Switchgear	
IB 32-690F	Instructions for DS metal-enclosed LV switchgear
DS and DSL Breakers	
IB 33-790-1I	Instruction, operation and maintenance for DS/DSL breakers
DSII Switchgear	
TD.44B.01A.TE	Technical Data for DSII metal-enclosed LV switchgear
DSII Switchgear with DS Breakers	
IB 32-695C	Instructions for DSII switchgear containing DS breakers
DSII Switchgear with DSII Breakers	
IB 32-694B	Instructions for DSII switchgear containing DSII breakers
Magnum DS Switchgear	
PA.44A.01.S.E	Product Aid (1pg.) for Magnum DS switchgear
TD.44A.01B.TE	Technical Data for Magnum DS metal-enclosed LV switchgear
IB 32-697A	Instructions for Magnum DS metal-enclosed LV switchgear
RP01901001E	Magnum DS switchgear common replacement parts and accessories
Magnum DS Switchgear and Breakers	
B.44A.01.S.E	Brochure (20 pg.) for Magnum DS switchgear and breakers
Magnum DS Breakers	
RP.22F.02.TE	Renewal parts and accessories catalog for Magnum DS breakers
IB 2C12060H03	Instructions, operation and maintenance for Magnum DS breakers
B.22F.01.S.U	Brochure (16 pg.) for Magnum DS breakers
PL.22F.01A.PE	Price List for Magnum DS breakers
IB.44A.05.TE	Instructions for Magnum DS (trip units 520-1150) tester
IL 32-696A	Instructions for Magnum DS breaker test cabinet

Low Voltage Competitive Upgrades—AR-Series Replacement Breakers

**Competitive Upgrades—
Low Voltage Power
Air Breakers**

**AR-Series
Replacement Breakers**

The AR-Series (air-replacement) breakers are not retrofits. They are 100% new breakers used to completely replace the original drawout type power air circuit breaker. This solution uses state-of-the-art Cutler-Hammer Magnum breaker technology that provides maximum life-extension and switchgear modernization. The offering includes a new breaker, a cassette with extension rails and a standard door. No modifications are required to the original line/load power stabs or the secondary disconnect contacts.

This solution can eliminate safety problems caused by defective racking and/or operator mechanisms. Additional safety against arc flash incidents can be obtained by equipping the breaker with ARMs Technologies, thereby reducing the arc flash energy available at downstream devices during maintenance periods. Additional switchgear maintenance problems such as parts unavailability and lengthy maintenance procedures can be eliminated. This solution often provides a substantial total installed cost savings when compared to completely replacing the switchgear assembly.

In many instances, the AR-Series replacement breaker can be combined with engineering services to provide continuous current and/or interruption rating upgrades.

The AR-Series breakers are designed, manufactured and tested to modern IEEE/ANSI standards.

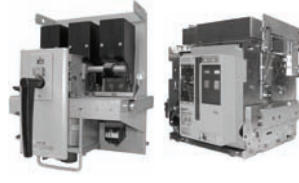
Designs are available for a wide variety of drawout type low voltage power air circuit breakers (LVPACB) originally manufactured by Westinghouse, Federal Pacific Electric, Allis-Chalmers, ITE and General Electric.

Pictured on this page are several examples of available designs. Contact your local Eaton sales representative for information on other breaker types.

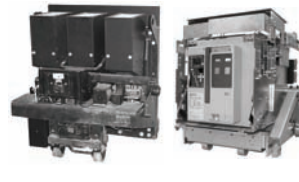
Westinghouse



Original DB-25 DB25-AR600NM

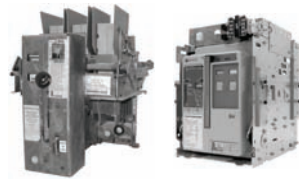


Original DB-50 DB50-AR1600M



Original DB-75 DB75-AR3000M

Allis-Chalmers



Original LA-600 LA600-AR600NM

ITE



Original K-600 K-600-AR600NM

Federal Pacific Electric



Original FP-25 FP25-AR600NM



Original FP-50 FP50-AR1600M



Original FP-75 FP75-AR3000M

General Electric



Original AK-2A-50 AK2A50-AR1600M



Original AKR-4A-30 AKR4A30-AR800NM

Low Voltage Breaker Drawout Vacuum Starter Replacement



DB-25-LV-VSR Shown

Product Description

Eaton's low voltage VSR is a self-contained vacuum starter replacement for a low voltage drawout air circuit breaker used for motor starting applications.

In some cases, low voltage air circuit breakers are used for motor starting applications. Air circuit breakers are not designed to withstand the frequent switching service and the mechanical stresses associated with repetitive motor starting duty. This is due to the breaker mechanism that must be designed to close and latch against a fault. In order to meet these requirements, the mechanism must close at high speeds with a great deal of force. Frequent closing operations stress and deteriorate the breaker mechanisms.

Eaton's LV-VSR is a self-contained replacement vacuum starter for a low voltage drawout air circuit breaker. The LV-VSR is interchangeable with the drawout breaker element and requires no cell modifications.

Features

Advantages

The use of an LV-VSR vacuum starter can prolong device life and significantly reduce maintenance repair and downtime.

A low voltage air circuit breaker has an effective life of 4000 operations while an LV-VSR vacuum starter has an effective life of 1,000,000 operations. For example, a motor starting application that required two starts per hour on continuous duty would require a major rebuild of the low voltage breaker within three months. The expected life of an LV-VSR vacuum starter would be over 50 years.

The LV-VSR vacuum starter uses state-of-the-art Eaton vacuum interrupters. The interrupters employ the latest vacuum technology with long life, resistance to environmental contaminants and positive contact wear indicators.

The integral, solid-state, trip units used on the air circuit breakers are designed primarily for cable and transformer protection. Motors require more precisely set overcurrent devices that prevent motor damage as well as avoiding nuisance tripping. A solid-state relay, Eaton Type C440, provides overload protection and phase unbalance protection. This relay was exclusively designed for motor protection.

Motor Starter

The LV-VSR consists of an Eaton V201 vacuum contactor, Class J current limiting fuses, multi-function motor protective relay, three current transformers and an integral control power transformer.

Vacuum Contactor

Eaton's V201 vacuum contactor is designed for starting and controlling three-phase, 50/60 Hz AC motors. Current interruption is contained within the vacuum bottles and no arc byproducts are vented to the outside environment. Contact condition is given by wear indicators.

Series Current Limiting Fuses

Class J current limiting fuses provide short-circuit protection and allow a combination rating of 100 kA at 480 or 600V.

C440 Electronic Overload Relay

Eaton's C440 multi-function electronic, motor protection relay provides the following features:

- Overload protection, Class 10A, 10, 20 or 30
- Phase unbalance protection, selectable (ON/OFF)
- Ground fault selectable (ON/OFF)
- Remote reset
- Alarm relay output contact
- LED status indication
- Communication modules available

VSR Designs

- Westinghouse DB and DS
- GE
- ITE
- and others

Contact EESS at 877-276-9379 for more details.

Life

Exceptional electrical and mechanical life is offered by the V201 contactor—up to 1,000,000 electrical operations and 2,500,000 mechanical operations, even under harsh conditions.

Drawout Capability

The LV-VSR is mounted on a drawout frame and maintains the safety interlocking system of the low voltage switchgear.

Ease of Installation

The LV-VSR may be inserted into a standard breaker compartment without modification to the compartment. The primary and secondary contact structures and drawout mechanism are identical. The LV-VSR control scheme will interface with standard switchgear wiring with no cell modifications and remote control schemes, if existing, are maintained.

Low Voltage Breaker Drawout Vacuum Starter Replacement

Safety Features

The LV-VSR vacuum starter retains all the safety features of the low voltage switchgear including:

- Racking the LV-VSR vacuum starter is prevented while the contactor is in the closed position. Closing the LV-VSR vacuum starter is prevented while racking
- Breaker position indication is provided (connected, test, disconnect, remove)
- The LV-VSR vacuum starter is padlockable (optional) in either the connect, test or disconnect positions
- Positive ground connection is maintained
- Closed door tripping
- Closed-door control, if existing, can be maintained

LV-VSR Control Features

LV-VSR vacuum starter offers the following standard control features. Other devices can be supplied on request.

- Start–stop pushbuttons
- Eaton C440 electronic overload relay
- Provision for remote control operation
- Custom-designed wiring schemes

Ease of Maintenance

The LV-VSR control components are front-mounted for easy access.

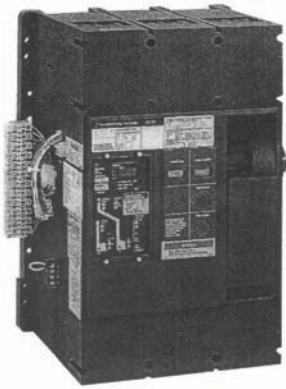
The LV-VSR uses the same line and load finger clusters, secondary contact assemblies and drawout mechanism as the original circuit breaker. Renewal parts are readily available.

Technical Data and Specifications**Ratings**

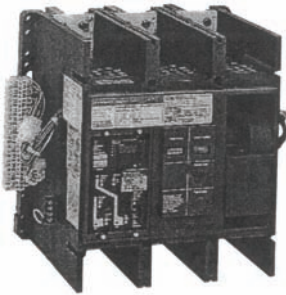
The LV-VSR vacuum starter is rated as follows:

- Maximum continuous current—425A
- Maximum voltage rating—600V
- Short-circuit rating at 240–600V, 200 kA
- Maximum motor hp at 550/575V, 400 hp
- Maximum motor hp at 440/460V, 300 hp
- Maximum motor hp at 220/230V, 150 hp

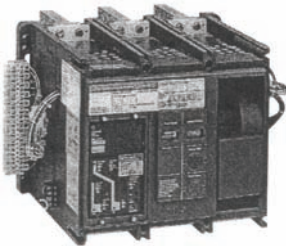
Systems Pow-R Breaker (SPB)



SPB-100 Series—3000A



SPB-65 Series—1600A



SPB-50 Series—800A

Product Description

The Cutler-Hammer Systems Pow-R Breaker is an encased power breaker designed to provide benefits of special interest to distribution systems designers.

Systems Pow-R Breakers can be applied as individual breakers in separate enclosures or in switchboards as mains, ties or feeder breakers. They can be applied in low voltage distribution systems through 600 Vac, 50 or 60 Hz. Because they combine high interrupting capacity with short-time delay tripping, Systems Pow-R

Breakers can be applied in fully rated, selective systems while providing full selectivity through the applied breaker's short-time rating.

Both mechanical and electrically operated versions of the breaker feature a true two-step stored energy mechanism with no change in dimensions. This mechanism allows maximum five-cycle closing usually required for generator paralleling.

An interrupting capacity of 150,000A at 480V without fuses and short-time capabilities of up to 85,000A are available. Systems Pow-R Breakers are UL Listed for 100% application.

Systems Pow-R Breakers must be applied within their published ratings in accordance with UL and NEMA Standards defined as "Usual Service Conditions."

Four basic frame sizes (400/800/1200A, 1600/2000A, 2500/3000A and 4000/5000A) cover the continuous ampere range of 100 to 5000A.

The Systems Pow-R Breakers use the proven microprocessor-based trip unit technology that was pioneered by Eaton. Developments in microprocessor technology have given us the new family of Digitrip RMS electronic trip units and the even newer OPTIM programmable trip unit.

All breakers come standard with the Digitrip RMS 510 trip units that have long time and instantaneous (LI) tripping functions. Short-time delay and three- or four-wire ground fault protection can be supplied as optional tripping characteristics, thereby providing for up to nine phase and ground current settings. This provides maximum flexibility in trip curve shaping and system coordination. Any combination of these trip functions (LI, LS, LSI, LIG, LSG or LSIG) can be provided within the Digitrip family of trip units.

Optional trip units such as the Digitrip RMS 610 that has a large four-digit alphanumeric display of load currents, cause of trip and self diagnostics can also be specified. The RMS 810, which in addition to the 610 features, displays and transmits via the IMPACC/PowerNet communications network power and energy values, may also be provided. The RMS 910 also displays power quality data, power factor and phase-to-phase voltages, and transmits waveform capture information.

The most technologically advanced trip unit in the Digitrip family is the Digitrip OPTIM. The OPTIM 750 has features similar to the Digitrip 610 and the OPTIM 1050 has features similar to the Digitrip 910. Both have the additional feature of being programmable, rather than having to be set by discrete switches. This programmability allows for an almost infinite number of trip settings, which in turn provides for even closer system coordination.

All trip units use completely interchangeable rating plugs. These plugs, when applied with the appropriate sensors, give the breakers a tripping range of 100 to 5000A.

The Systems Pow-R Breaker can be supplied in either fixed or drawout mounting configurations. The drawout assembly consists of a stationary frame and a moving carriage with four positions: connected, test, disconnected and fully withdrawn. The fixed configuration can be supplied as either front or rear connected.

The Systems Pow-R Breaker has available a complete family of integrally mounted accessories. Shunt trip, spring release solenoid, undervoltage release, auxiliary switches, key interlocks, mechanical interlocks and covers for the close and/or open pushbuttons are just an example of the accessories that can be mounted on the breaker.

Product History

Since its introduction to the market in 1976, the SPB has provided long and reliable service. Tens of thousands of SPBs have been manufactured and placed into service throughout the world in switchboards, automatic transfer switches and other specialty OEM manufactured power distribution products.

Systems Pow-R Breakers can be identified using two unique numbers. One is the S.O. (shop order number). The shop order number is located either on the breaker's nameplate or on the left side of the breaker.

An example of this number is S.O. 74E2792.01.

The second number is a 30-digit feature and option number. The first 10 characters of the feature and option number are considered to be the feature or style number, the next 20 characters are the option or edge number. This number is also located on the breaker's nameplate or on the left side of the breaker.

An example of this number is:

Feature and option
8702C35G012297240000000
1000144

Feature/style 8702C35G01

Option/edge
22972400000001000144

Product History Time Line

Product	1970	1975	1980	1985	1990	1995	2000	Present
Westinghouse SPB			■					
Cutler-Hammer SPB						■		

Replacement Capabilities

Genuine new SPB replacement parts and accessories, including those listed in SPB Renewal Parts Data RP01301013E, dated February 2006, are available. Contact **1-800-222-9773** for price and availability, or check Vista.

The following parts and accessories are available:

Mechanism and Related Parts

- Charging handle
- Cover assembly
- Mechanism assembly
- Trip unit cover plate assembly

Electrical Attachments

- Shunt trip assembly
- CT ground fault
- Undervoltage release
- Remote time delay
- Auxiliary switch
- Capacitor trip device
- Secondary connectors
- Plate assembly
- T-connectors
- Pressure terminals

Spring Release Solenoid Electrical Operator Breaker Accessories

- Key interlock
- Cover accessories
- Deadfront shield
- Door escutcheon
- Fixed-mounted breakers
- Behind-the-door and through-the-door drawout breakers

Trip Units

- Digitrip 500, 600, 700, 800
- Digitrip 510
- Digitrip 610
- Digitrip 810
- Digitrip 910
- OPTIM 750
- OPTIM 1050
- Pow-R-Trip 7 rating plugs
- Digitrip rating plugs for 500, 600, 700, 800

Technology Upgrades

Upgrade solutions for SPB breakers include trip unit upgrades. These solutions focus on replacing the older technology tripping systems with the latest technology offerings. The latest technology permits significant improvements to be realized in improved coordination and protection, remote metering and monitoring, network communications and energy management information.

Is the old technology breaker still good enough?

That depends on the answers to the following questions.

Can the problem be solved with renewal parts?

Some problems can be solved quickly and simply with the installation of replacement parts and accessories. Eaton continues to manufacture new genuine replacement parts and accessories for SPBs.

Does the breaker reliably perform as expected?

If the breaker does not perform reliably even when properly maintained or serviced, the mechanism or the entire breaker should be considered for replacement.

Does the breaker trip system perform reliably?

Older SPB breakers used trip systems that are no longer being supported by Eaton. Due to changes in the typical distribution system and the addition of numerous harmonic generating loads, some early vintage electronic trip systems could experience unreliable or inaccurate trip behavior. If this is the case, the trip system should be replaced.

Is there a need for energy management?

Breakers with older technology trip systems could not support the demands of energy management. Modern trip systems provide not only improved protection, but energy monitoring, power quality measurement and communications. If any of these are desired, the trip system should be replaced.

Are the recommended maintenance intervals being followed?

There is a tendency to stretch the maintenance interval well beyond the manufacturer's recommendations. This is dangerous. Some studies have shown that if a circuit breaker is left closed for a period of five to seven years, it may not operate as expected when needed to do so.

If the answers to the above questions all indicate that the existing trip system or the circuit breaker does not need to be replaced, then the old technology breaker is still good enough, and maintenance solutions are recommended:

1. Maintain the breaker at one- to two-year intervals using original OEM parts.
2. Use factory authorized service for more extensive repair needs and mechanism replacement.

Eaton can provide loaner breakers to maintain system uptime while the maintenance or factory authorized service is being performed. If any answer to the above questions indicate that the trip system or the circuit breaker should be replaced, then the old technology breaker is no longer good enough, and **Upgrade Solutions** are recommended.

Eaton offers a choice of two upgrade solutions:

1. Trip system retrofit.
2. New SPB breaker.

In summary, how do we choose the right upgrade solution?**Does the breaker perform reliably except for the trip system?**

If “Yes,” then a Trip System Retrofit is the preferred solution.

Does the breaker perform reliably but energy management, power quality measurement or communications are desired?

If “Yes,” then a Trip System Retrofit is still the preferred solution.

Is breaker reliability an issue and will it require extensive service or repairs?

If “Yes,” then a new SPB breaker is the appropriate solution.

See **Pages V12-T17-35** and **V12-T17-36** for information on Digitrip retrofits.

Product Support Services

Factory authorized non-warranty service is available from the Breaker Service Center in Skelton, WV.

The Breaker Service Center can perform:

- All service and testing needs
- Repairs to cracked and broken cases and frames
- Repairs to damaged contact assemblies
- Mechanism replacements
- Trip unit upgrades

The Breaker Service Center also stocks a variety of loaner SPB breakers to keep your customer up and running while their breaker is being serviced.

If you have an opportunity or need further information, call Eaton’s Breaker Service Center at **1-877-275-7782**.

Field Service and Testing (Performed at Customer site):

Provided by Eaton’s Electrical Services & Systems (EESS), Field Service and Testing includes initial inspection, secondary injection testing, service to electrical operators, handles and hub assemblies, installation of most renewal parts, and trip unit upgrades to the Digitrip 510. Contact your local EESS office for more information.

Service and Testing (Performed at local EESS facility):

EESS has a variety of service options for SPB breakers including primary injection testing, mechanism replacement, replacement of key interlocks and ground fault CT, service to finger clusters and stationary contacts, and trip unit upgrades to Digitrip 610/810/910. Contact your local EESS office for more information.

Further Information

Publication Number	Description
IL 15156B	Removal and replacement of moving and stationary conductors and operating mechanism in a Systems Pow-R breaker.
IL 6647C21H03	Key interlock installation instructions for through-the-door drawout Systems Pow-R breakers.
LEM010	Problems with SPB breakers/we have the solutions tri-fold.
RP01301013E	Systems Pow-R breakers renewal parts and accessories.

Pricing Information

Newly manufactured replacement SPB breakers and cassettes for existing switchgear manufactured in Asheville, NC; St. Louis, MO; or East Pittsburgh, PA, are available through the Aftermarket Product Center in Asheville, NC. Call **1-800-257-3278** for price and availability.

New, genuine SPB replacement parts and accessories can be identified in publication RP01301013E. Call **1-800-222-9773** for price and availability or check Vista.

Price and Availability Digest (PAD)

Vista/VISTALINE™ (Discount Symbol LVPCB)

Trip Unit Retrofit Kits

Application Description

Digitrip RMS trip unit retrofit kits are fully engineered, field-installable retrofit kits that enable the user to completely replace an existing tripping system. They are applicable to (600 Vac) low voltage power breakers and are designed for application on various manufacturers' power breakers.

Digitrip RMS trip unit retrofit kits provide true rms sensing, the most accurate and current state-of-the-art technology for measuring amperage loads. True rms sensing removes the possibility of false tripping due to harmonic distortion of the power waveform and enables greater accuracy in selective coordination of the power distribution system. The microprocessor-based Digitrip trip unit also allows communications for remote monitoring to a host computer or local Assemblies Electronic Monitor (AEM) via the Integrated Monitoring Protection and Control Communications (PowerNet) communication system.

Ratings

Digitrip RMS trip unit retrofit kits are available for a wide variety of various manufacturers' low voltage power breaker frames. Ratings range from 100 to 4000A. Multi-tapped CTs, interchangeable rating plugs, programmable pickup and time delay settings provide the user with flexibility.

Product History

Originally a Westinghouse Product

In the past, there have been three types of automatic control for low voltage power breakers: electromechanical trip units, solid-state peak sensing trip units and state-of-the-art true rms sensing trip units.

Electromechanical Trip Units

Electromechanical trip units were initially used in the early 1940s and phased out by all manufacturers in the mid-1970s.

Westinghouse used these trip devices on types DA and DK power circuit breakers. They were also used initially on the DB power circuit breaker. The electromechanical trip units were the conventional form of protection on all manufacturers' breakers, up until the 1970s.

Electromechanical trip units were composed of a solenoid, springs, a diaphragm, seals and air venting apertures. Three trip units were required per breaker. Due to age or harsh environments these devices would fail or lose calibration. They required a great deal of preventative maintenance.

Solid-State Peak Sensing Trip Units

In 1970, the Amptector Trip Unit was introduced as the standard trip unit on the Westinghouse type DS power circuit breaker. The Amptector solid-state trip system provided much greater accuracy and reliability, and included new features like ground fault (G) protection, mode of trip indication and the ability to perform secondary injection testing.

Electromechanical trip devices immediately became obsolete, creating a retrofit market. Amptector retrofit kits were introduced to convert the type DB breakers that had been factory equipped with the electromechanical type trip units.

In 1976, the POW-R-Trip 7 trip unit was introduced on the Westinghouse SPB insulated-case power circuit breaker. A more simplified version with only two trip functions, known as the POW-R-Trip, became available in 1978. Then in 1982, the POW-R Digitrip trip unit became available and was offered on the SPB breakers.

In 1985, RK trip units and retrofit kits were introduced to provide a solid-state trip unit small enough to retrofit General Electric breakers as well as the Westinghouse type DB breakers.

Peak sensing trip units were an improvement and provided improved reliability and accuracy. Only one trip unit was required per breaker; however, peak sensing trip units were not able to handle harmonic conditions. They caused nuisance tripping and unnecessary downtime.

True rms Sensing Trip Units

In 1987, Westinghouse introduced the Digitrip II RMS trip unit (standard version) for use on type DS and SPB power circuit breakers. Digitrip II RMS was the first microprocessor-based true rms sensing trip unit.

True rms trip units enabled the measuring of current rather than the sensing of current.

Because they are microprocessor-based digital devices, they are capable of taking discrete samples of the current waveform in each phase. By applying a mathematical algorithm, the current is accurately mapped out and measured. This method of measurement provides the ability to adapt to a changing harmonic content while providing repeatable and reliable protection.

Product History Time Line

Page	Product	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	Present	
	Electromechanical Trip Devices (B Breakers)	[Timeline bar from 1955 to 1975]											
	Amptector Trip Units and Accessories (DS Breakers)	[Timeline bar from 1970 to 1995]											
	Amptector Retrofit Kits, Trip Units, and Accessories (DB Breakers)	[Timeline bar from 1970 to 1995]											
	POW-R-Trip 7 Trip Units (SPB Breakers)	[Timeline bar from 1970 to 1995]											
	POW-R-Trip Trip Units (SPB Breakers)	[Timeline bar from 1975 to 1990]											
	POW-R-Digitrip I Trip Units (SPB Breakers)	[Timeline bar from 1980 to 1990]											
V12-T17-24	Rating Plugs	[Timeline bar from 1975 to 2000]											
	RK Retrofit Kits, Trip Units and Accessories (DB Breakers)	[Timeline bar from 1985 to 1995]											
	RK Retrofit Kits, Trip Units and Accessories (GE AK-2A Breakers)	[Timeline bar from 1985 to 1995]											
V12-T17-21	Digitrip II RMS Trip Units (RMS500, RMS600, RMS700, RMS800)	[Timeline bar from 1990 to 2000]											
V12-T17-21	Digitrip III RMS Trip Units (RMS510, RMS610, RMS710, RMS810)	[Timeline bar from 1990 to 2000]											
	Digitrip III RMS Retrofit Kits for:												
V12-T17-29	• Westinghouse DA and DK Breakers	[Timeline bar from 1995 to 2000]											
V12-T17-31	• Westinghouse DB Breakers	[Timeline bar from 1995 to 2000]											
V12-T17-33	• Westinghouse DS Breakers	[Timeline bar from 1995 to 2000]											
V12-T17-35	• Westinghouse SPB Breakers	[Timeline bar from 1995 to 2000]											
V12-T17-33	• GE® AK-1, AK-2/2A, AK-3/3A, AKR-50, AL-2E0, AL-2-50 Breakers	[Timeline bar from 1995 to 2000]											
V12-T17-41	• Allis-Chalmers LA Series Breakers	[Timeline bar from 1995 to 2000]											
V12-T17-43	• ITE® K-Line Breakers	[Timeline bar from 1995 to 2000]											
V12-T17-47	• Siemens® – Allis Breakers	[Timeline bar from 1995 to 2000]											
V12-T17-49	• Federal Pacific® Breakers	[Timeline bar from 1995 to 2000]											
V12-T17-51	• Other Breakers	[Timeline bar from 1995 to 2000]											

General Information

State-of-the-Art Features

Digitrip RMS trip unit retrofit kits come in several different model types. Among these types, they provide a variety of accommodating features (see table on **Page V12-T17-20**).

True rms measurement and protection. Extremely accurate and able to compensate for harmonic content and disturbances.

Ground fault may be added to an existing power breaker. Ground fault is offered in a three-wire and a four-wire version.

Zone interlocking is available on the short time and ground fault modes of protection. This enables enhanced selectivity for high fault and ground fault coordination between the main and the feeder breakers.

Local monitoring via a display. A red light emitting diode (LED) display enables the user to step through and read currents and energy readings for each phase and ground.

Communications via the PowerNet system

allows all pertinent information, regarding static and dynamic operation of the breaker, to be remotely monitored either by a host computer or an IQ AEM. This facilitates energy management and power management. Remember, *“If you can’t measure it, you can’t manage it.”*

The Packaged Kit

Each Digitrip RMS trip unit retrofit kit includes a Digitrip trip unit, an auxiliary CT module, a direct trip actuator (DTA), quantity (three) current sensors, a rating plug, interconnecting wiring harnesses, mounting brackets, copper connectors (when required), hardware, and installation instructions. Digitrip RMS retrofit kits are complete tripping systems engineered specifically for each breaker type and frame rating. All kits are designed for field installation.

Application and Service Condition

In order to ensure that Digitrip RMS trip unit retrofit kits are successfully applied, installation must only be done by a qualified individual.

Appropriate testing must be performed to qualify the retrofitted breaker prior to placing the breaker in service. Digitrip RMS trip unit retrofit kits will provide protection based on their published time-current curves when the breaker is properly maintained and operated in accordance with the original manufacturer’s specification and instructions.

Service Life

The physical structure, the bus assemblies and control wiring of switchgear are normally in good condition. The replacement of the trip system coupled along with either refurbishment or reconditioning of the breaker will prolong the life of the switchgear and provide modern state-of-the-art protection.

Availability

Digitrip RMS trip unit retrofit kits are currently available for select breaker frames from the following manufacturers:

- Westinghouse
- General Electric
- ITE
- Allis-Chalmers
- Siemens-Allis
- Federal Pacific
- Roller-Smith
- Other manufacturers

Order Information

In order to obtain the proper kit, the following information should be provided to your authorized Eaton distributor:

- Breaker manufacturer
- Breaker frame designation
- Breaker frame rating
- Breaker continuous current rating
- Kit type (see table on **Page V12-T17-20**) (i.e., RMS 510...RMS 810)
- Modes of protection
- Sensor rating
- Rating plug rating

Definitions of Replacement and Upgrade Capabilities

Replacement Digitrip Trip Units and Rating Plugs

Replacement trip units and rating plugs are available and are used when replacing components with similar functionality and protective features. A complete listing of replacement trip units and rating plugs is found on **Pages V12-T17-21–V12-T17-27**.

Digitrip Trip Unit Upgrades

Trip unit upgrades can be used when upgrading the trip system only requires a change in trip unit with no additional hardware. This option is used to replace an obsolete Digitrip 500/600/700/800 or as outlined in the table below. Use the replacement trip unit and rating plug tables on **Pages V12-T17-21–V12-T17-27**.

Digitrip Trip Unit Upgrades

Digitrip Trip Unit	
Existing	Upgrade
500	510
600	610
700	810/910
800	810/910
810	910

For advanced upgrades requiring more than just a trip unit replacement, a trip unit retrofit kit or upgrade retrofit kit is the correct solution.

Digitrip RMS Trip Unit Retrofit Kits

Digitrip RMS trip unit retrofit kits are fully engineered, field-installable retrofit kits that enable the user to completely retrofit an existing trip system on low voltage power breakers. They are applied on breakers that do not have existing Digitrip trip systems installed. Reference **Pages V12-T17-28–V12-T17-51** for information on retrofit kits.

For breakers previously retrofitted or shipped from the factory with a Digitrip trip system, refer to trip unit and rating plug replacement, Digitrip trip unit upgrades or upgrade retrofit kits.

Upgrade Retrofit Kits

An upgrade retrofit kit is used when upgrading a breaker (previously retrofitted or supplied from the factory with a Digitrip 500/510) to an advanced Digitrip 610/810/910. These are complete kits minus the components common with a basic Digitrip 500/510 retrofit kit. A "U" in the last position of the catalog number denotes an upgrade retrofit kit. Reference **Pages V12-T17-28–V12-T17-51** for information on upgrade retrofit kits.

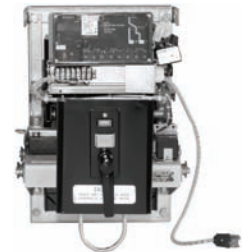
Arcflash Reduction Maintenance System™

NFPA® 70E-2004 defines flash hazard as: "A dangerous condition associated with the release of energy caused by an electric arc." This is primarily heat energy and may result in serious or life threatening burns.

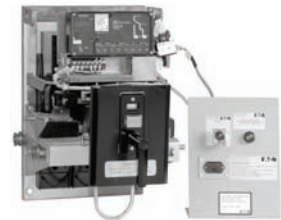
When properly applied to a power breaker, the Arcflash Reduction Maintenance System reduces fault-clearing time and lowers the available arc flash energy at the connected downstream devices. The result is a reduction of the hazard risk category, allowing for improved personnel safety while eliminating the need for higher levels of costly personal protective equipment (PPE).

The Arcflash Reduction Maintenance System is controlled by a lockable switch that can easily activate a faster tripping time at the work location and be incorporated into a lock-out tag-out (LOTO) procedure. This switch can be applied to any low voltage power breaker by modifying the existing Digitrip trip system, or retrofitting a breaker with a Digitrip retrofit kit (see Accessories table on **Page V12-T17-28**).

For further information, contact your local Eaton's Electrical Services & Systems office (see **Tab 24**), or the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.



Modified Digitrip Trip System with Arcflash Reduction Maintenance System



Digitrip Retrofit with Arcflash Reduction Maintenance System

Functional Comparison of Trip Units

Past Technology					Present Technology					
RMS 500	RMS 500 Zone	RMS 600	RMS 700	RMS 800	Features	RMS 510	RMS 510 Zone	RMS 610	RMS 810	RMS 910
Trip Unit Features										
■	■	■	■		Cause-of-trip LED indicators	■	■	■	■	■
■	■	■	■	■	Integral self test	■	■	■	■	■
■	■	■	■	■	Trip reset button	■	■	■	■	■
■	■	■	■	■	Hardware driven thermal memory					
					Software driven thermal memory (sel. 0/0)	■	■	■	■	■
■	■	■	■	■	Discriminator circuit on LS and LSG protection modes					
					Discriminator circuit on LS and LSG protection modes selectable (on/off)	■	■	■	■	■
	■	■	■	■	Zone protective interlocking for short time and ground fault modes of protection		■	■	■	■
	■	■	■	■	Auxiliary contact for long time, short circuit and ground fault functions			■	■	■
		■		■	Local display of phase currents			■	■	■
		■		■	Local display of ground currents			■	■	■
		■		■	Local display of cause of trip			■	■	■
				■	Local display of energy (MWh)				■	■
				■	Local display of peak demand (MW)				■	■
				■	Local display of present demand (MW)				■	■
PowerNet Communication Features										
		■		■	Data communicated with PowerNet includes: all display values, trip unit status, high load alarm, cause of trip, rating plug status, breaker status, reason for breaker status				■	■
					Trip settings				■	■
					Power factor				■	■
		■		■	Control via the PowerNet system (open/close)				■	■
					Voltage phase-to-phase, displayed on trip unit and communicated via PowerNet communications					■
					Total harmonic distortion (THD); phase A, B, C. Displayed on trip unit and communicated via PowerNet communications					■
					Total harmonic distortion per harmonic from the 2nd through the 27th harmonic displayed on trip unit and communicated via PowerNet communications					■
					System power factor. Displayed on trip unit and communicated via PowerNet communications					■

Replacement Digitrip RMS Trip Units for Power Circuit Breakers

Replacement Capabilities

Digitrip RMS Trip Units for Power Circuit Breakers

Digitrip RMS Trip Unit Replacement

When a Digitrip RMS trip unit requires replacement, it can be replaced directly using the enclosed charts. Observe the following restrictions:

The group function (G) cannot be added in the field just by changing the trip unit.

Trip Functions

All Digitrip RMS retrofit kit types are available with the necessary combinations of long, short, instantaneous and ground fault (LSIG) modes of protection as depicted and deemed necessary by industry standards.

The combinations of modes of protection are:

- LI
- LSI
- LS
- LIG
- LSG
- LSIG

Rating Plug Replacement

When changing or replacing rating plugs, use the charts provided on **Pages V12-T17-25–V12-T17-27** for DS, SPB and all other retrofitted breakers.



Digitrip Units—Standard, Horizontal and Vertical Configurations

Standard Retrofit RMS Replacement Trip Units for DS and SPB Breakers

Shaded area denotes obsolete or discontinued products and services. ①②

Digitrip Model	Protective Functions	Catalog Number	Style Number	Digitrip Model	Protective Functions	Catalog Number	Style Number
Past Technology				Present Technology			
RMS 500	LI	T51BLI	1230C97G01	RMS 510	LI	S51LI	7829C05G01
RMS 500	LSI	T52BLSI	1230C97G02	RMS 510	LSI	S52LSI	7829C05G02
RMS 500	LS	T53BLS	1230C97G03	RMS 510	LS	S53LS	7829C05G03
RMS 500	LIG	T54BLIG	1230C97G04	RMS 510	LIG	S54LIG	7829C05G04
RMS 500	LSG	T55BLSG	1230C97G05	RMS 510	LSG	S55LSG	7829C05G05
RMS 500	LSIG	T56BLSIG	1230C97G06	RMS 510	LSIG	S56LSIG	7829C05G06
RMS 600	LI	T61BLI	1230C97G07	RMS 610	LI	S61LI	7829C10G01
RMS 600	LSI	T62BLSI	1230C97G08	RMS 610	LSI	S62LSI	7829C10G02
RMS 600	LS	T63BLS	1230C97G09	RMS 610	LS	S63LS	7829C10G03
RMS 600	LIG	T64BLIG	1230C97G10	RMS 610	LIG	S64LIG	7829C10G04
RMS 600	LSG	T65BLSG	1230C97G11	RMS 610	LSG	S65LSG	7829C10G05
RMS 600	LSIG	T66BLSIG	1230C97G12	RMS 610	LSIG	S66LSIG	7829C10G06
RMS 700 ③	LI	T71BLI	1230C97G19	RMS 810	LI	S81LI	7829C08G01
RMS 700 ③	LSI	T72BLSI	1230C97G20	RMS 810	LSI	S82LSI	7829C08G02
RMS 700 ③	LS	T73BLS	1230C97G21	RMS 810	LS	S83LS	7829C08G03
RMS 700 ③	LIG	T74BLIG	1230C97G22	RMS 810	LIG	S84LIG	7829C08G04
RMS 700 ③	LSG	T75BLSG	1230C97G23	RMS 810	LSG	S85LSG	7829C08G05
RMS 700 ③	LSIG	T76BLSIG	1230C97G24	RMS 810	LSIG	S86LSIG	7829C08G06
RMS 800	LI	T81BLI	1230C97G13	RMS 910	LI	S91LI	7829C09G01
RMS 800	LSI	T82BLSI	1230C97G14	RMS 910	LSI	S92LSI	7829C09G02
RMS 800	LS	T83BLS	1230C97G15	RMS 910	LS	S93LS	7829C09G03
RMS 800	LIG	T84BLIG	1230C97G16	RMS 910	LIG	S94LIG	7829C09G0
RMS 800	LSG	T85BLSG	1230C97G17	RMS 910	LSG	S95LSG	7829C09G05
RMS 800	LSIG	T86BLSIG	1230C97G18	RMS 910	LSIG	S96LSIG	7829C09G06

Notes

- ① At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910. From 1989 to 1996, the standard trip units were the RMS 500/600/700/800. **These trip units are no longer in production.** Replacement orders for the 500/600/700/800 trip units will be filled by the equivalent 510/610/810/910 trip units. Remember, when replacing a 500/600/700/800 unit with a 510/610/810/910, the rating plug must also be replaced.
- ② Rating plugs for the 500/600/700/800 trip units will still be available. **These rating plugs are not interchangeable with the 510/610/810/910 trip units. Likewise, rating plugs for the 510/610/810/910 are not interchangeable with the 500/600/700/800 trip units.**
- ③ There is no direct replacement for Digitrip RMS 700. Use Digitrip RMS 810 or 910.

Horizontal Retrofit RMS/R Replacement Trip Units for all Other Breakers

Shaded area denotes obsolete or discontinued products and services. ①②

Digitrip Model	Protective Functions	Catalog Number	Style Number	Digitrip Model	Protective Functions	Catalog Number	Style Number
Past Technology				Present Technology			
RMS/R 500 Horizontal	LI	RH51BLI	1232C84G01	RMS 510	LI	SRH51LI	7801C36G01
RMS/R 500 Horizontal	LSI	RH52BLSI	1232C84G02	RMS 510	LSI	SRH52LSI	7801C36G02
RMS/R 500 Horizontal	LS	RH53BLS	1232C84G03	RMS 510	LS	SRH53LS	7801C36G03
RMS/R 500 Horizontal	LIG	RH54BLIG	1232C84G04	RMS 510	LIG	SRH54LIG	7801C36G04
RMS/R 500 Horizontal	LSG	RH55BLSG	1232C84G05	RMS 510	LSG	SRH55LSG	7801C36G05
RMS/R 500 Horizontal	LSIG	RH56BLSIG	1232C84G06	RMS 510	LSIG	SRH56LSIG	7801C36G06
RMS/R 600 Horizontal	LI	RH61BLI	1232C84G07	RMS 610	LI	SRH61LI	7801C46G01
RMS/R 600 Horizontal	LSI	RH62BLSI	1232C84G08	RMS 610	LSI	SRH62LSI	7801C46G02
RMS/R 600 Horizontal	LS	RH63BLS	1232C84G09	RMS 610	LS	SRH63LS	7801C46G03
RMS/R 600 Horizontal	LIG	RH64BLIG	1232C84G10	RMS 610	LIG	SRH64LIG	7801C46G04
RMS/R 600 Horizontal	LSG	RH65BLSG	1232C84G11	RMS 610	LSG	SRH65LSG	7801C46G05
RMS/R 600 Horizontal	LSIG	RH66BLSIG	1232C84G12	RMS 610	LSIG	SRH66LSIG	7801C46G06
RMS/R 700 Horizontal ③	LI	RH71BLI	1232C84G19	RMS 810	LI	SRH81LI	7801C48G01
RMS/R 700 Horizontal ③	LSI	RH72BLSI	1232C84G20	RMS 810	LSI	SRH82LSI	7801C48G02
RMS/R 700 Horizontal ③	LS	RH73BLS	1232C84G21	RMS 810	LS	SRH83LS	7801C48G03
RMS/R 700 Horizontal ③	LIG	RH74BLIG	1232C84G22	RMS 810	LIG	SRH84LIG	7801C48G04
RMS/R 700 Horizontal ③	LSG	RH75BLSG	1232C84G23	RMS 810	LSG	SRH85LSG	7801C48G05
RMS/R 700 Horizontal ③	LSIG	RH76BLSIG	1232C84G24	RMS 810	LSIG	SRH86LSIG	7801C48G06
RMS/R 800 Horizontal	LI	RH81BLI	1232C84G13	RMS 910	LI	SRH91LI	7801C49G01
RMS/R 800 Horizontal	LSI	RH82BLSI	1232C84G14	RMS 910	LSI	SRH92LSI	7801C49G02
RMS/R 800 Horizontal	LS	RH83BLS	1232C84G15	RMS 910	LS	SRH93LS	7801C49G03
RMS/R 800 Horizontal	LIG	RH84BLIG	1232C84G16	RMS 910	LIG	SRH94LIG	7801C49G04
RMS/R 800 Horizontal	LSG	RH85BLSG	1232C84G17	RMS 910	LSG	SRH95LSG	7801C49G05
RMS/R 800 Horizontal	LSIG	RH86BLSIG	1232C84G18	RMS 910	LSIG	SRH96LSIG	7801C49G06

Notes

- ① At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910. From 1989 to 1996, the standard trip units were the RMS 500/600/700/800. **These trip units are no longer in production.** Replacement orders for the 500/600/700/800 trip units will be filled by the equivalent 510/610/810/910 trip units. Remember, when replacing a 500/600/700/800 unit with a 510/610/810/910, the rating plug must also be replaced.
- ② Rating plugs for the 500/600/700/800 trip units will still be available. **These rating plugs are not interchangeable with the 510/610/810/910 trip units. Likewise, rating plugs for the 510/610/810/910 are not interchangeable with the 500/600/700/800 trip units.**
- ③ There is no direct replacement for Digitrip RMS 700. Use Digitrip RMS 810 or 910.

Replacement Digitrip RMS Trip Units for Power Circuit Breakers

Vertical Retrofit RMS/R Replacement Trip Units for all Other Breakers

Shaded area denotes obsolete or discontinued products and services. ^{①②}

Digitrip Model	Protective Functions	Catalog Number	Style Number	Digitrip Model	Protective Functions	Catalog Number	Style Number
Past Technology				Present Technology			
RMS/R 500 Vertical	LI	RV51BLI	1232C97G01	RMS 510	LI	SRV51LI	7801C37G01
RMS/R 500 Vertical	LSI	RV52BLSI	1232C97G02	RMS 510	LSI	SRV52LSI	7801C37G02
RMS/R 500 Vertical	LS	RV53BLS	1232C97G03	RMS 510	LS	SRV53LS	7801C37G03
RMS/R 500 Vertical	LIG	RV54BLIG	1232C97G04	RMS 510	LIG	SRV54LIG	7801C37G04
RMS/R 500 Vertical	LSG	RV55BLSG	1232C97G05	RMS 510	LSG	SRV55LSG	7801C37G05
RMS/R 500 Vertical	LSIG	RV56BLSIG	1232C97G06	RMS 510	LSIG	SRV56LSIG	7801C37G06
RMS/R 600 Vertical	LI	RV61BLI	1232C97G07	RMS 610	LI	SRV61LI	7801C41G01
RMS/R 600 Vertical	LSI	RV62BLSI	1232C97G08	RMS 610	LSI	SRV62LSI	7801C41G02
RMS/R 600 Vertical	LS	RV63BLS	1232C97G09	RMS 610	LS	SRV63LS	7801C41G03
RMS/R 600 Vertical	LIG	RV64BLIG	1232C97G10	RMS 610	LIG	SRV64LIG	7801C41G04
RMS/R 600 Vertical	LSG	RV65BLSG	1232C97G11	RMS 610	LSG	SRV65LSG	7801C41G05
RMS/R 600 Vertical	LSIG	RV66BLSIG	1232C97G12	RMS 610	LSIG	SRV66LSIG	7801C41G06
RMS/R 700 Vertical ^③	LI	RV71BLI	1232C97G19	RMS 810	LI	SRV81LI	7801C42G01
RMS/R 700 Vertical ^③	LSI	RV72BLSI	1232C97G20	RMS 810	LSI	SRV82LSI	7801C42G02
RMS/R 700 Vertical ^③	LS	RV73BLS	1232C97G21	RMS 810	LS	SRV83LS	7801C42G03
RMS/R 700 Vertical ^③	LIG	RV74BLIG	1232C97G22	RMS 810	LIG	SRV84LIG	7801C42G04
RMS/R 700 Vertical ^③	LSG	RV75BLSG	1232C97G23	RMS 810	LSG	SRV85LSG	7801C42G05
RMS/R 700 Vertical ^③	LSIG	RV76BLSIG	1232C97G24	RMS 810	LSIG	SRV86LSIG	7801C42G06
RMS/R 800 Vertical	LI	RV81BLI	1232C97G13	RMS 910	LI	SRV91LI	7801C43G01
RMS/R 800 Vertical	LSI	RV82BLSI	1232C97G14	RMS 910	LSI	SRV92LSI	7801C43G02
RMS/R 800 Vertical	LS	RV83BLS	1232C97G15	RMS 910	LS	SRV93LS	7801C43G03
RMS/R 800 Vertical	LIG	RV84BLIG	1232C97G16	RMS 910	LIG	SRV94LIG	7801C43G04
RMS/R 800 Vertical	LSG	RV85BLSG	1232C97G17	RMS 910	LSG	SRV95LSG	7801C43G05
RMS/R 800 Vertical	LSIG	RV86BLSIG	1232C97G18	RMS 910	LSIG	SRV96LSIG	7801C43G06

Notes

- ^① At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910. From 1989 to 1996, the standard trip units were the RMS 500/600/700/800. **These trip units are no longer in production.** Replacement orders for the 500/600/700/800 trip units will be filled by the equivalent 510/610/810/910 trip units. Remember, when replacing a 500/600/700/800 unit with a 510/610/810/910, the rating plug must also be replaced.
- ^② Rating plugs for the 500/600/700/800 trip units will still be available. **These rating plugs are not interchangeable with the 510/610/810/910 trip units. Likewise, rating plugs for the 510/610/810/910 are not interchangeable with the 500/600/700/800 trip units.**
- ^③ There is no direct replacement for Digitrip RMS 700. Use Digitrip RMS 810 or 910.

Digitrip RMS Rating Plugs

Product Description



SPB Rating Plug and Details

Rating plugs for Digitrip RMS trip units determine the continuous current rating of the circuit breaker. All protection function settings on the face of the trip unit are expressed in per unit multiples of the rating plug ampere rating (I_n).

The rating plug is interlocked with the tripping mechanism to automatically “open” the breaker when the plug is removed. The breaker will remain “trip free” with the plug removed.

SPB rating plugs must be selected to match the desired continuous current rating of the breaker, as well as the frame rating and the system frequency, i.e., 50 or 60 Hz.

DS and retrofit rating plugs must be selected to match the desired continuous current rating of the breaker, the sensor tap setting and the system frequency, i.e., 50 or 60 Hz.

Rating plugs are equipped with a backup battery to maintain the mode of trip operation following a circuit breaker tripping when external power is not available. The battery is a long-life lithium type, which is accessible from the front of the trip unit, without removing the rating plug. Replacement types and instructions are provided in Application Data 33-855.

Following a trip operation and with no supplementary control power available, the battery will maintain the mode of trip LED for approximately 60 hours.

Note: At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910. From 1989 to 1996, the standard trip units were the RMS 500/600/700/800. **These trip units are no longer in production.**

Replacement orders for the 500/600/700/800 trip units will be filled by the equivalent 510/610/810/910 trip units. Remember, when replacing a 500/600/700/800 unit with a 510/610/810/910, the rating plug must also be replaced.

Note: Rating plugs for the 500/600/700/800 trip units will still be available. **These rating plugs are not interchangeable with the 510/610/810/910 trip units. Likewise, rating plugs for the 510/610/810/910 are not interchangeable with the 500/600/700/800 trip units.**



Rating Plug for All Other Retrofitted Breakers



DS Rating Plug

Replacement Digitrip RMS Rating Plugs for DS Breakers

Replacement Capabilities

Rating Plugs for DS Breakers ①②③④

Past Technology (500/600/700/800)				Present Technology (510/610/810/910)			
Sensor Tap Connection	Rating Plug Rating	60 Hz Catalog Number ⑤	60 Hz Style Number ⑤	Sensor Tap Connection	Rating Plug Rating	50/60 Hz Catalog Number ⑥	50/60 Hz Style Number ⑥
200	100	PD6D02A010	2613D10G01	200	100	RP6D02A010	3D86734G01
200	200	PD6D02A020	2613D10G02	200	200	RP6D02A020	3D86734G02
300	200	PD6D03A020	2613D10G03	300	200	RP6D03A020	3D86734G03
300	250	PD6D03A025	2613D10G04	300	250	RP6D03A025	3D86734G04
300	300	PD6D03A030	2613D10G05	300	300	RP6D03A030	3D86734G05
400	200	PD6D04A020	2613D10G06	400	200	RP6D04A020	3D86734G06
400	250	PD6D04A025	2613D10G07	400	250	RP6D04A025	3D86734G07
400	300	PD6D04A030	2613D10G08	400	300	RP6D04A030	3D86734G08
400	400	PD6D04A040	2613D10G09	400	400	RP6D04A040	3D86734G09
600	300	PD6D06A030	2613D10G10	600	400	RP6D06A030	3D86734G10
600	400	PD6D06A040	2613D10G11	600	400	RP6D06A040	3D86734G11
600	600	PD6D06A060	2613D10G12	600	600	RP6D06A060	3D86734G12
800	400	PD6D08A040	2613D10G13	800	400	RP6D08A040	3D86734G13
800	600	PD6D08A060	2613D10G14	800	600	RP6D08A060	3D86734G14
800	800	PD6D08A080	2613D10G15	800	800	RP6D08A080	3D86734G15
1200	600	PD6D12A060	2613D10G16	1200	600	RP6D12A060	3D86734G16
1200	800	PD6D12A080	2613D10G17	1200	800	RP6D12A080	3D86734G17
1200	1000	PD6D12A100	2613D10G18	1200	1000	RP6D12A100	3D86734G18
1200	1200	PD6D12A120	2613D10G19	1200	1200	RP6D12A120	3D86734G19
1600	800	PD6D16A080	2613D10G20	1600	800	RP6D16A080	3D86734G20
1600	1000	PD6D16A100	2613D10G21	1600	1000	RP6D16A100	3D86734G21
1600	1200	PD6D16A120	2613D10G22	1600	1200	RP6D16A120	3D86734G22
1600	1600	PD6D16A160	2613D10G23	1600	1600	RP6D16A160	3D86734G23
2000	1000	PD6D20A100	2613D10G24	2000	1000	RP6D20A100	3D86734G24
2000	1200	PD6D20A120	2613D10G25	2000	1200	RP6D20A120	3D86734G25
2000	1600	PD6D20A160	2613D10G26	2000	1600	RP6D20A160	3D86734G26
2000	2000	PD6D20A200	2613D10G27	2000	2000	RP6D20A200	3D86734G27
2400	1600	PD6D24A160	2613D10G28	2400	1600	RP6D24A160	3D86734G28
2400	2000	PD6D24A200	2613D10G29	2400	2000	RP6D24A200	3D86734G29
2400	2400	PD6D24A240	2613D10G30	2400	2400	RP6D24A240	3D86734G30
3200	1600	PD6D32A160	2613D10G31	3200	1600	RP6D32A160	3D86734G31
3200	2000	PD6D32A200	2613D10G32	3200	2000	RP6D32A200	3D86734G32
3200	2400	PD6D32A240	2613D10G33	3200	2400	RP6D32A240	3D86734G33
3200	3200	PD6D32A320	2613D10G34	3200	3200	RP6D32A320	3D86734G34
4000	2000	PD6D40A200	2613D10G35	4000	2000	RP6D40A200	3D86734G35
4000	2400	PD6D40A240	2613D10G36	4000	2400	RP6D40A240	3D86734G36
4000	3200	PD6D40A320	2613D10G37	4000	3200	RP6D40A320	3D86734G37
4000	4000	PD6D40A400	2613D10G38	4000	4000	RP6D40A400	3D86734G38

Notes

- ① Choose the rating plug to match the sensor tap selected and the continuous current rating.
- ② When ordering as part of a retrofit kit, refer to **Pages V12-T17-28** through **V12-T17-51**.
- ③ At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910. From 1989 to 1996, the standard trip units were the RMS 500/600/700/800. **These trip units are no longer in production.** Replacement orders for the 500/600/700/800 trip units will be filled by the equivalent 510/610/810/910 trip units. Remember, when replacing a 500/600/700/800 unit with a 510/610/810/910, the rating plug must also be replaced.
- ④ Rating plugs for the 500/600/700/800 trip units will still be available. **These rating plugs are not interchangeable with the 510/610/810/910 trip units. Likewise, rating plugs for the 510/610/810/910 are not interchangeable with the 500/600/700/800 trip units.**
- ⑤ 50 Hz rating plugs are available. Contact your local Eaton Field Sales office for details.
- ⑥ Rating plugs may be ordered separately by above style number or as part of a complete retrofit kit.

Rating Plugs for SPB Breakers ①②③④

Past Technology (500/600/700/800)				Present Technology (510/610/810/910)			
Sensor Tap Connection	Rating Plug Rating	60 Hz Catalog Number ⑤	60 Hz Style Number ⑥	Sensor Tap Connection	Rating Plug Rating	50/60 Hz Catalog Number ⑤	50/60 Hz Style Number ⑥
400	200	PD6S04A020	2613D09G01	400	200	RP6S04A020	3D86737G01
400	250	PD6S04A025	2613D09G02	400	250	RP6S04A025	3D86737G02
400	300	PD6S04A030	2613D09G03	400	300	RP6S04A030	3D86737G03
400	400	PD6S04A040	2613D09G04	400	400	RP6S04A040	3D86737G04
800	400	PD6S08A040	2613D09G05	800	400	RP6S08A040	3D86737G05
800	600	PD6S08A060	2613D09G07	800	600	RP6S08A060	3D86737G07
800	800	PD6S08A080	2613D09G08	800	800	RP6S08A080	3D86737G08
1200	600	PD6S12A060	2613D09G09	1200	600	RP6S12A060	3D86737G09
1200	800	PD6S12A080	2613D09G10	1200	800	RP6S12A080	3D86737G10
1200	1000	PD6S12A100	2613D09G11	1200	1000	RP6S12A100	3D86737G11
1200	1200	PD6S12A120	2613D09G12	1200	1200	RP6S12A120	3D86737G12
1600	800	PD6S16A080	2613D09G13	1600	800	RP6S16A080	3D86737G13
1600	1000	PD6S16A100	2613D09G14	1600	1000	RP6S16A100	3D86737G14
1600	1200	PD6S16A120	2613D09G15	1600	1200	RP6S16A120	3D86737G15
1600	1600	PD6S16A160	2613D09G16	1600	1600	RP6S16A160	3D86737G16
2000C	1000	PD6S21A100	2613D09G17	2000C	1000	RP6S21A100	3D86737G17
2000C	1200	PD6S21A120	2613D09G18	2000C	1200	RP6S21A120	3D86737G18
2000C	1600	PD6S21A160	2613D09G19	2000C	1600	RP6S21A160	3D86737G19
2000C	2000	PD6S21A200	2613D09G20	2000C	2000	RP6S21A200	3D86737G20
2000	1600	PD6S20A160	2613D09G21	2000	1600	RP6S20A160	3D86737G21
2000	2000	PD6S20A200	2613D09G22	2000	2000	RP6S20A200	3D86737G22
2500	1600	PD6S25A160	2613D09G23	2500	1600	RP6S25A160	3D86737G23
2500	2000	PD6S25A200	2613D09G24	2500	2000	RP6S25A200	3D86737G24
2500	2500	PD6S25A250	2613D09G25	2500	2500	RP6S25A250	3D86737G25
3000	1600	PD6S30A160	2613D09G26	3000	1600	RP6S30A160	3D86737G26
3000	2000	PD6S30A200	2613D09G27	3000	2000	RP6S30A200	3D86737G27
3000	2500	PD6S30A250	2613D09G28	3000	2500	RP6S30A250	3D86737G28
3000	3000	PD6S30A300	2613D09G29	3000	3000	RP6S30A300	3D86737G29
4000	2000	PD6S40A200	2613D09G30	4000	2000	RP6S40A200	3D86737G30
4000	2500	PD6S40A250	2613D09G31	4000	2500	RP6S40A250	3D86737G31
4000	3000	PD6S40A300	2613D09G32	4000	3000	RP6S40A300	3D86737G32
4000	3200	PD6S40A320	2613D09G33	4000	3200	RP6S40A320	3D86737G33
4000	4000	PD6S40A400	2613D09G34	4000	4000	RP6S40A400	3D86737G34
4000	2000	PD6S40A200	2613D09G30	4000	2000	RP6S40A200	3D86737G30
4000	2500	PD6S40A250	2613D09G31	4000	2500	RP6S40A250	3D86737G31
4000	3000	PD6S40A300	2613D09G32	4000	3000	RP6S40A300	3D86737G32
4000	3200	PD6S40A320	2613D09G33	4000	3200	RP6S40A320	3D86737G33
4000	4000	PD6S40A400	2613D09G34	4000	4000	RP6S40A400	3D86737G34
5000	3000	PD6S50A300	2613D09G35	5000	3000	RP6S50A300	3D86737G35
5000	3200	PD6S50A320	2613D09G36	5000	3200	RP6S50A320	3D86737G36
5000	4000	PD6S50A400	2613D09G37	5000	4000	RP6S50A400	3D86737G37
5000	5000	PD6S50A500	2613D09G38	5000	5000	RP6S50A500	3D86737G38

Notes

- ① Choose the rating plug to match the sensor tap selected and the continuous current rating.
- ② When ordering as part of a retrofit kit, refer to **Pages V12-T17-28** through **V12-T17-51**.
- ③ At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910. From 1989 to 1996, the standard trip units were the RMS 500/600/700/800. **These trip units are no longer in production.** Replacement orders for the 500/600/700/800 trip units will be filled by the equivalent 510/610/810/910 trip units. Remember, when replacing a 500/600/700/800 unit with a 510/610/810/910, the rating plug must also be replaced.
- ④ Rating plugs for the 500/600/700/800 trip units will still be available. **These rating plugs are not interchangeable with the 510/610/810/910 trip units. Likewise, rating plugs for the 510/610/810/910 are not interchangeable with the 500/600/700/800 trip units.**
- ⑤ 50 Hz rating plugs are available. Contact your local Eaton Field Sales office for details.
- ⑥ Rating plugs may be ordered separately by above style number or as part of a complete retrofit kit.

Replacement Digitrip RMS Rating Plugs for DS Breakers

Rating Plugs for All Other Breakers ①②③④

Past Technology (500/600/700/800)				Present Technology (510/610/810/910)			
Sensor Tap Connection	Rating Plug Rating	60 Hz Catalog Number ⑤	60 Hz Style Number ⑤	Sensor Tap Connection	Rating Plug Rating	50/60 Hz Catalog Number ⑤	50/60 Hz Style Number ⑤
200	100	PR6A02A010	3D86709G01	200	100	RP6A02A010	3D86766G01
200	200	PR6A02A020	3D86709G02	200	200	RP6A02A020	3D86766G02
250	250	PR6A02A025	3D86709G11	250	250	RP6A02A025	3D86766G11
300	200	PR6A03A020	3D86709G36	300	200	RP6A03A020	3D86766G36
300	250	PR6A03A025	3D86709G12	300	250	RP6A03A025	3D86766G12
300	300	PR6A03A030	3D86709G37	300	300	RP6A03A030	3D86766G37
400	200	PR6A04A020	3D86709G13	400	200	RP6A04A020	3D86766G13
400	250	PR6A04A025	3D86709G14	400	250	RP6A04A025	3D86766G14
400	300	PR6A04A030	3D86709G15	400	300	RP6A04A030	3D86766G15
400	400	PR6A04A040	3D86709G03	400	400	RP6A04A040	3D86766G03
600	300	PR6A06A030	3D86709G16	600	300	RP6A06A030	3D86766G16
600	400	PR6A06A040	3D86709G17	600	400	RP6A06A040	3D86766G17
600	600	PR6A06A060	3D86709G04	600	600	RP6A06A060	3D86766G04
800	400	PR6A08A040	3D86709G18	800	400	RP6A08A040	3D86766G18
800	600	PR6A08A060	3D86709G19	800	600	RP6A08A060	3D86766G19
800	800	PR6A08A080	3D86709G05	800	800	RP6A08A080	3D86766G05
1200	600	PR6A12A060	3D86709G20	1200	600	RP6A12A060	3D86766G20
1200	800	PR6A12A080	3D86709G21	1200	800	RP6A12A080	3D86766G21
1200	1000	PR6A12A100	3D86709G22	1200	1000	RP6A12A100	3D86766G22
1200	1200	PR6A12A120	3D86709G10	1200	1200	RP6A12A120	3D86766G10
1600	800	PR6A16A080	3D86709G23	1600	800	RP6A16A080	3D86766G23
1600	1000	PR6A16A100	3D86709G24	1600	1000	RP6A16A100	3D86766G24
1600	1200	PR6A16A120	3D86709G25	1600	1200	RP6A16A120	3D86766G25
1600	1600	PR6A16A160	3D86709G06	1600	1600	RP6A16A160	3D86766G06
2000	1000	PR6A20A100	3D86709G26	2000	1000	RP6A20A100	3D86766G26
2000	1200	PR6A20A120	3D86709G27	2000	1200	RP6A20A120	3D86766G27
2000	1600	PR6A20A160	3D86709G28	2000	1600	RP6A20A160	3D86766G28
2000	2000	PR6A20A200	3D86709G07	2000	2000	RP6A20A200	3D86766G07
3000	1600	PR6A30A160	3D86709G29	3000	1600	RP6A30A160	3D86766G29
3000	2000	PR6A30A200	3D86709G30	3000	2000	RP6A30A200	3D86766G30
3000	2500	PR6A30A250	3D86709G31	3000	2500	RP6A30A250	3D86766G31
3000	3000	PR6A30A300	3D86709G08	3000	3000	RP6A30A300	3D86766G08
3200	1600	PR6A32A160	3D86709G39	3200	1600	RP6A32A160	3D86766G39
3200	2000	PR6A32A200	3D86709G40	3200	2000	RP6A32A200	3D86766G40
3200	2400	PR6A32A240	3D86709G41	3200	2400	RP6A32A240	3D86766G41
3200	3200	PR6A32A320	3D86709G42	3200	3200	RP6A32A320	3D86766G42
4000	2000	PR6A40A200	3D86709G32	4000	2000	RP6A40A200	3D86766G32
4000	2500	PR6A40A250	3D86709G33	4000	2500	RP6A40A250	3D86766G33
4000	3000	PR6A40A300	3D86709G34	4000	3000	RP6A40A300	3D86766G34
4000	3200	PR6A40A320	3D86709G35	4000	3200	RP6A40A320	3D86766G35
4000	4000	PR6A40A400	3D86709G09	4000	4000	RP6A40A400	3D86766G09

Notes

- ① Choose the rating plug to match the sensor tap selected and the continuous current rating.
- ② When ordering as part of a retrofit kit, refer to **Pages V12-T17-28** through **V12-T17-51**.
- ③ At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910. From 1989 to 1996, the standard trip units were the RMS 500/600/700/800. **These trip units are no longer in production.** Replacement orders for the 500/600/700/800 trip units will be filled by the equivalent 510/610/810/910 trip units. Remember, when replacing a 500/600/700/800 unit with a 510/610/810/910, the rating plug must also be replaced.
- ④ Rating plugs for the 500/600/700/800 trip units will still be available. **These rating plugs are not interchangeable with the 510/610/810/910 trip units. Likewise, rating plugs for the 510/610/810/910 are not interchangeable with the 500/600/700/800 trip units.**
- ⑤ 50 Hz rating plugs are available. Contact your local Eaton Field Sales office for details.
- ⑥ Rating plugs may be ordered separately by above style number or as part of a complete retrofit kit.

Customer Required Information

How to Select a Retrofit Kit

To properly select a retrofit kit, the following information is required:

- Breaker nameplate information
 - Manufacturer
 - Breaker type
 - Ampere frame size
 - Manually or electrically operated
- Drawout or fixed mounting
- Fused or non-fused
- Digitrip trip unit type required
 - 510, 610, 810, 910
- Protective functions required
 - LI, LSI, LS, LIG, LSG, LSIG
- Continuous current rating required (trip rating of breaker)
- Three- or four-wire system (determines number of sensors required)

To properly select options, the following questions need to be answered:

- Will customer supply 120 Vac control power or is breaker-mounted CPT needed?
 - Applies only to Digitrip 610, 810 and 910
- Are zone interlocks required?
- Does the application require relay outputs from the Digitrip 610, 810 or 910 for remote indication?
- Does the breaker have an existing amptector or Digitrip trip unit installed? If so, what is it?

How to Generate a Catalog Number

Refer to **Pages V12-T17-30 to V12-T17-51** to view the retrofit kit catalog numbers for specific breaker manufacturers and frames. When used in conjunction with the information obtained from this page, these pages contain all the information necessary to generate a catalog number.

How to Price a Kit

To correctly price a Low voltage Digitrip retrofit kit, refer to the *Retrofit Kit Product Guide*. This product guide includes base prices, adders and options for all low voltage Digitrip retrofit kits. For a copy of the *Retrofit Kit Product Guide*, contact your local Eaton Field Sales office or the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

Accessories

Description	Catalog Number	Style Number
Auxiliary power module	PRTAAPM	1267C16G01
Amptector and Digitrip test set (tests for both)		8779C02G02
Amptector adapter harness		6503C53G01
Amptector two-piece adapter harness (test set half)		6503C54G01
Amptector two-piece adapter harness (breaker half)		6503C55G01
External harness (zone interlock shorting plug non-DS)		6502C83G01
Simplified cell harness 1 ft		6506C34G01
Simplified cell harness 6 ft		6506C34G02
Simplified cell harness 4 ft		6506C34G03
Arcflash Reduction Maintenance System (ARMS)		
Non-DS		9A10160G01
DS with new Digitrip kit		9A10160G02
DS for existing Digitrip system		9A10160G03

Notes

At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910. From 1989 to 1996, the standard trip units were the RMS 500/600/700/800. **These trip units are no longer in production.** Replacement orders for the 500/600/700/800 trip units will be filled by the equivalent 510/610/810/910 trip units. Remember, when replacing a 500/600/700/800 unit with a 510/610/810/910, the rating plug must also be replaced.

Rating plugs for the 500/600/700/800 trip units will still be available. **These rating plugs are not interchangeable with the 510/610/810/910 trip units. Likewise, rating plugs for the 510/610/810/910 are not interchangeable with the 500/600/700/800 trip units.**

Digitrip RMS Trip Unit Retrofit Kits for Westinghouse DA and DK Breakers

Replacement and Upgrade Capabilities

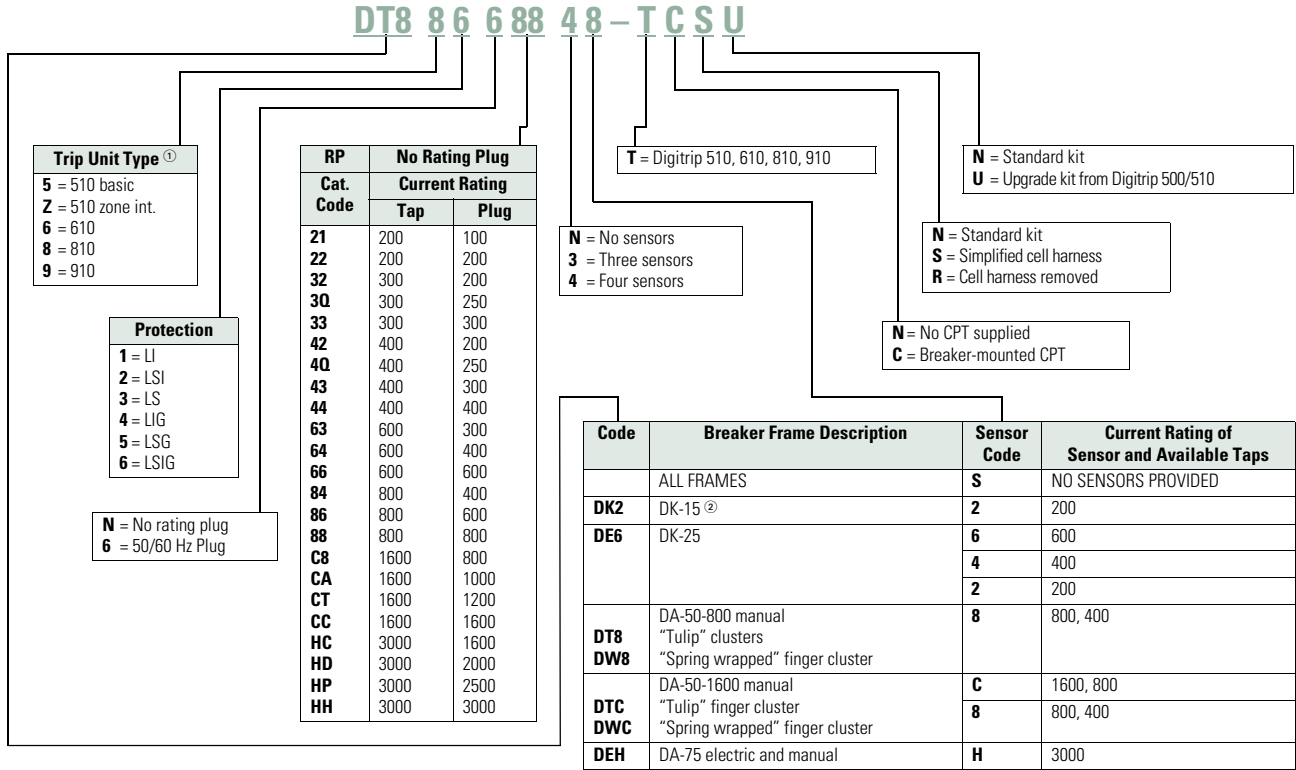
Replacement and upgrade capabilities include replacement Digitrip trip units and rating plugs, Digitrip trip unit upgrades, Digitrip RMS trip unit retrofit kits and upgrade retrofit kits. For definitions of these solutions see **Page V12-T17-19**.

For Digitrip RMS trip unit retrofit kits and upgrade retrofit kits, create the Digitrip RMS retrofit kit catalog number to match the Westinghouse DA or DK breaker type, retrofit kit type, protection function, rating plug type, current sensor type, CPT, and type of kit required for application. See the example provided on **Page V12-T17-30**.

Application Notes for DA and DK Power Circuit Breakers

1. Retrofit kits are for use on 50 and 60 Hz distribution systems.
2. All retrofit kits are designed for drawout power circuit breakers only. Refer all fixed-mounted breaker applications to the Digitrip retrofit kit Technical Service Center at **1-800-937-5487**.
3. The breaker compartment doors on the switchgear assembly must be free of panel-mounted instruments and devices (i.e., ammeters, switches, etc.) or the retrofitted breaker may interfere with these devices when the compartment door is closed.
4. When the ground fault (G) option is selected, please observe the following:
 - a. For three-phase, three-wire solidly grounded systems, choose quantity three current sensors in the catalog number development.
 - b. For three-phase, four-wire solidly grounded systems, choose quantity four current sensors in the catalog number development. Three sensors are mounted on the breaker and one sensor is mounted on the switchgear neutral. Hardware to mount the current sensor on the switchgear neutral and provisions to wire it into the trip unit circuit (including a required pair of breaker secondary disconnecting contacts) are not included in the kit.
5. RMS 510 Zone, 610, 810 and 910 retrofit kits include a cell terminal block assembly that must be installed in the switchgear assembly. Internal switchgear wiring to accommodate the customer application schemes must be added in the field.
6. RMS 610, 810 and 910 retrofit kits require a customer supplied 120 Vac source connected to the cell terminal block assembly to power the Digitrip RMS digital displays and communications functions (as applicable).

Digitrip RMS Retrofit Kits for Westinghouse DA and DK Breakers Catalog Numbering System



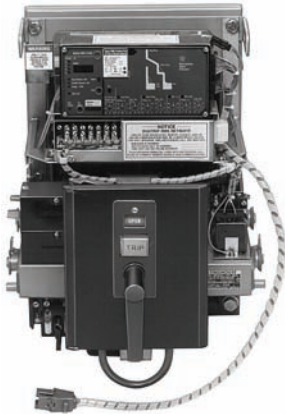
Notes

- ① At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910.
- ② Maximum ampere rating is 200A.

Example shown is a Digitrip retrofit kit for a DA-50-800 manual, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz plug, rated at 800A for a sensor tap of 800A, four sensors (for a four-wire ground system) that have a sensor tap of 800A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information is included in the *Retrofit Kit Product Guide*. For a copy of the *Retrofit Kit Product Guide*, contact your local Eaton Field Sales office or the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

Digitrip RMS Retrofit Kits for Westinghouse DB Breakers



DB-25 Breaker Retrofitted with Digitrip RMS 810 Retrofit Kit



Typical Digitrip RMS 810 Retrofit Kit for a DB-25 Power Circuit Breaker

Product Description

Digitrip RMS retrofit kits for Westinghouse DB and DBL power circuit breakers were first introduced in 1989. For a complete description of the Digitrip RMS trip system and the features of models RMS 510, 610, 810 and 910, see **Page V12-T17-20**.

Ratings

Digitrip RMS retrofit kits are applied on DB breakers with frame ratings from 225A (DB-15) to 4000A (DB-100) as identified below. The rating plug and the current sensor rating act in concert to provide for a wide spectrum of overload and short-circuit settings.

Chronology

Digitrip RMS retrofit kits and replacement trip units for DB breakers became available around 1989. The Digitrip RMS 510 model is the modern day replacement for the Amptector and RK trip systems.

Replacement and Upgrade Capabilities

Replacement and upgrade capabilities include replacement Digitrip trip units and rating plugs, Digitrip trip unit upgrades, Digitrip RMS trip unit retrofit kits and upgrade retrofit kits. For definitions of these solutions, see

Page V12-T17-19.

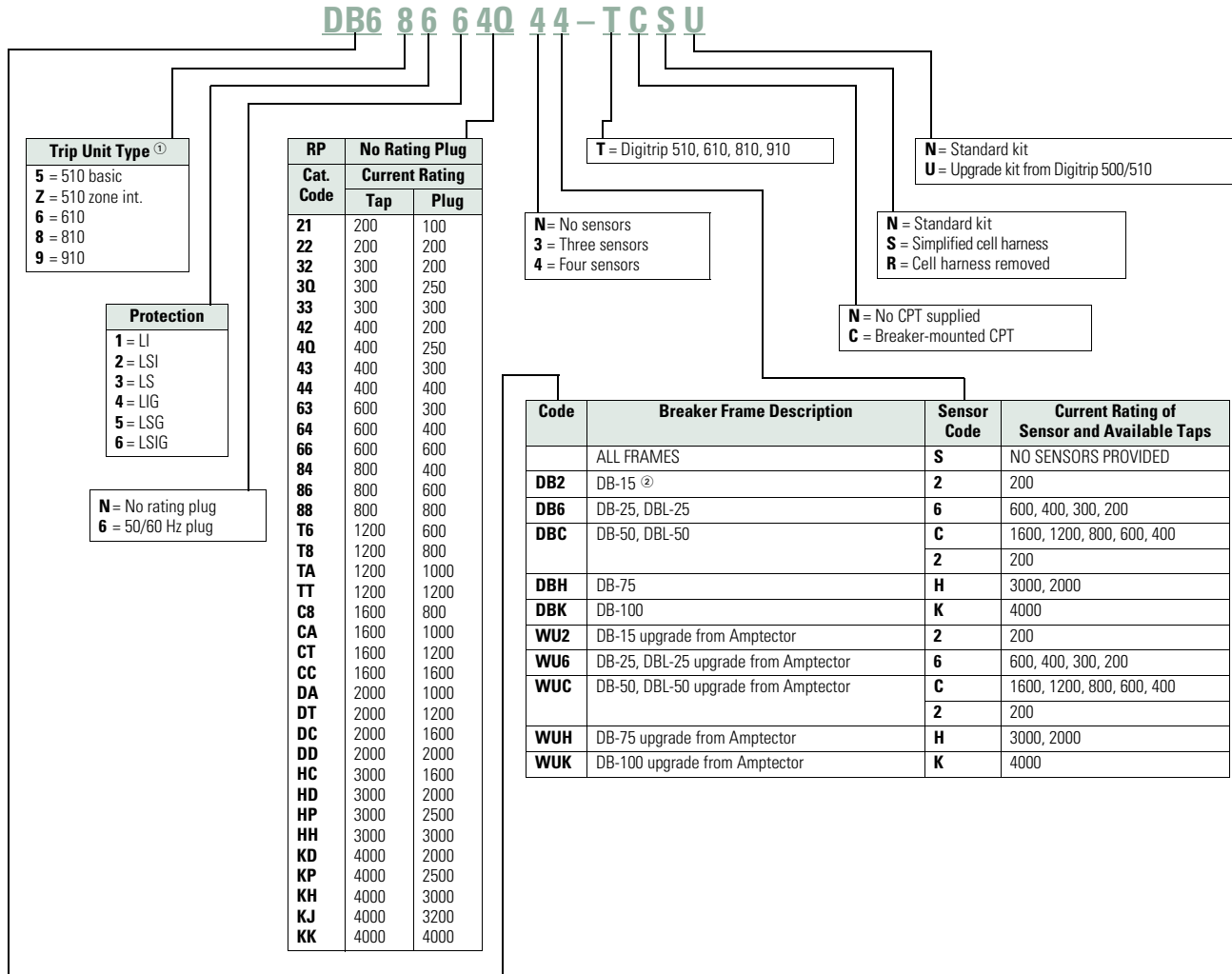
For Digitrip RMS trip unit retrofit kits and upgrade retrofit kits, create the Digitrip RMS retrofit kit catalog number to match the Westinghouse DB breaker type, retrofit kit type, protection function, rating plug type, current sensor type, CPT and type of kit required for application. See the example provided on **Page V12-T17-32**.

Application Notes for Westinghouse DB and DBL Power Circuit Breakers

1. Retrofit kits are for use on 50 and 60 Hz distribution systems.
2. All retrofit kits are designed for drawout power circuit breakers only. Refer all fixed-mounted breaker applications to the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.
3. The breaker compartment doors on the switchgear assembly must be free of panel-mounted instruments and devices (i.e., ammeters, switches, etc.) or the retrofitted breaker may interfere with these devices when the compartment door is closed.

4. Type DB-15 and DBL breaker components may have a metal baffle on the inside of the compartment door. If so, the baffle will have to be removed to accommodate the retrofitted DB breaker.
5. Contact your local Eaton office if the existing DB breaker has both an undervoltage trip device (UVTA) and a shunt trip.
6. When the ground fault (G) option is selected, please observe the following:
 - a. For three-phase, three-wire solidly grounded systems, choose quantity three current sensors in the catalog number development.
 - b. For three-phase, four-wire solidly grounded systems, choose a quantity of four current sensors in the catalog number development. Three sensors are mounted on the breaker and one sensor is mounted on the switchgear neutral. Hardware to mount the current sensor on the switchgear neutral and provisions to wire it into the trip unit circuit (including a required pair of breaker secondary disconnecting contacts) are not included in the kit.
7. RMS 510 Zone, 610, 810 and 910 retrofit kits include a cell terminal block assembly that must be installed in the switchgear assembly. Internal switchgear wiring to accommodate the customer application schemes must be added in the field.
8. RMS 610, 810 and 910 retrofit kits require a customer supplied 120 Vac source connected to the cell terminal block assembly to power the Digitrip RMS digital displays and communications functions (as applicable).
9. If the existing DB breaker has been retrofitted with an Amptector trip system, and a Digitrip RMS retrofit is desired, contact the Digitrip Retrofit Kit Service Center at **1-800-937-5487** for details.

Digitrip RMS Retrofit Kits for Westinghouse DB Breakers Catalog Numbering System



Notes

- ① At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910.
- ② Maximum ampere rating is 200A.

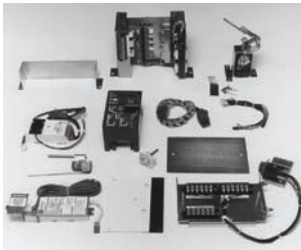
Sample shown is a Digitrip retrofit kit for a DB-25, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz Plug, rated at 250A for a sensor tap of 400A, four sensors (for a four-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information is included in the *Retrofit Kit Product Guide*. For a copy of the *Retrofit Kit Product Guide*, contact your local Eaton Field Sales office or the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

Digitrip RMS Retrofit Kits for Westinghouse DS Breakers



DS Breaker Retrofitted with Digitrip RMS 810 Retrofit Kit



Typical Digitrip RMS 810 Retrofit Kit for a DS Power Circuit Breaker

Product Description

Digitrip RMS retrofit kits for Westinghouse DS and DSL power circuit breakers were first introduced in 1987. For a complete description of the Digitrip RMS Trip System and the features of models RMS 510, 610, 810 and 910, see **Page V12-T17-20**.

Ratings

Digitrip RMS retrofit kits are applied on DS breakers with frame ratings from 800A (DS-206) to 4000A (DS-840) as identified below. The rating plug and the current sensor rating act in concert to provide for a wide spectrum of overload and short-circuit settings.

Chronology

Digitrip RMS retrofit kits and replacement trip units for DS breakers became available around 1987. The Digitrip RMS 510 model is the modern day replacement for the Amptector trip systems.

Replacement and Upgrade Capabilities

Replacement and upgrade capabilities include replacement Digitrip trip units and rating plugs, Digitrip trip unit upgrades, Digitrip RMS trip unit retrofit kits and upgrade retrofit kits. For definitions of these solutions, see **Page V12-T17-19**.

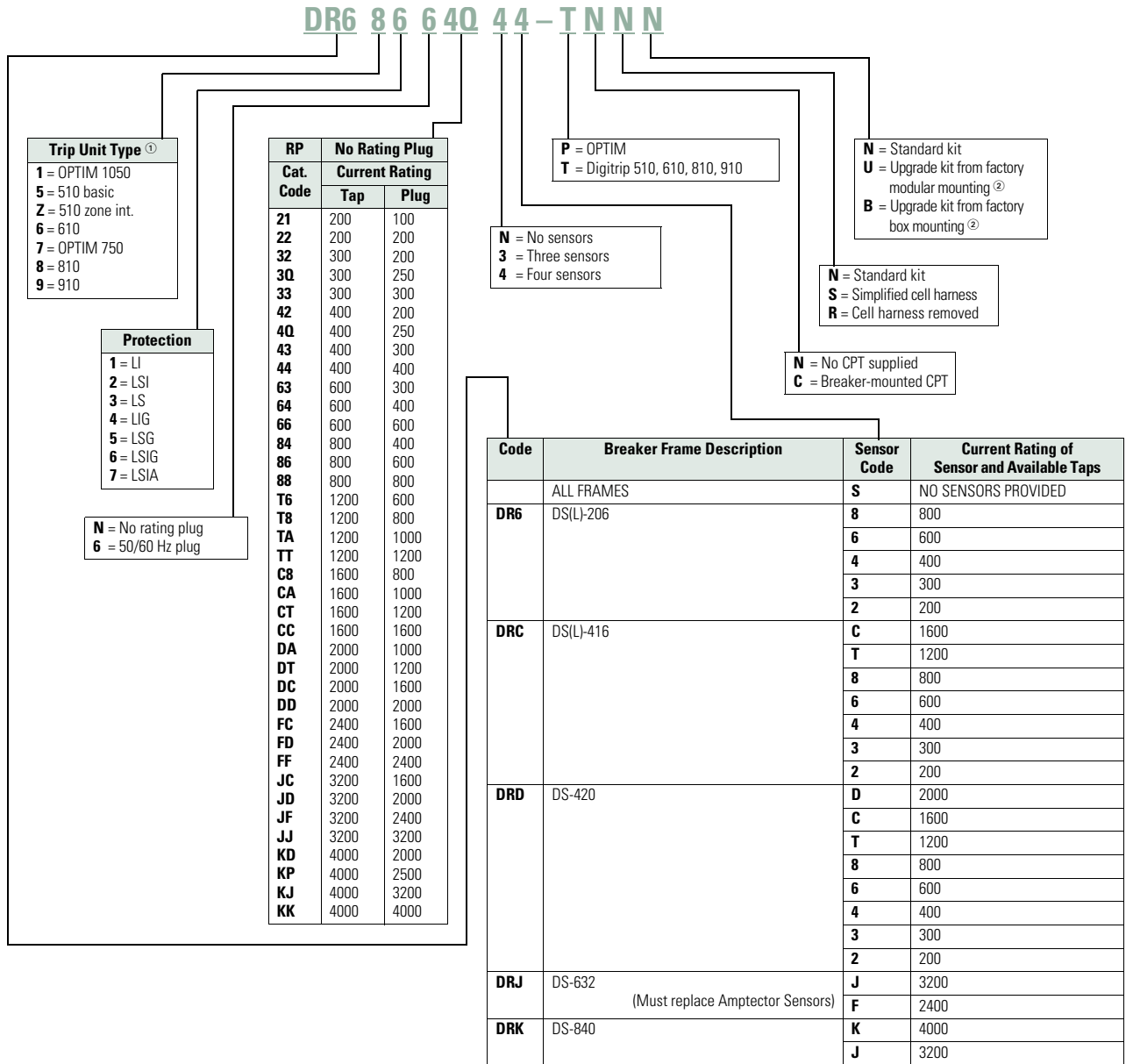
For Digitrip RMS trip unit retrofit kits and upgrade retrofit kits, create the Digitrip RMS retrofit kit catalog number to match the Cutler-Hammer or Westinghouse DS breaker type, retrofit kit type, protection function, rating plug type, current sensor type, CPT, and type of kit required for application. See the example provided on **Page V12-T17-34**.

Application Notes for Cutler-Hammer or Westinghouse DS and DSL Power Circuit Breakers

1. Retrofit kits are for use on 50 and 60 Hz distribution systems.
2. All retrofit kits are designed for drawout power circuit breakers only. Refer all fixed-mounted breaker applications to the Eaton Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

3. The breaker compartment doors on the switchgear assembly must be free of panel-mounted instruments and devices (i.e., ammeters, switches, etc.) or the retrofitted breaker may interfere with these devices when the compartment door is closed.
4. When the ground fault (G) option is selected, please observe the following:
 - a. For three-phase, three-wire solidly grounded systems, choose quantity three current sensors in the catalog number development.
 - b. For three-phase, four-wire solidly grounded systems, choose quantity four current sensors in the catalog number development. Three sensors are mounted on the breaker and one sensor is mounted on the switchgear neutral. Hardware to mount the current sensor on the switchgear neutral and provisions to wire it into the trip unit circuit (including a required pair of breaker secondary disconnecting contacts) are not included in the kit.
5. RMS 510, 610, 810 and 910 retrofit kits include a cell terminal block assembly that must be installed in the switchgear assembly. Internal switchgear wiring to accommodate the customer application schemes must be added in the field.
6. RMS 610, 810 and 910 retrofit kits require a customer supplied 120 Vac source connected to the cell terminal block assembly to power the Digitrip RMS digital displays and communications functions (as applicable).

Digitrip RMS Retrofit Kits for Westinghouse DS Breakers Catalog Numbering System



Notes

- ① At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910.
- ② If breaker has been previously retrofitted, call the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

Sample shown is a Digitrip retrofit kit for a DS-206, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz plug, rated at 250A for a sensor tap of 400A, four sensors (for a four-wire ground system) that have a sensor tap of 400A, and there are no other features so this is a standard original kit.

This information is subject to change. Updated pricing and availability information is included in the *Retrofit Kit Product Guide*. For a copy of the *Retrofit Kit Product Guide*, contact your local Eaton Field Sales office or the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

Digitrip RMS Retrofit Kits for Westinghouse SPB Breakers



SPB-100 Series—3000A Frame
—Digitrip RMS



Rear View of Plug Adapter Box
and Digitrip RMS 510 (Typical Parts
of Retrofit Kit)

Product Description

Digitrip RMS retrofit kits for Westinghouse SPB power circuit breakers equipped with Pow-R Trip 7 or Pow-R Digitrip trip units were first introduced in 1989. Field retrofits are limited to the RMS 510 model. For a complete description of the Digitrip RMS trip system, see **Page V12-T17-20**.

Ratings

Digitrip RMS 510 retrofit kits are applied on SPB breakers with frame ratings from 400A (SPB-50) to 5000A (SPB-150) as identified on **Page V12-T17-25**. The rating plug and the current sensor rating act in concert to provide for a wide spectrum of overload and short-circuit settings.

Chronology

Digitrip RMS retrofit kits for SPB breakers became available around 1989. The Digitrip RMS 510 model is the only model that is available. Retrofits are limited to SPB breakers equipped with a Pow-R Trip 7 or Pow-R Digitrip (also known as Digitrip 1) trip units.

Replacement and Upgrade Capabilities

Replacement and upgrade capabilities include replacement Digitrip trip units and rating plugs, Digitrip trip unit upgrades, Digitrip RMS trip unit retrofit kits and upgrade retrofit kits. For definitions of these solutions see **Page V12-T17-19**.

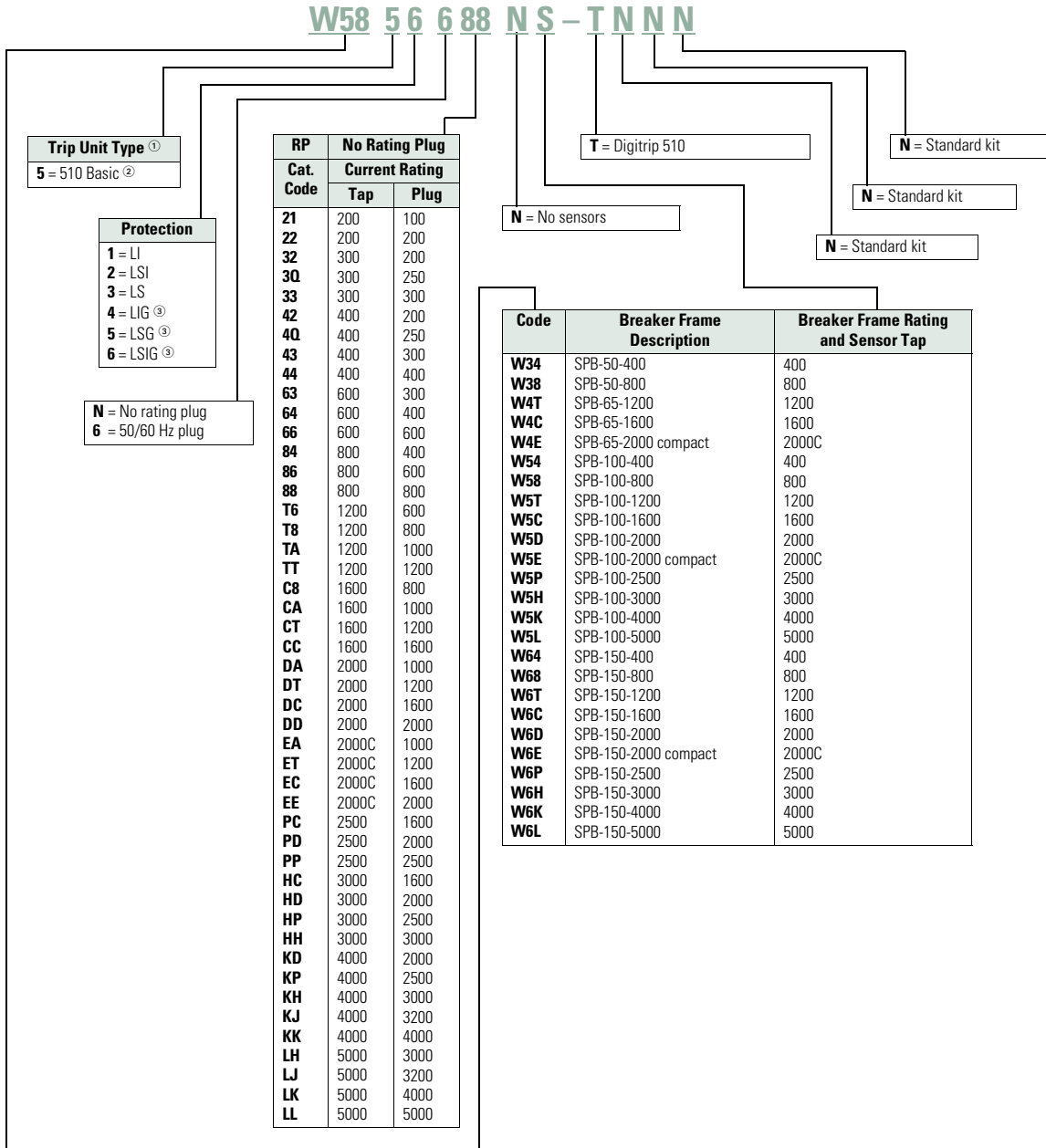
For Digitrip RMS trip unit retrofit kits and upgrade retrofit kits, create the Digitrip RMS retrofit kit catalog number to match the Cutler-Hammer or Westinghouse SPB breaker type, retrofit kit type, protection function, rating plug type, current sensor type, CPT and type of kit required for application. See the example provided on **Page V12-T17-36**.

Application Notes for Cutler-Hammer or Westinghouse SPB Power Circuit Breakers

1. Retrofit kits are for use on 50 and 60 Hz distribution systems.
2. Only SPB breakers equipped with a Pow-R Trip 7 or Pow-R Digitrip (also known as Digitrip 1) trip units are retrofittable at this time. Breakers equipped with a Pow-R trip cannot be retrofitted.
3. SPB breakers installed in automatic transfer switches and equipped with a bell alarm contact cannot be retrofitted at this time.

4. An automatic trip relay (ATR) is a remote mounted accessory breaker designed to provide visual trip mode indication, alarm and lockout interlocking circuitry following a breaker automatic tripping operation. SPB breakers equipped with Pow-R Trip 7 and this ATR must purchase a separate ATR adapter kit. SPB adapter kit with ground fault: 4A35718G02. SPB adapter kit without ground fault: 4A35718G01.
5. An SPB breaker with a 250A frame rating can not be retrofitted.
6. Ground fault protection cannot be added to the SPB breaker. The breaker must be originally equipped with ground fault protection, for ground fault protection to be selected. Changing the ground fault protection from three-wire to four-wire is not permitted. Interchanging between LI, LS, LSI, LIG, LSG or LSI is not permitted.
7. SPB breakers equipped with zone interlocking for short time and/or ground fault time delays can be retrofitted, provided that the existing zone interlock configuration is not changed.
8. For Digitrip RMS trip unit replacements, see **Page V12-T17-21**. For Pow-R Trip 7 trip unit replacements, see **Page V12-T17-36**.
9. A factory retrofit is possible for applications requiring Digitrip RMS 610, 810 and 910. Call factory for more information at **1-800-222-9773**.
10. SPB breakers retrofitted with Digitrip RMS can be tested with primary injection testing and trip unit self test. Secondary injection testing is not available.

Digitrip RMS Retrofit Kits for Westinghouse SPB Breakers Catalog Numbering System



Notes

- ① At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910.
- ② Digitrip 610, 810 and 910 are not available for SPB breaker retrofit kits. A factory upgrade program is available. Call factory for more information at **1-800-222-9773**.
- ③ SPB breakers supplied from factory without ground fault (G) cannot be retrofitted in the field to include ground fault.

This information is subject to change. Updated pricing and availability information is included in the *Retrofit Kit Product Guide*. For a copy of the *Retrofit Kit Product Guide*, contact your local Eaton Field Sales office or the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

Digitrip RMS Retrofit Kits for Westinghouse DB Breakers



DB-25 Breaker Retrofitted with Digitrip RMS 810 Retrofit Kit



Typical Digitrip RMS 810 Retrofit Kit for a DB-25 Power Circuit Breaker

Product Description

Digitrip RMS retrofit kits for Westinghouse DB and DBL power circuit breakers were first introduced in 1989. For a complete description of the Digitrip RMS trip system and the features of models RMS 510, 610, 810 and 910, see **Page V12-T17-20**.

Ratings

Digitrip RMS retrofit kits are applied on DB breakers with frame ratings from 225A (DB-15) to 4000A (DB-100) as identified below. The rating plug and the current sensor rating act in concert to provide for a wide spectrum of overload and short-circuit settings.

Chronology

Digitrip RMS retrofit kits and replacement trip units for DB breakers became available around 1989. The Digitrip RMS 510 model is the modern day replacement for the Amptector and RK trip systems.

Replacement and Upgrade Capabilities

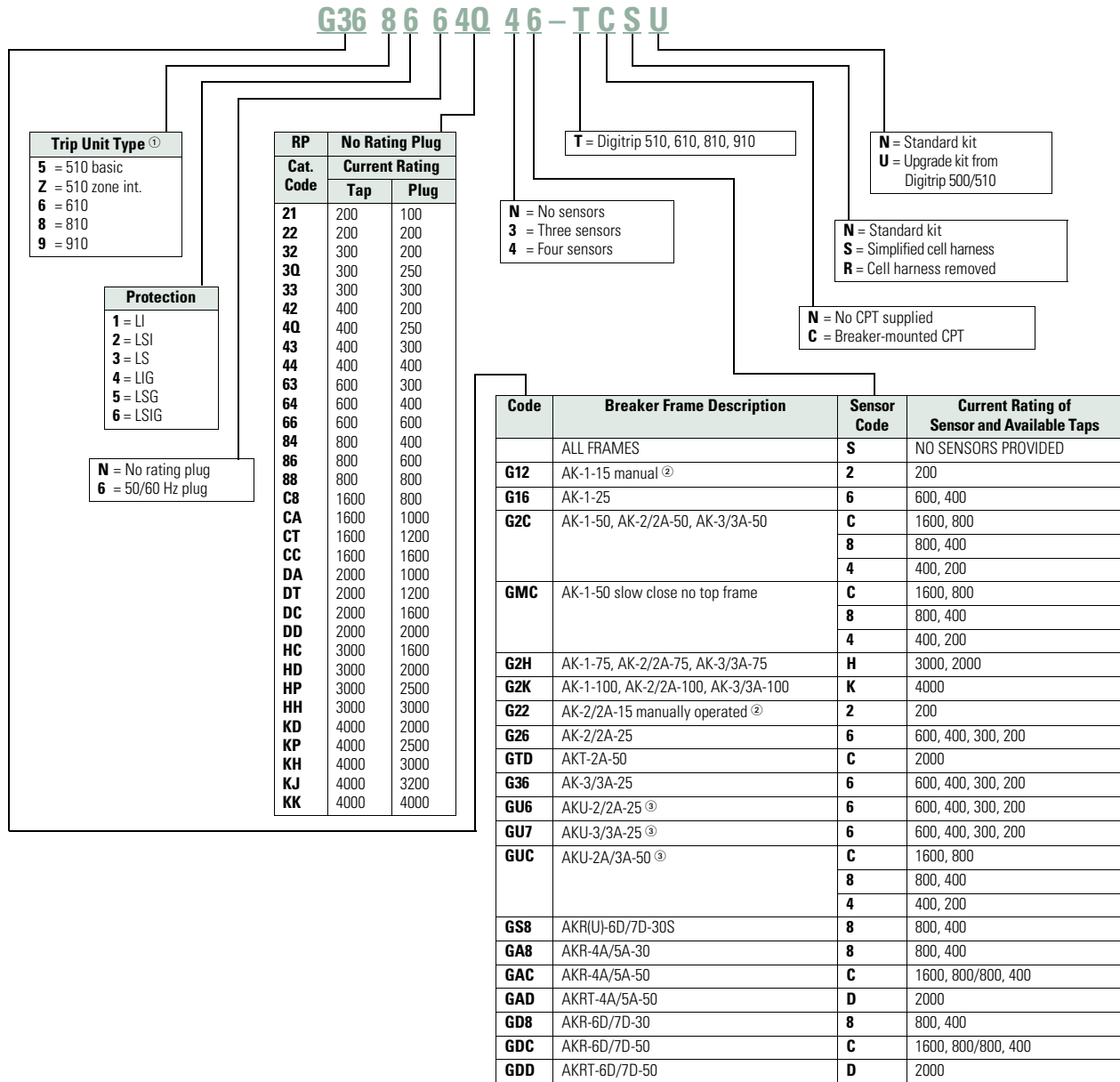
Replacement and upgrade capabilities include replacement Digitrip trip units and rating plugs, Digitrip trip unit upgrades, Digitrip RMS trip unit retrofit kits and upgrade retrofit kits. For definitions of these solutions, see **Page V12-T17-19**.

For Digitrip RMS trip unit retrofit kits and upgrade retrofit kits, create the Digitrip RMS retrofit kit catalog number to match the Westinghouse DB breaker type, retrofit kit type, protection function, rating plug type, current sensor type, CPT and type of kit required for application. See the example provided on **Page V12-T17-32**.

Application Notes for Westinghouse DB and DBL Power Circuit Breakers

1. Retrofit kits are for use on 50 and 60 Hz distribution systems.
2. All retrofit kits are designed for drawout power circuit breakers only. Refer all fixed-mounted breaker applications to the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.
3. The breaker compartment doors on the switchgear assembly must be free of panel-mounted instruments and devices (i.e., ammeters, switches, etc.) or the retrofitted breaker may interfere with these devices when the compartment door is closed.
4. Type DB-15 and DBL breaker components may have a metal baffle on the inside of the compartment door. If so, the baffle will have to be removed to accommodate the retrofitted DB breaker.
5. Contact your local Eaton office if the existing DB breaker has both an undervoltage trip device (UVTA) and a shunt trip.
6. When the ground fault (G) option is selected, please observe the following:
 - a. For three-phase, three-wire solidly grounded systems, choose quantity three current sensors in the catalog number development.
 - b. For three-phase, four-wire solidly grounded systems, choose a quantity of four current sensors in the catalog number development. Three sensors are mounted on the breaker and one sensor is mounted on the switchgear neutral. Hardware to mount the current sensor on the switchgear neutral and provisions to wire it into the trip unit circuit (including a required pair of breaker secondary disconnecting contacts) are not included in the kit.
7. RMS 510 zone, 610, 810 and 910 retrofit kits include a cell terminal block assembly that must be installed in the switchgear assembly. Internal switchgear wiring to accommodate the customer application schemes must be added in the field.
8. RMS 610, 810 and 910 retrofit kits require a customer supplied 120 Vac source connected to the cell terminal block assembly to power the Digitrip RMS digital displays and communications functions (as applicable).
9. If the existing DB breaker has been retrofitted with an Amptector trip system, and a Digitrip RMS retrofit is desired, contact the Digitrip Retrofit Kit Service Center at **1-800-937-5487** for details.

Digitrip RMS Retrofit Kits for General Electric AK Breakers Catalog Numbering System



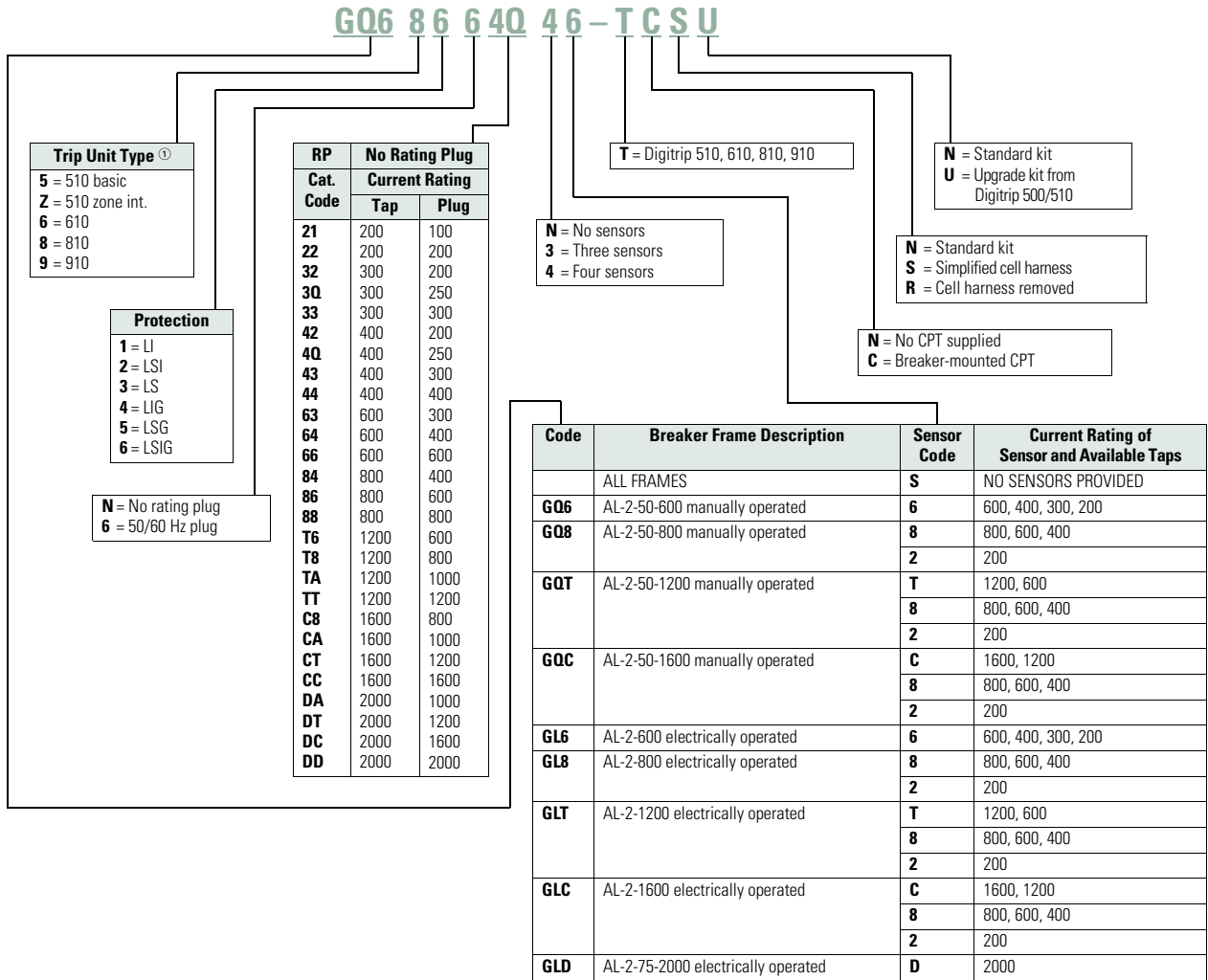
Notes

- ① At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910.
- ② Maximum ampere rating is 200A.
- ③ Use GU6, GU7, GUC kits only for breakers with top-mounted fuses. For breakers with bottom-mounted fuses, use standard kit.

This information is subject to change. Updated pricing and availability information is included in the *Retrofit Kit Product Guide*. For a copy of the *Retrofit Kit Product Guide*, contact your local Eaton Field Sales office or the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

General Electric AL-2-50-75 Breakers—Trip Unit Retrofit Kits

Digitrip RMS Retrofit Kits for General Electric AL-2-50-75 Breakers Catalog Numbering System



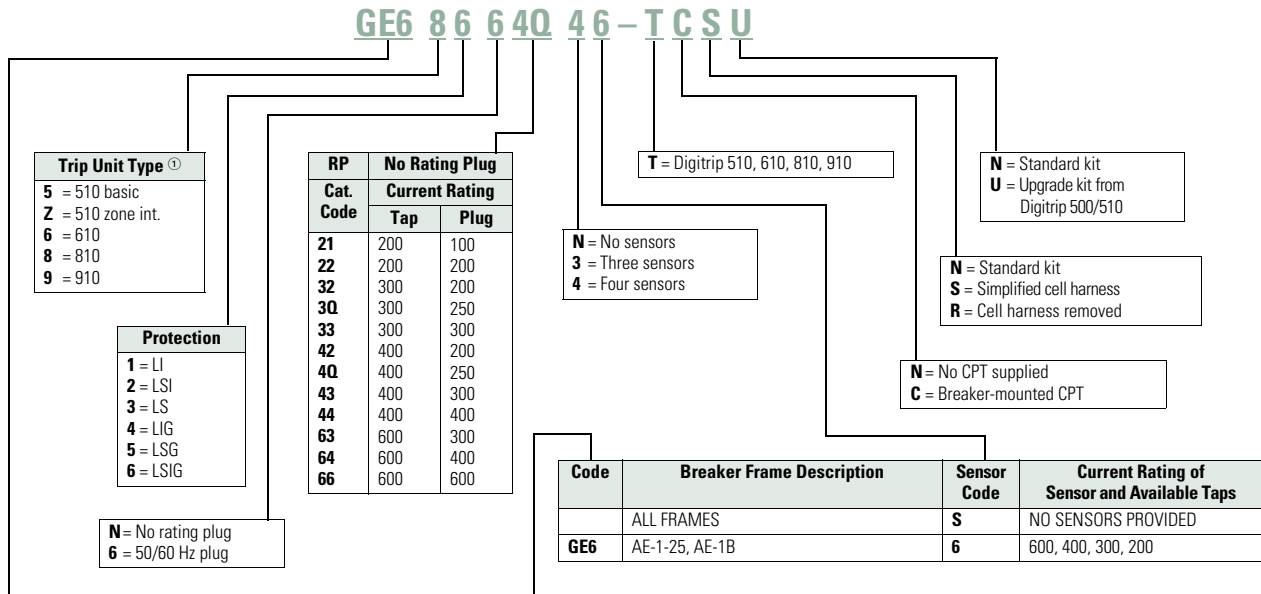
Note

① At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910.

Sample shown is a Digitrip retrofit kit for an AL-2-50-600 manually operated, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz plug, rated at 250A for a sensor tap of 400A, four sensors (for a four-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information is included in the *Retrofit Kit Product Guide*. For a copy of the *Retrofit Kit Product Guide*, contact your local Eaton Field Sales office or the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

Digitrip RMS Retrofit Kits for Other General Electric Breakers Catalog Numbering System



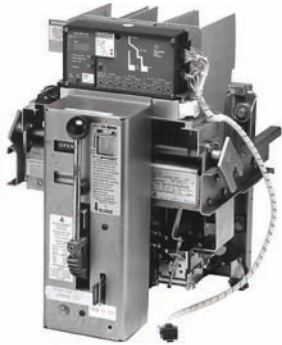
Note

① At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910.

Sample shown is a Digitrip retrofit kit for an AE-1-25, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz plug, rated at 250A for a sensor tap of 400A, four sensors (for a four-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information is included in the *Retrofit Kit Product Guide*. For a copy of the *Retrofit Kit Product Guide*, contact your local Eaton Field Sales office or the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

Digitrip RMS Retrofit Kits for Allis-Chalmers LA Breakers



**Allis-Chalmers LA 600 Gold Breaker
Retrofitted with Digitrip
RMS 810 Retrofit Kit**



**Typical RMS 810 Retrofit Kit
for Allis-Chalmers LA 600
Gold Power Circuit Breaker**

Product Description

Digitrip RMS retrofit kits for Allis-Chalmers LA power circuit breakers were first introduced in 1991. For a complete description of the Digitrip RMS trip system and the features of models RMS 510, 610, 810 and 910, see **Page V12-T17-20**.

Ratings

Digitrip RMS retrofit kits are applied on Allis-Chalmers breakers from 600A (LA 600) to 3000A (LA 3000). The rating plug and the current sensor act in concert to provide for a wide spectrum of overload and short-circuit settings.

Chronology

Digitrip RMS retrofit kits and replacement trip units for Allis-Chalmers LA breakers became available in 1991. The Digitrip RMS 510 model is the modern day replacement for electromechanical trip device or peak sensing solid-state trip systems.

Replacement and Upgrade Capabilities

Replacement and upgrade capabilities include replacement Digitrip trip units and rating plugs, Digitrip trip unit upgrades, Digitrip RMS trip unit retrofit kits and upgrade retrofit kits. For definitions of these solutions, see **Page V12-T17-19**.

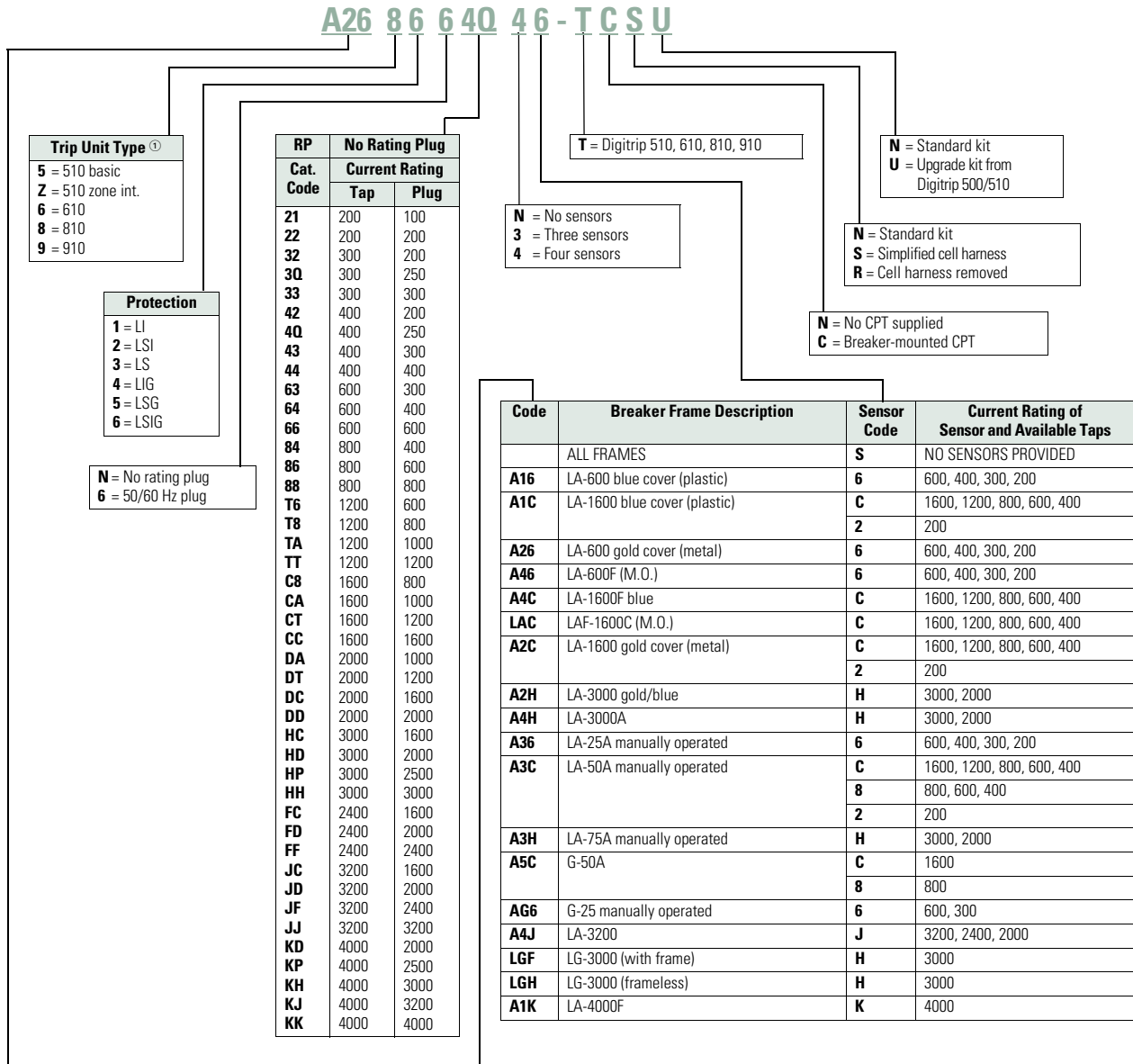
For Digitrip RMS trip unit retrofit kits and upgrade retrofit kits, choose or create the Digitrip RMS retrofit kit catalog number to match the Allis-Chalmers LA breaker type, retrofit kit type, protection function, rating plug type, current sensor type, CPT and type of kit required for application. See the example provided on **Page V12-T17-42**.

Application Notes for Allis-Chalmers LA Power Circuit Breakers

1. Retrofit kits are for use on 50 and 60 Hz distribution systems.
2. All retrofit kits are designed for drawout power circuit breakers only. Refer all fixed-mounted breaker applications to the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

3. The breaker compartment doors on the switchgear assembly must be free of panel-mounted instruments (i.e., meters, instruments, control switches, indicating lamps, etc.) or the retrofitted breaker may interfere with these devices when the compartment door is closed.
4. When the ground fault (G) option is selected, please observe the following:
 - a. For three-phase, three-wire solidly grounded systems, choose quantity three current sensors in the catalog number development.
 - b. For three-phase, four-wire solidly grounded systems, choose quantity four current sensors in the catalog number development. Three sensors are mounted on the breaker and one sensor is mounted on the switchgear neutral. Hardware to mount the current sensor on the switchgear neutral and provisions to wire it into the trip unit circuit (including a required pair of breaker secondary disconnecting contacts) are not included in the kit.
5. RMS 510 Zone, 610, 810 and 910 retrofit kits include a cell terminal block assembly that must be installed in the switchgear assembly. Internal switchgear wiring to accommodate the customer application schemes must be added in the field.
6. RMS 610, 810 and 910 retrofit kits require a customer supplied 120 Vac source connected to the cell terminal block assembly to power the Digitrip RMS digital displays and communications functions (as applicable).
7. Refer all LAF (LA breakers with current limiters) breakers to the Digitrip Retrofit Kit Service Center at **1-800-937-5487** for evaluation.

Digitrip RMS Retrofit Kits for Allis-Chalmers LA Breakers Catalog Numbering System



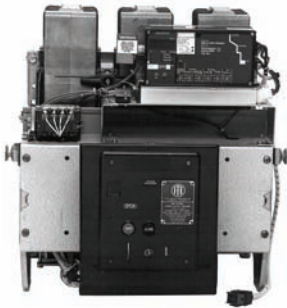
Note

Ⓞ At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910.

Sample shown is a Digitrip retrofit kit for an LA-600 gold, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz Plug, rated at 250A for a sensor tap of 400A, four sensors (for a four-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information is included in the *Retrofit Kit Product Guide*. For a copy of the *Retrofit Kit Product Guide*, contact your local Eaton Field Sales office or the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

Digitrip RMS Retrofit Kits for ITE K-Line Breakers



K-1600 Breaker Retrofitted with Digitrip RMS 810 Retrofit Kit



Typical Digitrip RMS 810 Retrofit Kit for ITE K-1600 Power Circuit Breaker

Product Description

Digitrip RMS retrofit kits for ITE K-Line power circuit breakers were first introduced in 1991. For a complete description of the Digitrip RMS trip system and the features of models RMS 510, 610, 810 and 910, see **Page V12-T17-20**.

Ratings

Digitrip RMS retrofit kits are applied on ITE K-Line breakers from 225A (K-225) to 3000A (K-3000), the rating plug and the current sensor rating act in concert to provide for a wide spectrum of overload and short-circuit settings.

Chronology

Digitrip RMS retrofit kits and replacement trip units for ITE K-Line breakers became available in 1991. The Digitrip RMS 510 model is the modern day replacement for electromechanical trip device or peak sensing solid-state trip systems.

Replacement and Upgrade Capabilities

Replacement and upgrade capabilities include replacement Digitrip trip units and rating plugs, Digitrip trip unit upgrades, Digitrip RMS trip unit retrofit kits and upgrade retrofit kits. For definitions of these solutions, see **Page V12-T17-19**.

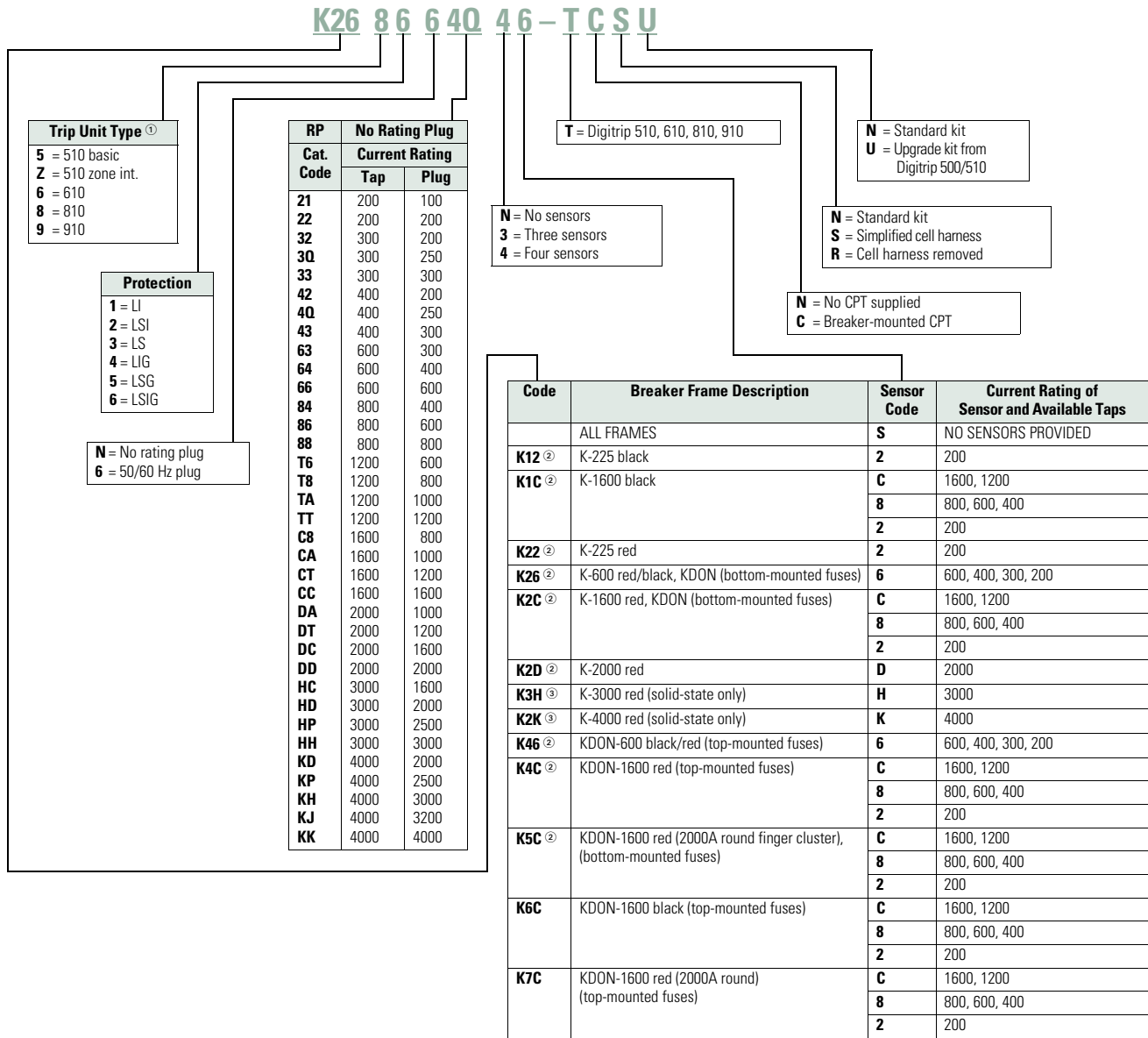
For Digitrip RMS trip unit retrofit kits and upgrade retrofit kits, choose or create the Digitrip RMS retrofit kit catalog number to match the ITE K-Line and other breaker types, retrofit kit type, protection function, rating plug type, current sensor type, CPT and type of kit required for application. See the examples provided on **Page V12-T17-44**.

Application Notes for ITE K-Line and other Power Circuit Breakers

1. Retrofit kits are for use on 50 and 60 Hz distribution systems.
2. All retrofit kits are designed for drawout power circuit breakers only. Refer all fixed-mounted breaker applications to the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

3. The breaker compartment doors on the switchgear assembly must be free of panel-mounted instruments and devices (i.e., ammeters, switches, etc.) or the retrofitted breaker may interfere with these devices when the compartment door is closed.
4. When the ground fault (G) option is selected, please observe the following:
 - a. For three-phase, three-wire solidly grounded systems, choose quantity three current sensors in the catalog number development.
 - b. For three-phase, four-wire solidly grounded systems, choose quantity four current sensors in the catalog number development. Three sensors are mounted on the breaker and one sensor is mounted on the switchgear neutral. Hardware to mount the current sensor on the switchgear neutral and provisions to wire it into the trip unit circuit (including a required pair of breaker secondary disconnecting contacts) are not included in the kit.
5. RMS 510 zone, 610, 810 and 910 retrofit kits include a cell terminal block assembly that must be installed in the switchgear assembly. Internal switchgear wiring to accommodate the customer application schemes must be added in the field.
6. RMS 610, 810 and 910 retrofit kits require a customer supplied 120 Vac source connected to the cell terminal block assembly to power the Digitrip RMS digital displays and communications functions (as applicable).
7. Refer all K-DON Series (K-Line breakers with current limiters) breakers to the Digitrip Retrofit Kit Service Center at **1-800-937-5487** for evaluation.

Digitrip RMS Retrofit Kits for ITE K-Line Breakers Catalog Numbering System



Notes

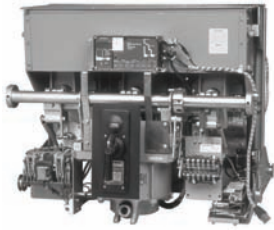
- ① At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910.
- ② Black and red refer to the color of the back plane insulation material.
- ③ If your breaker is not solid-state, call the Digitrip Retrofit Kit Service Center at **1-800-937-5487** for technical clarification on these kits.

Sample shown is a Digitrip retrofit kit for a K-600 with red back plane insulation, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz plug, rated at 250A for a sensor tap of 400A, four sensors (for a four-wire ground system) that have a sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was

previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information is included in the *Retrofit Kit Product Guide*. For a copy of the *Retrofit Kit Product Guide*, contact your local Eaton Field Sales office or the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

Digitrip Retrofit Kits for Other ITE Breakers



KE-4000 Breaker Retrofitted with Digitrip RMS 810 Retrofit Kit



Typical Digitrip RMS 810 Retrofit Kit for ITE KE-4000 Power Circuit Breaker

Product Description

Digitrip retrofit kits for ITE power circuit breakers were first introduced in 1992. For a complete description of the Digitrip RMS trip system and the features of models RMS 510, 610, 810 and 910, see **Page V12-T17-20**.

Ratings

Digitrip RMS retrofit kits are applied on ITE breakers from 600A (KB-600) to 3000A (KE-4000), the rating plug and the current sensor rating act in concert to provide for a wide spectrum of overload and short-circuit settings.

Chronology

Digitrip retrofit kits and replacement trip units for ITE breakers became available in 1992. The Digitrip RMS 510 model is the modern day replacement for electromechanical trip device or peak sensing solid-state trip systems.

Replacement and Upgrade Capabilities

Replacement and upgrade capabilities include replacement Digitrip trip units and rating plugs, Digitrip trip unit upgrades, Digitrip RMS trip unit retrofit kits and upgrade retrofit kits. For definitions of these solutions, see **Page V12-T17-19**.

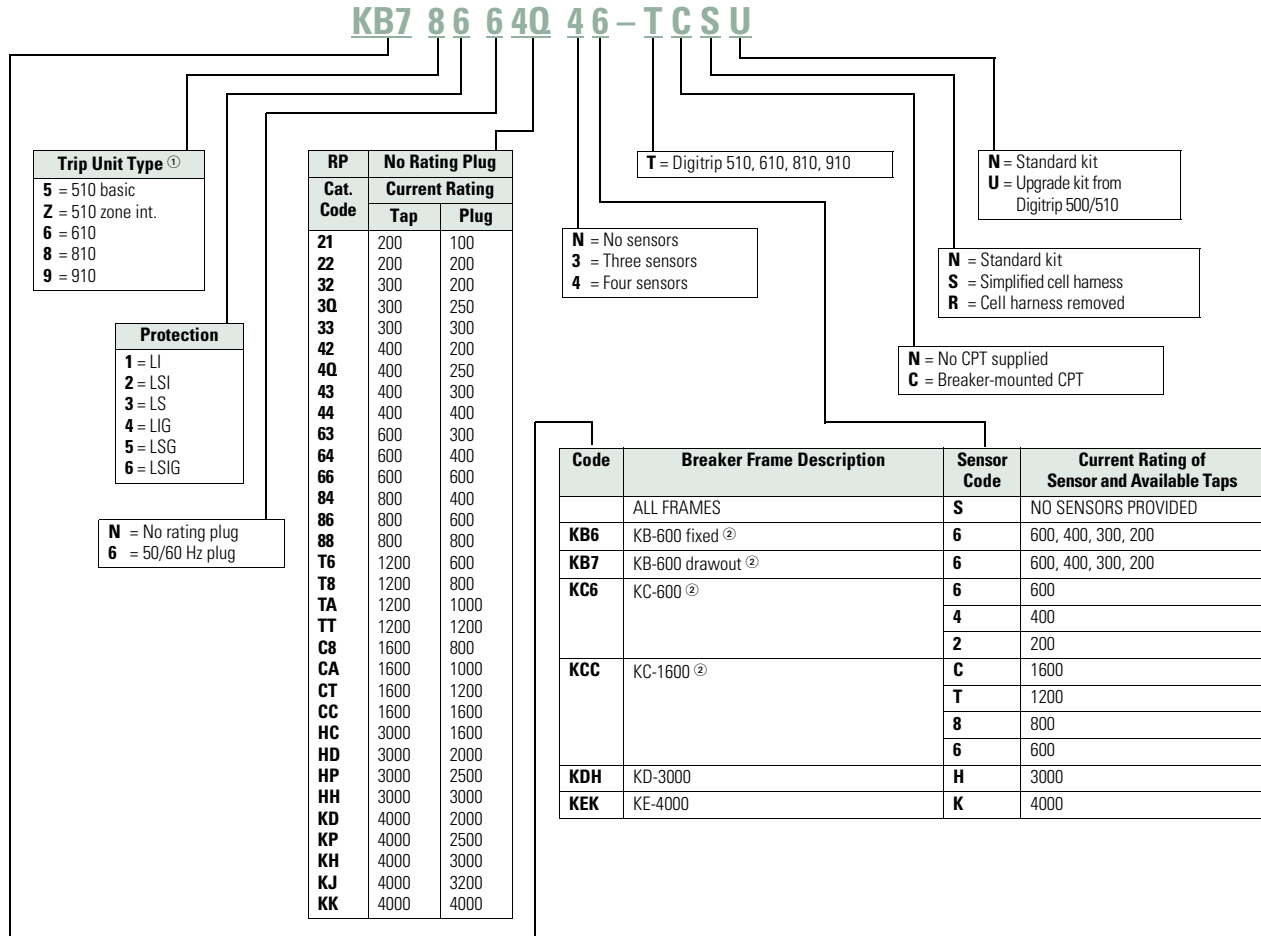
For Digitrip RMS trip unit retrofit kits and upgrade retrofit kits, choose or create the Digitrip RMS retrofit kit catalog number to match the ITE and other breaker types, retrofit kit type, protection function, rating plug type, current sensor type, CPT and type of kit required for application. See the examples provided on **Page V12-T17-46**.

Application Notes for ITE and Other Power Circuit Breakers

1. Retrofit kits are for use on 50 and 60 Hz distribution systems.
2. All retrofit kits are designed for drawout power circuit breakers only. Refer all fixed-mounted breaker applications to the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

3. The breaker compartment doors on the switchgear assembly must be free of panel-mounted instruments and devices (i.e., ammeters, switches, etc.) or the retrofitted breaker may interfere with these devices when the compartment door is closed.
4. When the ground fault (G) option is selected, please observe the following:
 - a. For three-phase, three-wire solidly grounded systems, choose quantity three current sensors in the catalog number development.
 - b. For three-phase, four-wire solidly grounded systems, choose a quantity of four current sensors in the catalog number development. Three sensors are mounted on the breaker and one sensor is mounted on the switchgear neutral. Hardware to mount the current sensor on the switchgear neutral and provisions to wire it into the trip unit circuit (including a required pair of breaker secondary disconnecting contacts) are not included in the kit.
5. RMS 510 Zone, 610, 810 and 910 retrofit kits include a cell terminal block assembly that must be installed in the switchgear assembly. Internal switchgear wiring to accommodate the customer application schemes must be added in the field.
6. RMS 610, 810 and 910 retrofit kits require a customer supplied 120 Vac source connected to the cell terminal block assembly to power the Digitrip RMS digital displays and communications functions (as applicable).
7. Refer all ITE breakers with current limiters to the Digitrip Retrofit Kit Service Center at **1-800-937-5487** for evaluation.

Digitrip RMS Retrofit Kits for Other ITE Breakers Catalog Numbering System



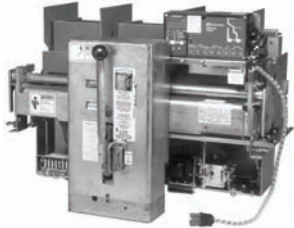
Notes

- ① At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910.
- ② Call the Digitrip Retrofit Kit Service Center at **1-800-937-5487** for technical clarification on these kits.

Sample shown is a Digitrip retrofit kit for a KB-600 drawout breaker, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz plug, rated at 250A for a sensor tap of 400A, four sensors (for a four-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information is included in the *Retrofit Kit Product Guide*. For a copy of the *Retrofit Kit Product Guide*, contact your local Eaton Field Sales office or the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

Digitrip Retrofit Kits for Siemens and Siemens-Allis Breakers



LAF-800 Breaker Retrofitted with Digitrip RMS 810 Retrofit Kit



Typical Digitrip RMS 810 Retrofit Kit for Siemens-Allis LAF-800 Power Circuit Breaker

Product Description

Digitrip retrofit kits for Siemens and Siemens-Allis power circuit breakers were first introduced in 1993. For a complete description of the Digitrip RMS trip system and the features of models RMS 510, 610, 810 and 910, see **Page V12-T17-20**.

Ratings

Digitrip RMS retrofit kits are applied on Siemens and Siemens-Allis breakers from 800A (LAF-800) to 4000A (RL-3000), the rating plug and the current sensor rating act in concert to provide for a wide spectrum of overload and short-circuit settings.

Chronology

Digitrip retrofit kits and replacement trip units for Siemens and Siemens-Allis breakers became available in 1992. The Digitrip RMS 510 model is the modern day replacement for electromechanical trip device or peak sensing solid-state trip systems.

Replacement and Upgrade Capabilities

Replacement and upgrade capabilities include replacement Digitrip trip units and rating plugs, Digitrip trip unit upgrades, Digitrip RMS trip unit retrofit kits and upgrade retrofit kits. For definitions of these solutions, see **Page V12-T17-19**.

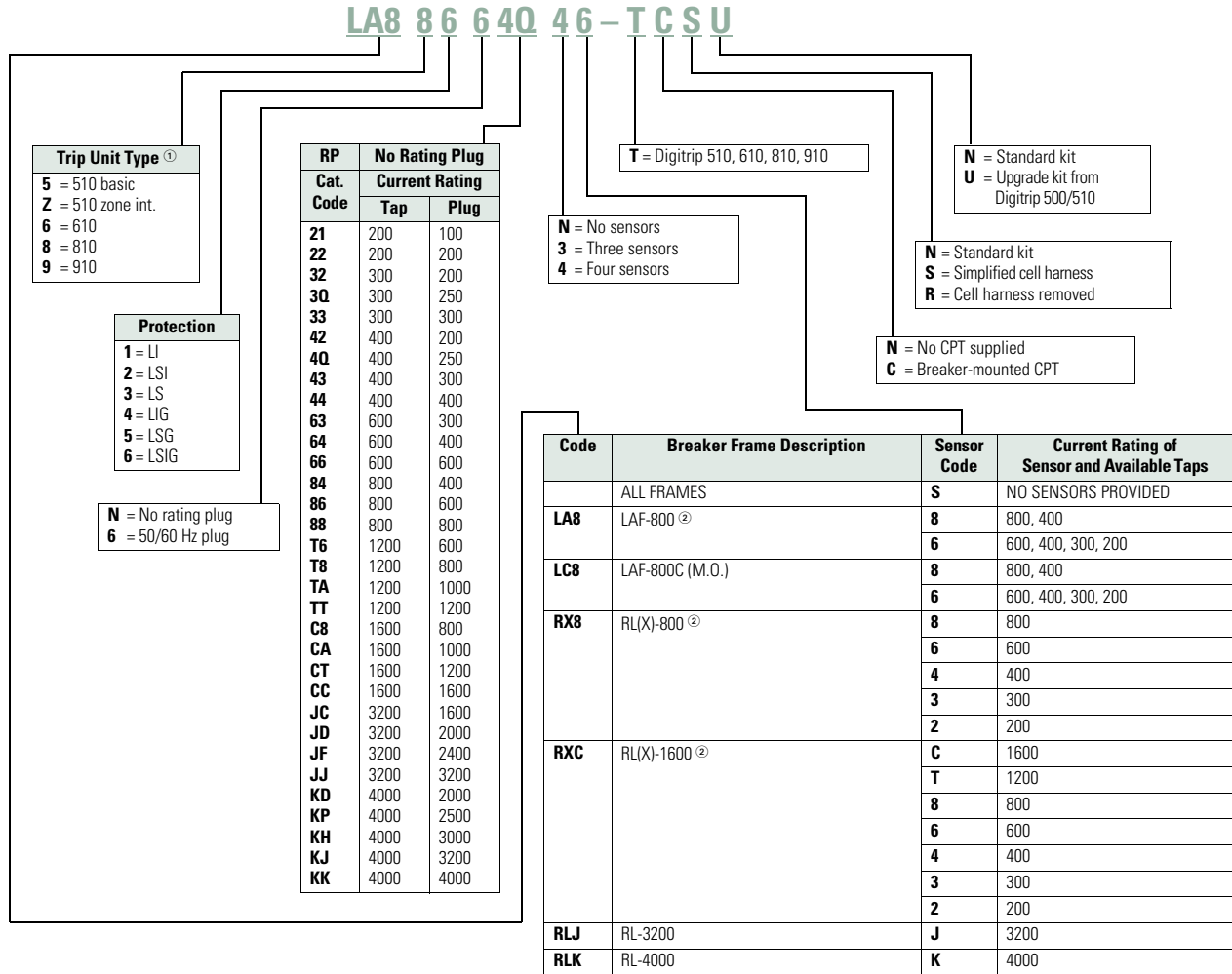
For Digitrip RMS trip unit retrofit kits and upgrade retrofit kits, choose or create the Digitrip RMS retrofit kit catalog number to match the Siemens and Siemens-Allis breaker types, retrofit kit type, protection function, rating plug type, current sensor type, CPT and type of kit required for application. See the examples provided on **Page V12-T17-48**.

Application Notes for Siemens and Siemens-Allis Power Circuit Breakers

1. Retrofit kits are for use on 50 and 60 Hz distribution systems.
2. All retrofit kits are designed for drawout power circuit breakers only. Refer all fixed-mounted breaker applications to the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

3. The breaker compartment doors on the switchgear assembly must be free of panel-mounted instruments and devices (i.e., ammeters, switches, etc.) or the retrofitted breaker may interfere with these devices when the compartment door is closed.
4. When the ground fault (G) option is selected, please observe the following:
 - a. For three-phase, three-wire solidly grounded systems, choose quantity three current sensors in the catalog number development.
 - b. For three-phase, four-wire solidly grounded systems, choose a quantity of four current sensors in the catalog number development. Three sensors are mounted on the breaker and one sensor is mounted on the switchgear neutral. Hardware to mount the current sensor on the switchgear neutral and provisions to wire it into the trip unit circuit (including a required pair of breaker secondary disconnecting contacts) are not included in the kit.
5. RMS 510 zone, 610, 810 and 910 retrofit kits include a cell terminal block assembly that must be installed in the switchgear assembly. Internal switchgear wiring to accommodate the customer application schemes must be added in the field.
6. RMS 610, 810 and 910 retrofit kits require a customer supplied 120 Vac source connected to the cell terminal block assembly to power the Digitrip RMS Digital displays and communications functions (as applicable).
7. Refer all Siemens and Siemens-Allis breakers with current limiters to the Digitrip Retrofit Kit Service Center at **1-800-937-5487** for evaluation.

Digitrip Retrofit Kits for Siemens and Siemens-Allis Breakers Catalog Numbering System



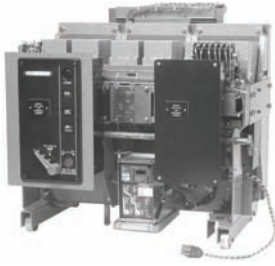
Notes

- ① At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910.
- ② Call the Digitrip Retrofit Kit Service Center at **1-800-937-5487** for technical clarification on these kits.

Sample shown is a Digitrip retrofit kit for an LAF-800, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz plug, rated at 250A for a sensor tap of 400A, four sensors (for a four-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information is included in the *Retrofit Kit Product Guide*. For a copy of the *Retrofit Kit Product Guide*, contact your local Eaton Field Sales office or the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

Digitrip Retrofit Kits for Federal Pacific Breakers



FPS-75 Breaker Retrofitted with Digitrip RMS 810 Retrofit Kit



Typical Digitrip RMS 810 Retrofit Kit for Federal Pacific FPS-75 Power Circuit Breaker

Product Description

Digitrip RMS retrofit kits for Federal Pacific power circuit breakers were first introduced in 1992. For a complete description of the Digitrip RMS trip system and the features of models RMS 510, 610, 810 and 910, see **Page V12-T17-20**.

Ratings

Digitrip RMS retrofit kits are applied on Federal Pacific breakers from 600A (FP-25) to 3000A (FPS-75), the rating plug and the current sensor rating act in concert to provide for a wide spectrum of overload and short-circuit settings.

Chronology

Digitrip retrofit kits and replacement trip units for Federal Pacific breakers became available in 1992. The Digitrip RMS 510 model is the modern day replacement for electromechanical trip device or peak sensing solid-state trip systems.

Replacement and Upgrade Capabilities

Replacement and upgrade capabilities include replacement Digitrip trip units and rating plugs, Digitrip trip unit upgrades, Digitrip RMS trip unit retrofit kits and upgrade retrofit kits. For definitions of these solutions, see **Page V12-T17-19**.

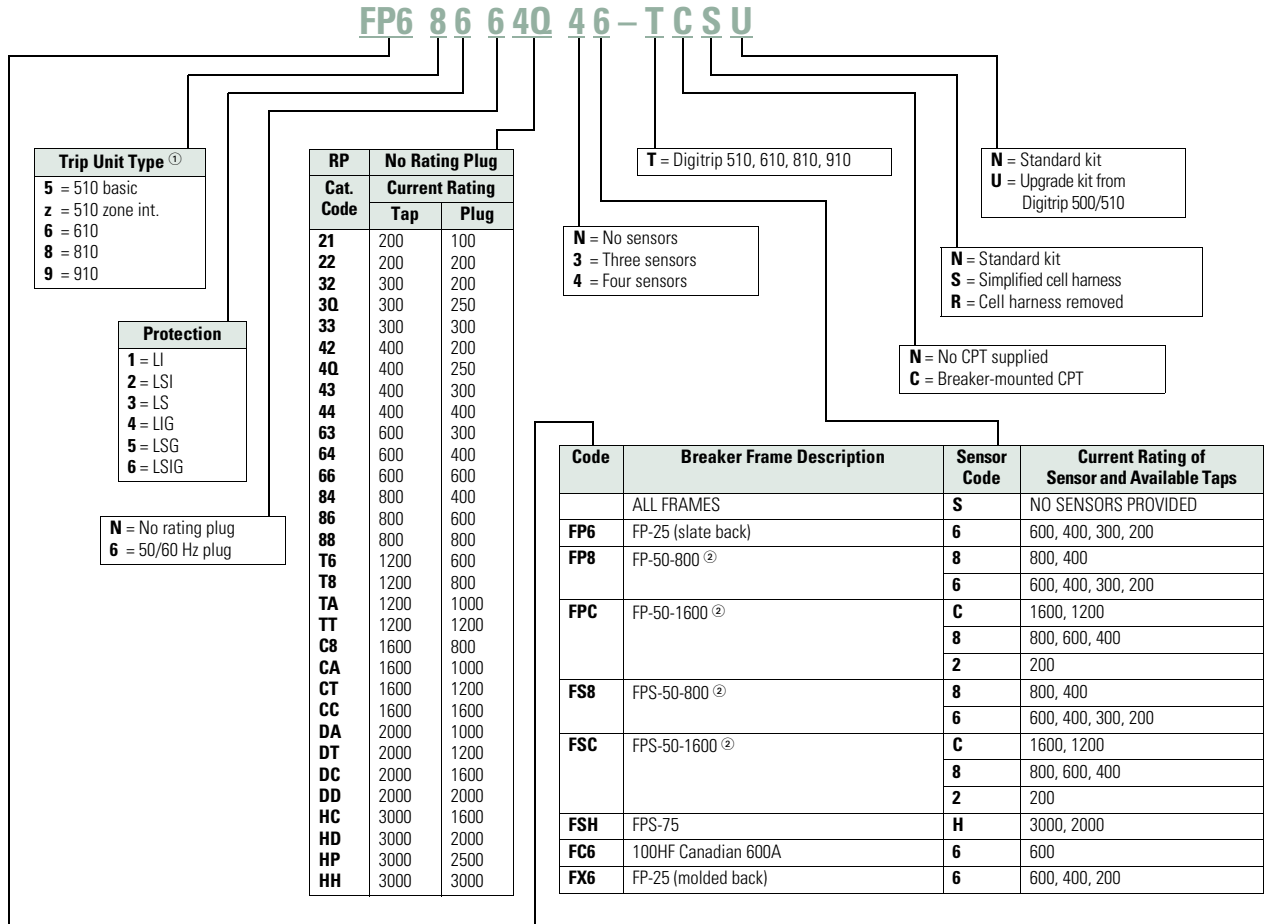
For Digitrip RMS trip unit retrofit kits and upgrade retrofit kits, choose or create the Digitrip RMS retrofit kit catalog number to match the Federal Pacific breaker types, retrofit kit type, protection function, rating plug type, current sensor type, CPT and type of kit required for application. See the examples provided on **Page V12-T17-50**.

Application Notes for Federal Pacific Power Circuit Breakers

1. Retrofit kits are for use on 50 and 60 Hz distribution systems.
2. All retrofit kits are designed for drawout power circuit breakers only. Refer all fixed-mounted breaker applications to the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

3. The breaker compartment doors on the switchgear assembly must be free of panel-mounted instruments and devices (i.e., ammeters, switches, etc.) or the retrofitted breaker may interfere with these devices when the compartment door is closed.
4. When the ground fault (G) option is selected, please observe the following:
 - a. For three-phase, three-wire solidly grounded systems, choose quantity three current sensors in the catalog number development.
 - b. For three-phase, four-wire solidly grounded systems, choose quantity four current sensors in the catalog number development. Three sensors are mounted on the breaker and one sensor is mounted on the switchgear neutral. Hardware to mount the current sensor on the switchgear neutral and provisions to wire it into the trip unit circuit (including a required pair of breaker secondary disconnecting contacts) are not included in the kit.
5. RMS 510 zone, 610, 810 and 910 retrofit kits include a cell terminal block assembly that must be installed in the switchgear assembly. Internal switchgear wiring to accommodate the customer application schemes must be added in the field.
6. RMS 610, 810 and 910 retrofit kits require a customer supplied 120 Vac source connected to the cell terminal block assembly to power the Digitrip RMS digital displays and communications functions (as applicable).
7. Refer all Federal Pacific breakers with current limiters to the Digitrip Retrofit Kit Service Center at **1-800-937-5487** for evaluation.

Digitrip Retrofit Kits for Federal Pacific Breakers Catalog Numbering System



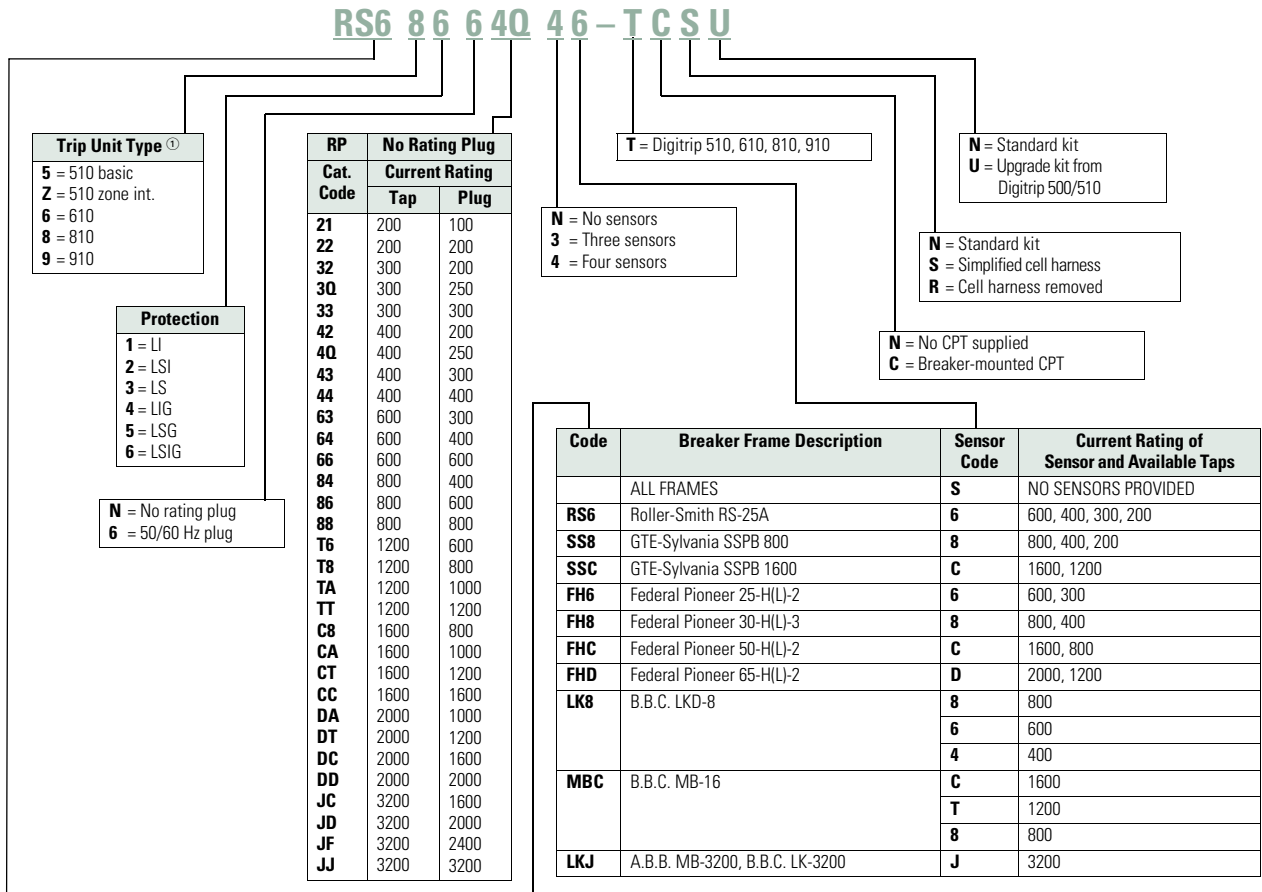
Notes

- ① At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910.
- ② Call the Digitrip Retrofit Kit Service Center at **1-800-937-5487** for technical clarification on these kits.

Sample shown is a Digitrip retrofit kit for an FP-25, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz plug, rated at 250A for a sensor tap of 400A, four sensors (for a four-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information is included in the *Retrofit Kit Product Guide*. For a copy of the *Retrofit Kit Product Guide*, contact your local Eaton Field Sales office or the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

Digitrip Retrofit Kits for Other Breakers Catalog Numbering System



Note

① At the time of this publication, the standard trip units for low voltage Digitrip retrofit kits are the RMS 510/610/810/910.

Sample shown is a Digitrip Retrofit Kit for an RS-25A, with an RMS 810 trip unit, with LSIG protection, with a 60 Hz plug, rated at 250A for a sensor tap of 400A, four sensors (for a four-wire ground system) that have sensor taps of 600, 400, 300 and 200A, there is a breaker-mounted CPT with the kit, the cell wiring is simplified (only 6 wires vs. 16), and the breaker was previously retrofitted with a Digitrip 500/510, so this is an upgrade kit.

This information is subject to change. Updated pricing and availability information is included in the *Retrofit Kit Product Guide*. For a copy of the *Retrofit Kit Product Guide*, contact your local Eaton Field Sales office or the Digitrip Retrofit Kit Service Center at **1-800-937-5487**.

Further Information**Publication**

Number	Description
B.22D.01.S.E	Sales Brochure for Digitrip RMS retrofit kits
AD 33-855-3	Instructions for the Application of Digitrip RMS Retrofit Kits on power circuit breakers
SA-11581D	Sales Aid for Digitrip trip units
IL 29-885-A	Instruction Leaflet for Digitrip RMS 510 trip unit
IL 29-886-B	Instruction Leaflet for Digitrip RMS 610 trip unit
IL 29-888-A	Instruction Leaflet for Digitrip RMS 810 trip unit
IL 29-889-A	Instruction Leaflet for Digitrip RMS 910 trip unit
AD 32-870	Application Data for time current curves for DS and DSL circuit breakers
PA01301011E	Product Aid for Arcflash Reduction Maintenance System

Pricing Information

*Price and Availability
Digest (PAD)*

*Retrofit Kit Product Guide
(Contact Digitrip Retrofit Kit
Service Center)*

Vista/VISTALINE
discount symbol Y1-R

Medium Voltage Metal-Clad—Assemblies and Power Circuit Breakers

Assemblies and Power Circuit Breakers

Originally a Westinghouse Product



Medium Voltage Switchgear Assembly (Type DHP with Drawout Breaker)

Product Description

Medium voltage switchgear serves to channel and switch power in industrial, commercial and utility electrical distribution systems. It is manufactured to industry standards that define the requirements for its ratings, design, construction and testing. ANSI C37.20.2 is the current applicable industry standard for medium voltage metal-clad switchgear, defining the rated maximum voltage range to be from 4.76 kV to 38 kV.

Medium voltage switchgear consists of one or more metal structures that house drawout power circuit breakers, phase bus conductors, auxiliary, control, metering and protective devices. These switchgear components are customized in various combinations during manufacturing to satisfy the application requirements of the switchgear user. Control switches, meters, instruments and protective relays are generally mounted on the switchgear front panels to provide breaker control, metering and circuit protection.

Medium voltage switchgear is typically characterized by metal-clad construction, which means that the switchgear compartments enclosing primary voltage are separated from adjacent compartments by grounded metal barriers.

Product History

In 1939, Westinghouse introduced type DH medium voltage air magnetic power circuit breakers and associated switchgear. Initially, DH breakers were rated up to 5 kV with a maximum interrupting capacity of 150 MVA. Product design enhancements evolved and additional variations of the DH breaker became available. In 1946, the maximum rated voltage of the DH breaker was extended to 15 kV. Eventually, the maximum rated interrupting capacity of the DH breaker reached 1000 MVA.

In 1963, Westinghouse introduced type DHP medium voltage Porcel-line® air magnetic power circuit breakers and associated switchgear with all live parts insulated to ground by high-strength porcelain insulation. Porcelain provided excellent high dielectric, non-tracking, non-combustible, non-hygroscopic and non-aging insulation characteristics. This was a technological improvement over the first DH breakers, which were furnished with a paper phenolic insulation. DHP switchgear was manufactured in ratings from 5 kV, 75 MVA to 15 kV, 1000 MVA. In 1978, Westinghouse introduced the

DVP breaker, the first Westinghouse medium voltage power circuit breaker to use vacuum interrupters. The DVP vacuum breaker was manufactured in 500 and 750 MVA interrupting ratings and was directly interchangeable with DHP air magnetic breakers of the same ratings.

In 1981, Westinghouse introduced VacClad medium voltage metal-clad switchgear with type VCP vacuum power circuit breakers. VCP breakers were furnished with vacuum interrupters, greatly reducing breaker size and weight. The reduced size permitted most breaker ratings to be stacked two-high in the switchgear enclosure, saving on switchgear installation space. VCP breakers included a design improvement called the V-Flex current transfer system, which eliminated the transfer of primary current over a moving hinge or a sliding contact assembly on the breaker. Porcelain insulation was maintained on the breaker elements and in the switchgear, except for the 5 kV switchgear cell insulation that was glass polyester. The switchgear phase bus was insulated with a fluidized bed epoxy insulation system, which was a technological

improvement over the epoxy impregnated kraft paper or noryl sleeving that was used over phase busbars in previous switchgear designs. VacClad switchgear was manufactured in ratings from 5 kV, 250 MVA to 15 kV, 1000 MVA.

In 1986, Westinghouse introduced VacClad-W World-Class medium voltage metal-clad switchgear with type VCP-W vacuum power circuit breakers. VCP-W switchgear included product improvements in manufacturing design and product performance. However, many of the attractive design features of VCP switchgear were maintained, including two-high breaker stacking, V-Flex breaker current transfer and fluidized epoxy insulation on the switchgear phase buses. VCP-W breakers and switchgear were furnished with high-grade glass polyester insulation as standard. Optional insulation upgrades included cycloaliphatic epoxy insulation for breaker element insulation (VCP-WSE breakers) and porcelain insulation for the switchgear cell contact bottles. VacClad-W switchgear is manufactured in ratings from 5 kV, 250 MVA to 15 kV, 1500 MVA to 27 kV and 38 kV, 40 kA.

Product History Time Line

Page	Product	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	Present
V12-T17-55	Westinghouse DH Switchgear and Breakers	█										
V12-T17-56	Westinghouse DHP Switchgear and Breakers		█									
V12-T17-55	DHP-VR Replacement Breaker								█			
V12-T17-57	Westinghouse VCP VacClad Switchgear and Breakers						█					
V12-T17-58	Cutler-Hammer VCP-W VacClad Switchgear and Breakers								█			
V12-T17-60	Competitive Replacement Breakers									█		

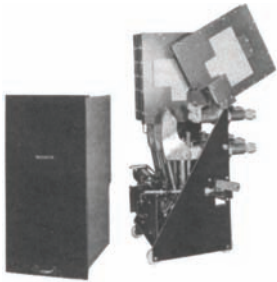
General Information

Medium Voltage Switchgear Support

Product	Brand	Introduced to Market	New Structures	Assembly Parts	Breaker	Breaker Parts	Switch	Switch Parts
Metal-Clad Switchgear								
DH	Westinghouse	1939	No	No	DH Breaker Replacement by DH-VR Breaker	No (contact Homewood Products at 412-665-2700)	N/A	N/A
DHP	Westinghouse	1963	No (contact the factory)	Yes	DHP breaker replacement by DHP-VR breaker. Class I reconditioning of DHP breakers and repair service.	Yes (contact the Power Breaker Center 1-877-276-9379)	N/A	N/A
VCP VacClad	Westinghouse	1981	New VCP-W structures can be directly coupled to VCP structures	Some	Yes	Yes	N/A	N/A
VCP-W VacClad	Westinghouse Cutler-Hammer	1986 1995	Yes	Yes	Yes	Yes	N/A	N/A
VCP-W VacClad arc resistant	Cutler-Hammer	1995	Yes	Yes	Yes	Yes	N/A	N/A
VCP-ND VacClad narrow design	Cutler-Hammer	1994	Yes	Yes	Yes	Yes	N/A	N/A
C-HRG high resistance pulsing ground system	Cutler-Hammer	1999	Yes	Yes	N/A	N/A	N/A	N/A
Metal-Enclosed Switchgear—Switch								
LBF	Westinghouse	1952	No	No (contact Cleveland-Price at 724-864-4177)	N/A	N/A	No	No (Contact Cleveland-Price at 724-864-4177)
WLI	Westinghouse Cutler-Hammer	1972	No	Yes	N/A	N/A	Yes	Yes
MVS	Cutler-Hammer	1999	Yes	Yes	N/A	N/A	Yes	Yes
UPC, Unitized Power Center	Cutler-Hammer	1999	Yes	Yes	N/A	N/A	Yes	Yes
Pad Mount	Cutler-Hammer	1999	Yes	Yes	N/A	N/A	Yes	Yes
Mini-MVS	Cutler-Hammer	2003	Yes	Yes	N/A	N/A	Yes	Yes
Metal-Enclosed Switchgear—Switch and Breaker								
WVB	Westinghouse	1991	No	Yes	Yes	Yes	Yes	Yes
MEB	Cutler-Hammer	1999	Yes	Yes	Yes— VCP-W breaker	Yes— VCP-W breaker	Yes	Yes
Metal-Enclosed Switchgear—Breaker								
Station Distribution Breaker	Cutler-Hammer	1994	Yes	Yes	Yes— VCP-W breaker	Yes— VCP-W breaker	N/A	N/A
MSB	Cutler-Hammer	1999	Yes	Yes	Yes—VCP-TR fixed-mounted breaker	Yes—VCP-TR fixed-mounted breaker	N/A	N/A

DH Medium Voltage Metal-Clad—Assemblies and Power Circuit Breakers

DH Switchgear Assemblies and Power Circuit Breakers



Westinghouse DH Drawout Air Magnetic Power Circuit Breaker (Interphase Barrier Removed)

Product Description

Westinghouse DH medium voltage metal-clad switchgear with type DH “DE-ION®” air circuit breakers was introduced in 1939. The drawout breaker element consists of an operating mechanism that drives a set of three-pole units. When the breaker is tripped, the moving and stationary contacts separate. The resulting arc on each phase is drawn up and into the arc chutes, which dissipate the arc through ceramic splitter plates. The de-ionizing interruption process is aided magnetically by the arc chute blow out coil assembly.

DH switchgear was available in indoor and in sheltered aisle and aisle-less outdoor enclosures. DH metal-clad switchgear structure dimensions were standardized, but varied with individual breaker ratings. Widths varied from 20.00 inches for the 50DH75 (1200A) light duty rating, to 26.00 inches for the 50DH250 (1200A) rating, to 36.00 inches for most 2000A and 7.5 and 15 kV ratings.

Ratings

DH switchgear ratings started with the light duty 50DH75 (5 kV, 75 MVA) 1200A breaker. The spectrum of ratings also included 7.5 and 15 kV ratings. The maximum breaker rating produced was the 150DH1000 (15 kV, 1000 MVA) 3000A.

Chronology

DH switchgear was introduced in 1939 and was actively manufactured by Westinghouse in complete switchgear assemblies until the introduction of DHP switchgear in 1963. As production activity tapered after 1963, only match and lineup additions to existing DH switchgear were manufactured along with complete replacement circuit breakers and renewal parts. The last new manufactured DH breakers and switchgear cells were produced in 1983.

Replacement Capabilities



150DH-VR 1200A VR-Series Circuit Breaker

Eaton offers the following to support DH switchgear.

DH-VR Vacuum Replacement Breakers

The DH-VR is a brand new vacuum replacement breaker (VR-Series) for DH air magnetic breakers. The DH-VR breaker permits DH switchgear modernization by using state-of-the-art Eaton VCP-W vacuum breaker technology. The DH-VR is designed, manufactured and tested to applicable IEEE/ANSI standards.

Ratings are available to replace: 5 kV through 15 kV, 50DH150 through 150DH1000, 1200 through 3000A (4000A fan-cooled).

Additional VR-Series breakers are available to upgrade competitors’ air magnetic breakers. See **Pages V12-T17-60 and V12-T17-61**.

SURE CLOSE

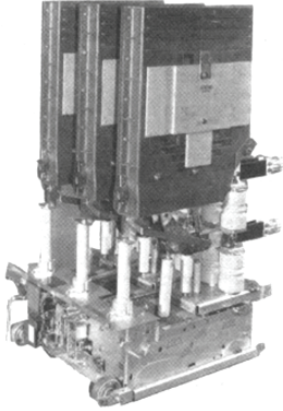
All VR Series breakers that are furnished with MOC operators incorporate Eaton’s exclusive *SURE CLOSE* MOC technology. See additional information on **Page V12-T17-62**.

Renewal Parts

Eaton no longer offers new manufactured renewal parts for DH switchgear structures. For DH renewal parts, contact Homewood Products at **412-665-2700**.

Note: New DH factory manufactured switchgear structures and breakers are no longer available.

DHP Switchgear Assemblies and Power Circuit Breakers



Type DHP Drawout Air Magnetic Power Circuit Breaker
(Front Interphase Barrier Removed)

Product Description

Westinghouse DHP medium voltage porcelain metal-clad switchgear with type DHP air magnetic power circuit breakers was introduced in 1963. DHP breakers and switchgear were similar to, but not interchangeable with, the older DH product. DHP was provided with porcelain insulation on all live parts to ground in the switchgear and on the breaker element. DHP switchgear was available in indoor and in sheltered aisle and aisle-less outdoor enclosures.

DHP air magnetic breakers were subject to three major design changes that were phased in during their manufacturing life. The first DHP breakers were furnished with solenoid operated mechanisms with cast parts and monolithic pole units. From 1964 to 1968, the stored energy spring mechanism gradually phased out the solenoid operator. After 1968, cast mechanisms were phased out by fabricated mechanisms. After 1970, monolithic pole units were phased out by the post-insulator pole unit (PIP) design.

DVP vacuum breakers were introduced in 1978. DVP breakers were first generation vacuum breakers that were interchangeable in DHP switchgear with DHP air magnetic breakers of the same ratings.

Ratings

- DHP breakers:
 - 5 kV (75, 250 and 350 MVA)
 - 7.5 kV (500 MVA)
 - 15 kV (500, 750 and 1000 MVA)
- DVP breakers:
 - 7.5 kV (500 MVA)
 - 15 kV (500 and 750 MVA)

Chronology

DHP switchgear was introduced in 1963 and was actively manufactured by Westinghouse in complete switchgear assemblies until 1984.

Replacement Capabilities



DHP-VR VR-Series Circuit Breaker

Eaton offers the following to support DHP switchgear.

DHP-VR Vacuum Replacement Breakers

The DHP-VR is a brand new vacuum replacement breaker (VR-Series) for DHP air magnetic and DVP vacuum breakers. The DHP-VR breaker permits DHP switchgear modernization by using state-of-the-art Cutler-Hammer VCP-W vacuum breaker technology. The DHP-VR is designed, manufactured and tested to applicable IEEE/ANSI standards.

Ratings are available to replace: 5 kV through 15 kV, 50DHP75 through 150DHP1000, 1200–3000A.

Additional VR-Series breakers are available to upgrade competitors' air magnetic breakers. See **Pages V12-T17-60 and V12-T17-61.**

SURE CLOSE

All VR Series breakers that are furnished with MOC operators incorporate Eaton exclusive *SURE CLOSE* MOC technology. See additional information on **Page V12-T17-62.**

Class 1 Reconditioned DHP Breakers and Repair Service

Class 1 Reconditioning of DHP breakers and repair service for DHP breakers are available.

Renewal Parts

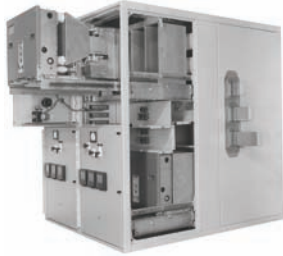
Eaton offers an inventory of newly manufactured renewal parts for most DHP switchgear structures and breakers.

Effective 12/17/2002, DHP match and lineup cubicles, DHP air magnetic breakers and arc chutes will no longer be available.

Fluidized Switchgear Bus

Eaton offers new fluidized epoxy bus—insulated bus to replace existing switchgear phase bus insulation. See **Page V12-T17-59.**

VCP VacClad Switchgear Assemblies and Power Circuit Breakers



VacClad Switchgear with Type VCP Drawout Vacuum Power Circuit Breakers

Product Description

Westinghouse VacClad medium voltage metal-clad switchgear with type VCP vacuum power circuit breakers was introduced in 1981. Vacuum interrupter technology provided many advantages over the previous DH and DHP air magnetic breaker designs. Vacuum interrupters permitted the breaker size and weight to be significantly reduced, allowing for two-high stacking construction of most breaker ratings in the switchgear enclosure. VCP breakers withdraw onto switchgear rail assemblies for ease of inspection. Maintenance associated with air magnetic arc chutes was eliminated and contact maintenance was reduced to visual inspection of wear gap indicators.

VCP breakers included a design improvement called the V-Flex current transfer system, which eliminated the transfer of primary current over a moving hinge (like DHP breakers) or a sliding contact assembly (like DVP breakers). Porcelain insulation was maintained on the breaker elements and in the switchgear except for the 5 kV switchgear cell insulation, which was glass polyester as standard. The switchgear phase bus was insulated with a fluidized bed epoxy insulation system, which was a major improvement over the epoxy impregnated kraft paper or noryl that was used as sleeving on phase busbars in previous switchgear designs. VacClad switchgear was manufactured in indoor and in sheltered aisle and aisle-less outdoor enclosures.

Ratings

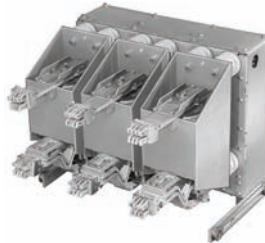
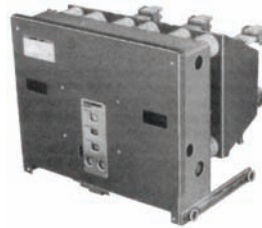
VCP switchgear provided the first complete line of Westinghouse vacuum breakers in the medium voltage ratings:

- 5 kV (250 and 350 MVA)
- 7.5 kV (500 MVA)
- 15 kV (500, 750 and 1000 MVA)

Chronology

VacClad switchgear was introduced in 1981 and was manufactured by Westinghouse in complete switchgear assemblies until the introduction of VacClad-W switchgear in 1986. Today, many capabilities still exist to support VacClad switchgear.

Replacement Capabilities



Type VCP Vacuum Power Circuit Breaker (Front and Rear Views)

Eaton offers the following to support VacClad switchgear.

Remanufactured VCP Breakers and Factory Repair Service

Factory remanufacturing of VCP breakers and factory repair service for VCP breakers are available.

Renewal Parts

Eaton offers an extensive inventory of newly manufactured renewal parts for VCP switchgear structures and breakers.

Fluidized Switchgear Bus

Eaton offers new fluidized epoxy bus—insulated bus to replace existing switchgear phase bus insulation. See [Page V12-T17-59](#).

VCP-W VacClad Switchgear Assemblies and Power Circuit Breakers



VacClad-W Switchgear with Type VCP-W Drawout Vacuum Power Circuit Breakers

Product Description

VacClad-W world-class medium voltage metal-clad switchgear with type VCP-W vacuum power circuit breakers was introduced by Westinghouse in 1986. VCP-W breakers and switchgear were similar to but not interchangeable with the original VacClad (VCP) product.

The VCP-W design includes a consolidation of improvements in product design and performance that enables the introduction of IEC and 27 kV breaker

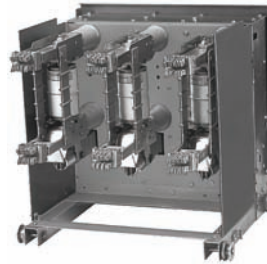
ratings. However, VCP-W still includes many of the proven product features of VCP switchgear design, including two-high breaker stacking, V-Flex breaker current transfer and fluidized epoxy insulation on the switchgear phase buses. VCP-W breakers withdraw onto removable switchgear rail assemblies for ease of inspection. VCP-W breakers and switchgear were furnished with high-grade glass polyester insulation as standard. Optional insulation upgrades included cycloaliphatic epoxy insulation for breaker element insulation (VCP-WSE breakers) and porcelain insulation for the switchgear cell contact bottles. VacClad-W switchgear is manufactured in indoor and in outdoor sheltered aisle and aisle-less enclosures. Another option offered for VacClad indoor switchgear is arc-resistance. Eaton was a leader in the development and design of arc-resistant switchgear. Arc-resistant metal-clad switchgear is metal-clad switchgear tested for resistance to the effects of arcing due to an internal fault.

Chronology

VacClad-W switchgear was introduced in 1986 and is the current state-of-the-art Eaton switchgear product. The VCP-WSE breaker with special cycloaliphatic epoxy insulation and the 27 kV VCP-W rating were introduced in 1990. IEC VCP-W ratings were introduced in 1991. 38 kV was introduced in 1995.

Arc-resistant VCP-W switchgear was introduced in 1995.

Replacement Capabilities



Type VCP-W Vacuum Power Circuit Breaker (Front and Rear Views)

Eaton offers the following to support VacClad-W switchgear.

Complete New VacClad-W Switchgear Assemblies

Complete new manufactured VacClad-W switchgear assemblies are available to replace obsolete existing switchgear with new Cutler-Hammer state-of-the-art vacuum switchgear.

VacClad-W Match and Lineup Cubicles

New manufactured VacClad-W switchgear structures to match and line up to existing Westinghouse and Cutler-Hammer VacClad-W switchgear. New VCP-W structures can also connect to existing Westinghouse indoor switchgear (types DH, DHP and VCP) with a transition section.

New VCP-W Vacuum Breakers

Completely new factory manufactured VCP-W vacuum power circuit breakers are available in all published ratings.

Renewal Parts

Eaton offers an extensive inventory of newly manufactured renewal parts for VCP-W switchgear structures and breakers.

Fluidized Switchgear Bus

Eaton offers new fluidized epoxy bus—insulated bus to replace existing switchgear phase bus insulation. See **Page V12-T17-59**.

ANSI and IEC Ratings

ANSI Ratings	IEC Ratings
5 kV (250 and 350 MVA)	3.6 kV (25, 31.5, 40 kA rms SC Make)
7.5 kV (500 MVA)	7.2 kV (25, 31.5, 40 kA rms SC Make)
15 kV (500, 750, 1000 and 1500 MVA)	12 kV (25, 31.5, 40 kA rms SC Make)
27 kV (750, 1000 and 1250 MVA, and 40 kA)	17.5 kV (31.5, 40 kA rms SC Make)
38 kV (16, 21, 25, 31.5 and 40 kA)	24 kV (25 kA rms SC Make)

Technology Upgrades Front Panel Retrofit with IQ Devices and PowerNet Communications

DHP, VCP, VCP-W

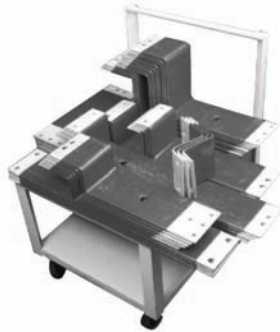


***New VCW Front Panel with
Upgraded Control Devices***

Eaton can provide an upgrade to your system by replacing existing analog meters, instruments and protective relays with microprocessor-based solid-state true rms sensing devices. New replacement front panels are available for DHP, VCP and VCW switchgear assemblies, and they can be provided with devices mounted and wired.

Wire markers and wiring diagrams are provided for the hinged panel. The existing panel is removed, the new panel is set in place and the solid-state devices are wired into the switchgear unit.

Fluidized Switchgear Bus

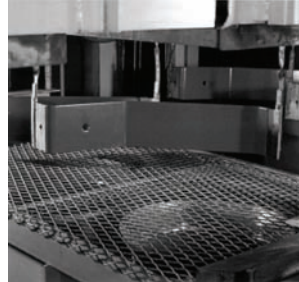


***Any Busbar Shape or Configuration
is Uniformly Coated. There are
No Dielectric Weak Spots and
Taping is Not Necessary***

Eaton offers a cost-effective program that can extend the life of any manufacturer's equipment by replacing the bus and insulating it with fluidized bed epoxy. The bus insulation in many existing switchgear assemblies may be NORYL®, Micarta®, redacta, heat shrink tubing or fiberglass. These materials are adversely affected by aging, environment and operating conditions. The solution to these concerns can be answered with the high quality, state-of-the-art system and superiority offered by the fluidized bed epoxy process.

Customers can use any of the following services to fit specific switchgear applications from 600V to 38 kV:

- Bus replacement
- Bus duct replacement



Coated Busbars Pass Through a Post-heat Oven to Cure and Fuse the Epoxy

Switchgear Upgrades

DHP, VCP, VCP-W

Switchgear upgrades are available to increase the MVA and continuous current ratings of the entire assembly.

Competitive Upgrades Medium Voltage Vacuum Replacement Breakers

General Electric MagneBlast



**GE-AM13.8-VR VR-Series
Circuit Breaker**

Eaton manufactures an extensive line of VR-Series breakers to replace General Electric MagneBlast air magnetic breakers.

Ratings are available to replace:

- AM4.16 5 kV, 150–350 MVA, 1200–3000A
- AM5 5 kV, 150–250 MVA, 1200 and 2000A
- AM7.2 7.5 kV, 500 MVA, 1200 and 2000A.
- AM7.5 7.5 kV, 250–500 MVA, 1200 and 2000A
- AM13.8 15 kV, 250–1000 MVA, 1200 and 3750A (both short and tall frames)
- AM15 15 kV, 250–750 MVA, 1200 and 2000A

Allis-Chalmers RUPTAIR



MA-VR VR-Series Circuit Breaker

An extensive line of Eaton VR-Series breakers are manufactured to replace Allis-Chalmers RUPTAIR type AM, MA, FA, FB and FC air magnetic breakers.

Ratings are available to replace:

- AM 5 kV, 100–250 MVA, 1200 and 2000A
- MA 5 kV, 150–350 MVA, 1200 and 2000A
- FA 5 kV, 350 MVA, 3000A
- FB 7.5 kV, 500 MVA, 1200 and 2000A
- FC 15 kV, 500–1000 MVA, 1200–3000A

Federal Pacific Electric



DST-2-VR VR-Series Circuit Breaker

An extensive line of Eaton VR-Series breakers are manufactured to replace Federal Pacific Electric air magnetic breakers.

Ratings are available to replace:

- DST 5–15 kV, 150–750 MVA, 1200 and 2000A
- DST-2 5–15 kV, 150 000 MVA, 1200–2000A

SURE CLOSE

All VR-Series breakers that are furnished with MOC operators incorporate Eaton's exclusive *SURE CLOSE* MOC technology. See additional information on **Page V12-T17-62**.

ITE



15HK-VR VR-Series Circuit Breaker

Eaton manufactures an extensive line of VR-Series breakers to replace ITE air magnetic breakers.

Ratings are available to replace:

- 5HV 5 kV, 100–250 MVA, 600–2000A
- 5HK-Model 03, 5 kV, 250–350 MVA, 1200 and 2000A
- 15HK-Model 03, 15 kV, 500–1000 MVA, 1200 and 2000A
- 15VHK-Model 20, 15 kV, 500–750 MVA, 1200A

Medium Voltage Competitive Upgrades—Vacuum Replacement Breakers

McGraw & Edison

**PSD-VR and WSA-VR VR-Series
Circuit Breakers**

An extensive line of Eaton VR-Series breakers are manufactured to replace McGraw-Edison air magnetic breakers.

Ratings are available to replace:

- PSD-15 15 kV, 500–750 MVA, 1200 and 2000A
- WSA-5 5 kV, 250 MVA, 1200 and 2000A
- WSA-15 15 kV, 500–750 MVA, 1200 and 2000A

SURE CLOSE

All VR-Series breakers that are furnished with MOC operators incorporate Eaton's exclusive *SURE CLOSE* MOC technology. See additional information on **Page V12-T17-62**.

Remote Power Racking

Remote Power Racking (RPR-2)

Eaton's remote power racking (RPR-2) unit provides a means of remotely racking most power circuit breakers that use the rotation of a shaft for insertion and removal. Personnel can be up to 25 feet (8m) or more away from the switchgear door during the racking process. This need for distance away from the switchgear is due to safety precautions from potential arc flash occurrences.

Many arc flash incidences with low voltage and medium voltage switchgear occur during the process of inserting and removing (racking) power circuit breakers in switchgear cubicles. Personnel are typically within 2 feet (0.6m) of the front of the power circuit breaker during the racking process and this close proximity to an arc flash can cause serious injury. The best way to limit exposure to arc flash during the process of racking power circuit breakers is to put more distance between the person and the possible point of exposure.

NFPA 70E provides guidance for the requirements of personal protective equipment (PPE) to protect personnel from arc flash exposure. Eaton's RPR-2 allows personnel to wear a lower level of PPE, increasing worker comfort and mobility, while operating the RPR-2 from an increased distance from the power circuit breaker.

The RPR-2 system is the solution that provides the value and the features that customers request.

SURE CLOSE

An Eaton Solution for an Industry-Wide Problem



SURE CLOSE

Background

Mechanism Operated Contacts (MOCs) are external to the breaker (mounted in the switchgear cell) and are driven by the breaker mechanism through a mechanical interface. These contacts are used to provide extra contacts for breaker status and for other control functions. As the circuit breaker closes, an MOC operator causes the MOC switches to operate.

Air-magnetic breakers have massive mechanisms with high forces and inertia. The resultant travel times and the velocities are slow. The figure (A-M) shows the closing curve of a typical air-magnetic breaker and the MOC operator. It closes in approximately 100 msec (a tenth of a second), measured from the time the breaker begins to close.

Problem

A vacuum replacement breaker (VR) is much smaller and lighter than the air-magnetic breaker it replaces. The vacuum contacts move a smaller distance and much faster. When a VR breaker is applied to the cell that originally contained an air-magnetic breaker, the resultant speed of operation of the MOC becomes much faster when it is directly driven by the breaker operating mechanism. The result is higher impact loads and mismatched inertia with the existing switchgear MOC. The effect of the system mismatch is shown in the figure (VR Direct Drive).

When a VR breaker without SURE CLOSE drives the MOC, the breaker and the MOC complete the closing stroke in the same time; 25 msec, versus the 100 msec for the original air-magnetic breaker. Notice the over-travel with the direct drive MOC. The velocity of the MOC system is essentially four times what it is with the air-magnetic breaker. Because kinetic energy (the energy associated with motion) is proportional to the velocity squared, the kinetic energy of the MOC has increased to 16 times that of the original design. This faster operation causes:

- Significant MOC over-travel and bounce
- MOC component wear
- A worn or broken MOC could cause a breaker to stall

Solution

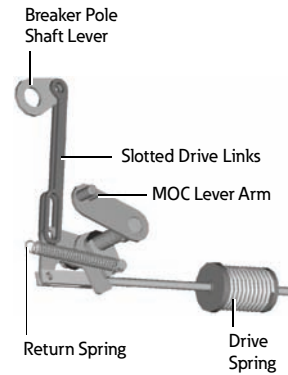
SURE CLOSE is a stored energy device, internal to the breaker, which allows the MOC to open and close independently from the speed of the breaker mechanism and:

- Eliminates the possibility of the MOC stalling the breaker
- Slows down the MOC operation
- Prevents damage to MOC cell components

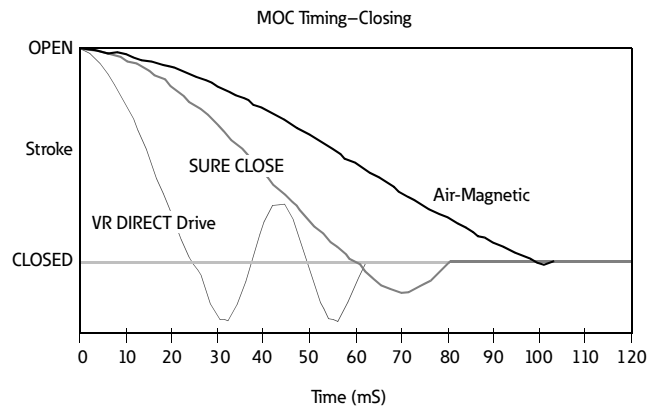
Conclusion

In the figure below, you can see that the SURE CLOSE MOC drive approximates the original air-magnetic MOC response much better than the VR direct drive. The VR-Series breaker with the SURE CLOSE drive does NOT cause MOC switch contact bounce or abnormal wear.

SURE CLOSE Components



MOC Closing Times—Air-Magnetic, VR without SURE CLOSE and VR with SURE CLOSE



VacClad-W Motorized Remote Racking (VCP-W MR2)



Remote Racking

Product Description

Eaton's VCP-W MR2 motorized remote racking device provides a means of remotely inserting or removing any drawout circuit breaker used in VacClad-W switchgear, to help mitigate arc flash exposure.

The VCP-W MR2 permits the operator to safely move a VCP-W breaker between three pre-determined positions within the circuit breaker compartment. Standing at a safe distance, well outside the arc flash boundary of the equipment, an operator can use remote controls to select disconnect, test or connected positions for the circuit breaker.

The Danger

Electric arcs result from thermal ionization that occurs when current flow is interrupted by the separation of conductors. Thermal ionization can generate temperatures as high as 35,000°F. Conductor materials melt into metal vapor and the surrounding air is ionized.

External arcs create a violent explosion, resulting in an inferno of ionized gases, molten debris, metal shrapnel and a flash of light (an arc flash). Inside a switchgear/switchboard cabinet, an arc event can dislodge compartment doors and turn hardware into high-speed projectiles.

Increased safety precautions and the need to protect personnel from the dangers of potential arc flash occurrences suggest the need to increase the distance between an operator and the front of a switchgear lineup during racking operations.

Features

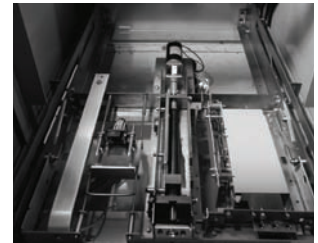
- Self powered when switchgear is energized
- Provisions energize the system racking motors with an external 120 Vac power source
- Available for all breakers in VacClad-W switchgear
- Factory installed and tested in circuit breaker compartment
- Permanently installed racking motors eliminate the need to lift and manipulate, and align heavy, bulky equipment
- Simple hand-held pendant controller is available with indicating lights to clearly indicate position and status of the circuit breaker
- 25 ft umbilical cord between hand-held controller and circuit breaker compartment

- All circuit breaker safety interlocks remain intact per IEEE C37.20.2
- Logic is built into the device to sense an interference issue
- Logic will not accept a command to connect a circuit breaker that has experienced interference until after it has been moved to the disconnect position
- Controls can be integrated into switchgear secondary control circuits, and/or SCADA systems using Modbus® interface or discrete wiring
- Permissive circuit provision for disabling remote racking until the right system conditions are satisfied
- Pendant will override system when plugged into a specific circuit breaker

Benefits

- Automatic racking reduces installation effort
- Permanently installed system will not get lost between service intervals

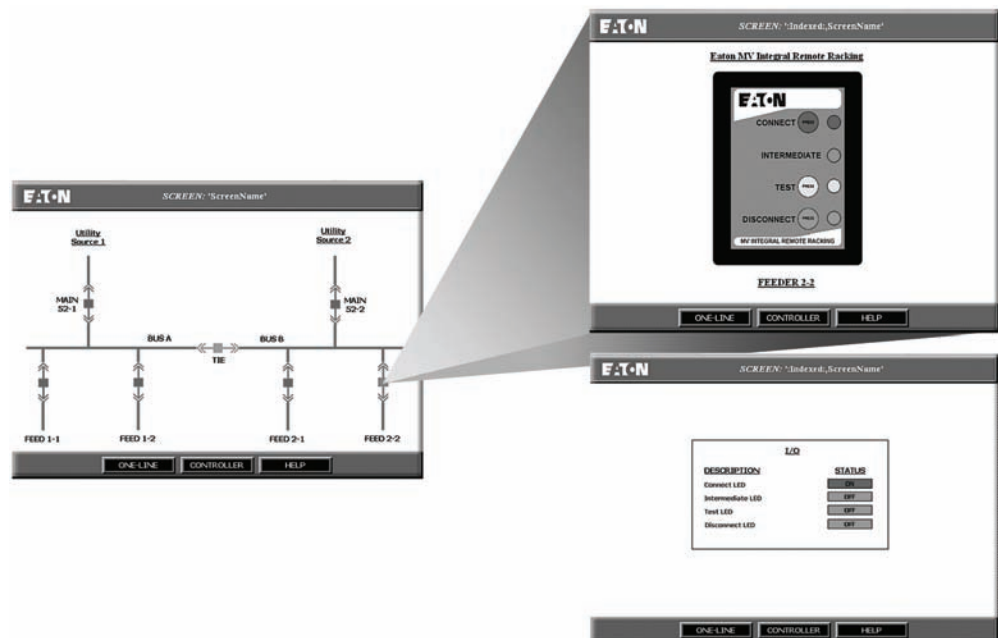
- You do not lose the ability to manually operate your circuit breaker racking mechanism
- Operators can open and disconnect all circuit breakers remotely before entering the equipment room, which ensures no exposure to arc flash energy



Racking Pan

Motor, logic controller and safety interlocks are built into the circuit breaker compartment. System is factory installed and tested with VCP-W circuit breakers. Each switchgear system that is purchased with remote racking capabilities will come with a hand-held pendant for simple operation of a single circuit breaker at a time.

PanelMate® Interface for Integrated Controls



Further Information

Publication Number	Description
DHP Switchgear and Breaker	
RPD 32-253-4D	Renewal Parts Data for DHP breaker and switchgear parts
PA02707017E	Sales Aid for the DHP-VR vacuum replacement breaker
RP01301006E	Renewal Parts Data for the DHP-VR vacuum replacement breaker
VCP Switchgear and Breaker	
RPD 32-274	Renewal Parts Data for VCP breaker and switchgear parts
LEL007A	Sales Aid for the VCP remanufacture program
VCP-W Switchgear and Breaker	
RP02201001E	VCP-W 5 and 15 kV switchgear common replacement parts
RP02204001E	Renewal Parts Data for VCP-W switchgear parts
SA-11671	Sales Aid for VCP-W switchgear
DB 32-255	Descriptive Bulletin for VCP-W switchgear
AD 32-265	Application Data for VCP-W switchgear
Fluidized Bus	
SA-11745	Sales Aid for custom fluidized switchgear bus
General Information	
LEL004A	Sales Aid for breaker remanufacture program
SA02204001E	Sales Aid for MV switchgear replacement front panels with IQ devices
DH Breakers	
PA02707011E	Sales Aid for the DH-VR vacuum replacement breaker
GE MagneBlast Breakers	
PA02707021E	Sales Aid for GE AM4.16 and AM13.8 vacuum replacement breakers
Allis-Chalmers Breakers	
PA02707032E	Sales Aid for Allis-Chalmers Type MA vacuum replacement breakers
PA02707031E	Sales Aid for Allis-Chalmers Type AM 250 vacuum replacement breakers
PA02707033E	Sales Aid for Allis-Chalmers Type F-Series vacuum replacement breakers
Federal Pacific Electric Breakers	
PA02707041E	Sales Aid for Federal Pacific Electric Type DST vacuum replacement breakers
PA02707042E	Sales Aid for Federal Pacific Electric Type DST-2 vacuum replacement breakers
ITE Breakers	
PA02707052E	Sales Aid for ITE Type HK (Model 03) vacuum replacement breakers
PA02707051E	Sales Aid for ITE 5HV vacuum replacement breakers
McGraw-Edison Breakers	
PA02707062E	Sales Aid for McGraw-Edison PSD vacuum replacement breakers
PA02707061E	Sales Aid for McGraw-Edison WSA vacuum replacement breakers
Universal Remote Power Racking	
PA02707071E	Sales Aid for universal remote power racking system (RPR-2)

Pricing Information**VCP-W Breaker**

Price List for VCP-W Breaker Parts—PL 33-729

VCP-WR Breaker

Price List for VCP-WR Fixed Vacuum Breakers—PL 33-724

MV Air/Vacuum Switchgear Parts

Vista/VISTALINE Discount Symbol Y1

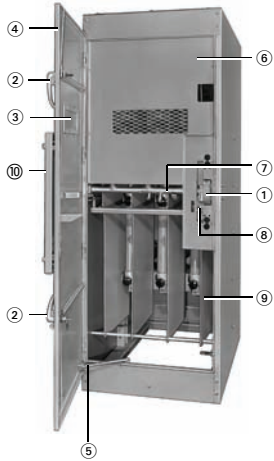
VR-Series Breakers

Price List for VR-Series Replacement Breakers—PL02707001E

Medium Voltage Metal-Enclosed Load Interrupter Switch Assembly and Switches

WLI Load Interrupter Metal-Enclosed Switchgear

Originally a Westinghouse Product



WLI Design

Standard Manually Operated Fused WLI Switch

- ① Switch position indicator/operator mechanism
- ② Provisions for padlocking door
- ③ Inspection window (4 x 16 inches)
- ④ Full height main door
- ⑤ Door stop, foot operated
- ⑥ Grounded metal safety barrier
- ⑦ Door interlock
- ⑧ Switch interlock
- ⑨ Interphase barrier
- ⑩ Switch operator mechanism access door

Product Description

The WLI (Westinghouse Load Interrupter) medium voltage switchgear is generally composed of a three-phase load interrupter housed in a metal-enclosed structure. The switch is rated for use in four voltage classes: 4 kV, 15 kV, 25 kV and 38 kV. 600A and 1200A current ratings are available. The switch is typically applied in series with three medium voltage fuses on the load side of the switch. WLI switchgear is used for economical protection of unit substation transformers and medium voltage power distribution (via a lineup of these switches). The WLI product line also offered a compact Unitized Power Center (UPC) that used the WLI switch on the primary of the UPC transformer.

LBF and WLI look similar in design. They can be differentiated by the nameplate located behind the operating handle access door. The front is largely covered by the main door, with a 4 x 16-inch viewing window, providing access to the switch and fuse compartment. A smaller access door on the main door allows access to the switch operating mechanism. Upon opening the main door, the switch in the upper part of the structure is covered

by a protective screen barrier that allows visual inspection. The fuses, when provided, are located in the lower part of the structure, and are readily visible for easy maintenance when the main door is open. The rear of the switch structure is generally used for cable entrance and/or exit. Access to the cable entrance/exit area is via a rear cover or door.

The MVS design offers many enhancements over the previous WLI design. A few of the exterior features include a galvanized base and a larger viewing window. Interior features include a hinged barrier, rustproof latches, nylon finned insulators and a switch that is a removable component.

The WVB (Westinghouse Vacuum breaker) switchgear was introduced in 1991, providing a fixed-mounted medium voltage vacuum breaker on the load side of the switch. The medium voltage vacuum breaker was used in lieu of fuses, providing the capability to instantly reset the breaker after a trip condition and the ability to adjust to a wide variety of coordination curves in the field.

The MEB (Metal-Enclosed Breaker) and MSB (Medium Voltage Switch and Breaker) designs replaced the WVB product offering. The MEB

design uses the VCP-TR medium voltage fixed-mounted vacuum breaker. The MSB offering employs a three-phase load interrupter to provide a means to isolate the fixed-mounted breaker.

Product History

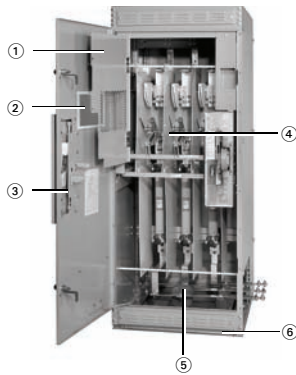
Metal-enclosed load break air interrupter switches were first produced in 1952 under the name Load Break Fusible (LBF) at M & R facilities around the country. In 1964, the manufacturing of the product was consolidated in the Cincinnati, OH, facility. The product was discontinued in 1972 and replaced with Westinghouse Load Interrupter (WLI), having many design changes and improvements. Parts for the two products are incompatible, but the WLI design can be added to existing LBF lineups. The WLI product line was moved to the Sumter, SC, manufacturing facility in 1979.

The current MVS design was first introduced in Sumter, SC, in 1999 and built concurrently with the previous design until December 2001. The product line was relocated to Greenwood, SC, in late 2001. As of January 2002, only the current MVS design was manufactured.

Product History Time Line

Page	Product	1950	1960	1970	1980	1990	1995	2000	Present
V12-T17-66	Westinghouse LBF	█							
V12-T17-66	Westinghouse/C-H WLI			█					
V12-T17-66	Cutler-Hammer MVS							█	

WLI/MVS Load Interrupter Switchgear



MVS Design

Standard Manually Operated Fused MVS Improvements

- ① Standard hinged barrier
- ② Larger, lower window (8.00 x 16.00-inch) double viewing area
- ③ Rustproof latches
- ④ Removable switch
- ⑤ Nylon finned insulators
- ⑥ G90 galvanized base

LBF/WLI Product Description

The LBF (load break) switch standard structure was 33.00 inches wide, 90.38 inches high (indoor) and 98.88 inches high (outdoor). The WLI (Load Interrupter) switch structure was offered in both 33.00-inch and 36.00-inch wide enclosures in the 5 kV and 15 kV ratings. Both designs used vertical sections that were freestanding, close coupled to transformers, and bolted together in lineups. Starting in 1984, ANSI 61 light gray was the standard internal and external color for all WLI structures. Prior to 1984, the exterior surfaces of outdoor enclosures were ANSI 24 dark gray. LBF was only offered in the 5 kV and 15 kV voltage ratings. WLI was offered in 5 kV, 15 kV, 25 kV and 38 kV voltage ratings using 600A and 1200A switches.

MVS Product Description

The MVS standard structures for 5 kV and 15 kV gear is 33.00 to 48.00 inches wide, 90.38 inches high (indoor), 98.88 inches high (outdoor), with varying depths. The standard structures for 27 kV and 38 kV gear is 48.00 to 54.00 inches wide, 101.50 or 127.00 inches high (indoor), 110.00 or 135.50 inches high (outdoor), with varying depths. Vertical sections are freestanding, close coupled to transformers and bolted together forming lineups.

Switch Ratings

- LBF
 - 5 kV
 - 15 kV
- WLI
 - 5 kV
 - 15 kV
 - 25 kV
 - 38 kV
- MVS
 - 5 kV (600 and 1200A)
 - 15 kV (600 and 1200A)
 - 27 kV (600A)
 - 38 kV (600A)

Replacement Capabilities

LBF

The LBF product line was discontinued in 1972. Due to design change and retooling, replacement parts are only available through Cleveland-Price, Inc. at **724-864-4177**.

WLI/MVS


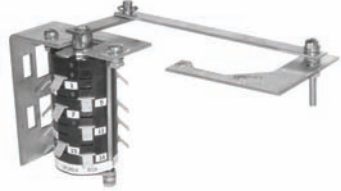
Eaton offers an inventory of newly manufactured renewal parts of WLI/MVS switchgear. See **Pages V12-T17-67** through **V12-T17-69**.

WLI/MVS Medium Voltage Metal-Enclosed Load Break Switch Replacement Parts

Replacement Parts—WLI/MVS/MVS2 Load Break Switch




Description	Part Description	Quantity per Switch	Style Number	
Switch Pole Assemblies				
	Switch Pole Assemblies Three-pole set includes main and flicker blades, break jaws and arc chutes.			
	(60 kV BIL or 95 kV BIL) 5 and 15 kV—600A	1 set	7278A27G01	
	5 and 15 kV—1200A	1 set	7278A27G02	
	(125 kV BIL or 150 kV BIL) 25 and 38 kV—600A	1 set	7278A27G05	
	MVS2 5/15 kV—600A MVS2 5/15 kV—1200A	1 set 1 set	7278A27G43 7278A27G44	
Arcing Contact Assemblies				
	Arcing Contact Assemblies Three-pole set includes flicker blades and arc chutes. This kit is not required when switch pole assemblies above are ordered.			
	(60 kV BIL or 95 kV BIL) 5 and 15 kV—600A	1 set	7278A27G06	
	5 and 15 kV—1200A	1 set	7278A27G07	
	(125 kV BIL or 150 kV BIL) 25 and 38 kV—600A	1 set	7278A27G08	
Drive Rod Link (Polyester)				
	Drive Rod Link (polyester, set of three)			
	5 kV (60 kV BIL)	1 set	7278A27G09	
	15 kV (95 kV BIL)	1 set	7278A27G10	
	25 and 38 kV (125 kV BIL or 150 kV BIL)	1 set	7278A27G12	
	MVS2 5/15 kV MVS2 5/15 kV manufactured after May 2011	1 set 1 set	7278A27G45 7278A27G53	
Finned Bus Support				
 <p>Finned Bus Support</p> <p>Three-Phase Bus Brace Two-Phase Bus Brace</p>	Finned Bus Support (one each) 36.00-inch wide (glass polyester) Three-phase bus brace (glass polyester) Two-phase bus brace (glass polyester)	1 each 1 each 1 each	260C003H51 260C005H51 260C005H53	
	36.00-inch wide (epoxy) Three-phase bus brace (epoxy) Two-phase bus brace (epoxy)	1 each 1 each 1 each	260C003H11 260C005H11 260C003H13	
	Insulators			
	 <p>Polyester Epoxy</p>	Insulators (one each) (60 kV BIL) 5 kV glass polyester 5 kV epoxy	as required as required	4892A97H01 4892A97H07
		(95 kV BIL) 15 kV glass polyester 15 kV epoxy	as required as required	4892A97H02 4892A97H08
		(125 kV BIL or 150 kV BIL) 25 and 38 kV epoxy	as required	4892A97H18

Replacement Parts—WLI/MVS/MVS2 Load Break Switch, Continued

Description	Part Description	Quantity per Switch	Style Number
Removable Handle			
	Removable handle All ratings	1 each	7274A49H01
Switch Spring Mounted Assembly			
	Switch Spring Mounting Assembly		
	5–15 kV—40 kA fault close	1 set	7278A27G16
	5–15 kV—61 kA fault close	1 set	7278A27G18
	25 kV—20 kA fault close	1 set	7278A27G19
	25 kV—40 kA fault close	1 set	7278A27G20
	25 kV—60 kA fault close	1 set	7278A27G21
38 kV—20 kA fault close	1 set	7278A27G22	
38 kV—30 kA fault close	1 set	7278A27G23	
Switch or Fuse Barrier Assembly			
	Switch Barrier Assembly		
	5 and 15 kV	1 set	7278A27G24
	25 and 38 kV	1 set	7278A27G25
	MVS2 5 kV	1 set	7278A27G46
	MVS2 15 kV	1 set	7278A27G47
	Fuse Barrier Assembly		
15 kV (WLI design)	1 set	7278A27G26	
25 and 38 kV (WLI design)	1 set	7278A27G27	
15 kV (MVS/MVS2 design) (tightening knob or quick disconnect)	1 set	7278A27G43	
15kV (MVS2 design—bolt in fuses)	1 set	7278A27G01	
Open Close Indicator/Interlock Cam			
	WLI/MVS Standard Open-Close Indicator/Interlock Cam For lock open/close (top) or lock open (bottom)	1 each	220C934G01
	MVS2 Standard Open-Close Indicator/Interlock Cam For lock close (top) or lock open (bottom)	1 each	220C934G02
Auxiliary Switch Assembly			
	Auxiliary Switch Assembly (5NO and 5NC contacts)	1 each	7278A27G28
Switch Adjustment Tool Kit			
	Switch WLI/MVS Adjustment Tool Kit	1 each	221C113G031

WLI/MVS Medium Voltage Metal-Enclosed Load Break Switch Replacement Parts

Replacement Parts—WLI/MVS/MVS2 Load Break Switch, Continued

Description	Part Description	Quantity per Switch	Style Number
Fuse Live Part Kit			
	Fuse Live Part Kit (WLI Design)		
	Non-disconnect (three-phase—top and bottom)		
	RBA200 5–15 kV	1 each	7278A27G29
	RBA400 5–15 kV	1 each	7278A27G30
	RBA200 25–38 kV	1 each	7278A27G31
	RBA400 25–38 kV	1 each	7278A27G32
	CLE-1 5–15 kV	1 each	7278A27G33
	CLE-2 5–15 kV	1 each	7278A27G34
	CX 5–15 kV	1 each	7278A27G36
	CXN-1 5–15 kV (single barrel—3.00-inch diameter)	1 each	7278A27G37
	CXN-1 5–15 kV (single barrel—4.00-inch diameter)	1 each	7278A27G38
	CXN-2 5–15 kV (double barrel—3.00-inch diameter)	1 each	7278A27G39
	CXN-2 5–15 kV (double barrel—4.00-inch diameter)	1 each	7278A27G40
	NX25 kV	1 each	7278A27G41
	EJO38 kV	1 each	7278A27G42
	Fuse Live Part Kit (MVS Design)		
	Non-disconnect (three-phase—top and bottom)		
RBA200 5 kV	1 each	98A1125G22	
RBA200 15 kV	1 each	98A1125G23	
RBA400 5 kV	1 each	98A1125G24	
RBA400 15 kV	1 each	98A1125G25	
RBA800 5 kV	1 each	98A1125G26	
RBA800 15 kV	1 each	98A1125G27	
CLE-1 5 kV	1 each	98A1125G03	
CLE-1 15 kV	1 each	98A1125G04	
CLE-2 5 kV	1 each	98A1125G05	
CLE-2 15 kV	1 each	98A1125G06	
CX 5 kV	1 each	98A1125G09	
CX 15 kV	1 each	98A1125G10	
CXN-1 5–15 kV (single barrel—3.00-inch diameter)	1 each	98A1125G11	
CXN-1 5–15 kV (single barrel—4.00-inch diameter)	1 each	98A1125G12	
CXN-2 5–15 kV (double barrel—3.00-inch diameter)	1 each	98A1125G13	
CXN-2 5–15 kV (double barrel—4.00-inch diameter)	1 each	98A1125G14	
Space Heaters			
	Space Heaters (low watt density)		
	125V (WLI design)	as required	220C974G03
	250V (WLI design)	as required	220C974G04
	125V (MVS design)	as required	3614A50H01
	250V (MVS design)	as required	3614A50H02
	Shunt Trip Coil		
	Shunt Trip Coil		
	48 Vdc	1 each	7278A78H01
	125 Vdc	1 each	7278A78H02
	250 Vdc	1 each	7278A78H03
	115 Vac	1 each	7278A78H04
	230 Vac	1 each	7278A78H05
	CAP TRIP	1 each	7278A78H06

Other Replacement Parts

Other replacement parts are available but shall be considered on a job-by-job basis.

Include switch nameplate information located behind the switch operating handle access door with any correspondence. Be sure this includes the "CN" or "SM" number.

Renewal Parts

When ordering parts, specify the part description and mini-MVS switchgear assembly catalog number found on the nameplate.

Enter on Suffix Q50.

Replacement Parts

Part Description	Quantity per Assembly	Style Number
Switch pole assembly epoxy (three-pole set, includes arc chute, switch blade, drive rod and insulators)	1	7997A57G03
Non-fused switch and CLE fused switch barrier assemblies (set of four)	1	7997A57G06
Switch operator lever assembly	1	7997A57G11
Auxiliary switch assembly	1	7997A57G12
Space heater	1	7997A57G13
Filter (set of two)	1	7997A57G05
Key interlock provision kit [Ⓢ]	1	7826C86G01

Replacement Fuses

Fuse Continuous Ampere Rating	Quantity per Assembly	CLE Style Number
10	3	5981C29G01
15	3	5981C29G02
20	3	5981C29G03
25	3	5981C29G04
30	3	5981C29G05
40	3	5981C65G01
50	3	5981C65G02
65	3	5981C65G03
80	3	5981C65G04
100	3	5981C65G05
125	3	5981C65G06
150	3	5981C65G07
175	3	5981C65G08
200	3	5981C65G09

Torque Values

Tighten the hardware per the table below.

Torque Values

Bolt Diameter in Inches	Nominal Torque, ft lbs (Nm)
0.25	4 (5.42)
0.31	8 (10.85)
0.38	25 (33.90)
0.50	50 (67.79)
0.63	65 (88.13)

Further Information

Publication Number	Description
DB 31-935	Descriptive bulletin for WLI load interrupter metal-enclosed switchgear
DB 31-950	Descriptive bulletin for unitized dry-type power centers
IL 31-930-D	Instructions for WLI and WVB metal-enclosed switchgear

Pricing Information

Vista/VISTALINE Discount Symbol Y2

Note

[Ⓢ] Key interlock(s) provided by others.