Siemens Type WL low voltage metal-enclosed switchgear is designed, constructed and tested to provide superior power distribution, power monitoring and control. At the heart of the Type WL low voltage switchgear is the World Class Siemens WL breaker.

Siemens Type WL low voltage switchgear can be utilized in the following applications:
- Industrial
- Institutional
- Critical Power
- Utility and co-generation
- Commercial

**Product Scope**
- Equipment ratings
  - 635VAC Maximum
  - 3-Phase 3-Wire, 3-Phase 4-Wire
  - 50/60 Hz
  - 6000 amp maximum horizontal bus
  - 5000 amp maximum vertical distribution bus
- Enclosure options
  - NEMA 1 Indoor
  - NEMA 3R Outdoor Walk-in
  - NEMA 3R Outdoor Non Walk-in

**Exclusive Features**

**Generator/Utility Protection Sets**
24/7/365 power availability is critical for some systems. On-site generation capability is growing more and more common in many systems. All of the WL digital electronic trip units allow the system designer to precisely tailor trip settings for the most demanding requirements. However, the 776 trip unit allows one set of trip settings for a fully loaded utility feed and with a simple contact closure, the trip unit toggles to a second set tailored to provide optimal generator protection. The wide range of settings allows the WL to provide protection for a minimal generator capacity for only essential loads, through full backup for an entire facility. This dual utility/generator protection capability in a single circuit breaker allows the system designer unparalleled, cost-effective flexibility.

**Extended Instantaneous Protection**
*(EIP – Patent Pending Feature)*
Another unique feature of the WL Trip Unit, allows the system designer to achieve full selective trip coordination up to the short-time rating of the frame, while allowing application of the breaker up to the interrupting rating of the frame. EIP allows the WL breaker to be applied up to the full withstand rating of the breaker, for complete coordination, with a minus 0% short-time band tolerance up to 85kA on Frame Size II and 100kA on Frame Size III. Above fault currents of 20% higher than the full short-time rating, the WL breaker is self-protecting, and the EIP function will trip the breaker instantly to protect the frame and the system from these extremely high currents, as high as 150 kA on Frame Size III. One added benefit is that arc flash energy is greatly reduced in this high current region due to the instantaneous trip response that EIP provides.

**Industry Standards**
Type WL switchgear with power circuit breakers are designed, tested and constructed in accordance with:
- UL 1558—Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear
- ANSI C37.20.1—Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear
- IEEE C37.20.7 - IEEE Guide for Testing Metal-Enclosed Switchgear Rated Up to 38KV for Internal Arcing Faults (Optional)

WL drawout circuit breakers are designed for continuous operation at 100% of their current rating without the need for external heat sinks, and are in accordance with:
- UL 1066—Low Voltage AC and DC Power Circuit Breakers Used in Enclosures
- ANSI C37.13—Low Voltage AC Power Circuit Breakers Used in Enclosures

For more information, please visit [http://automation.usa.siemens.com/consultant/](http://automation.usa.siemens.com/consultant/) or contact your local sales office.
Low Voltage Switchgear

Type WL Low Voltage Metal-Enclosed Switchgear

Specifications

Low Voltage Metal-Enclosed Switchgear Features & Benefits

- Control and communication termination area located in front of equipment and segregated from power cable termination area that is located in rear of equipment
- Front accessible vertical and horizontal wiring channels
- No heat sinks on breaker or bus
- No front-breaker door ventilation
- 100kA bus bracing standard - 150kA and 200kA optional
- Insulated/isolated bus through 6000 amps
- Three levels of horizontal bus through 5000 amps
- Modular design for maximum configuration flexibility
- Breaker racking handle integral to the breaker
- All breaker settings and displays clearly visible with breaker door closed
- Field installable “drop in place” accessories and trip units
- Same accessories work for entire breaker line
- ModBus, ProfiBus and Ethernet communication
- Field installable ground fault protection and zone selective interlock
- Rogowski coil current sensors provide high metering accuracy and prevent saturation at high current levels
- Dynamic Arc Flash Sentry (DAS) and EIP (Extended Instantaneous Protection) are patent pending features from Siemens that greatly reduce Arc Flash Energy
- Optional arc resistant metal-enclosed low voltage switchgear designed and tested to provide an additional degree of protection for personnel performing normal operating duties in proximity to the energized equipment.

Breaker Ratings

<table>
<thead>
<tr>
<th>Frame Size II</th>
<th>Frame Size III</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frame Rating</strong></td>
<td><strong>3200</strong></td>
</tr>
<tr>
<td><strong>Rating Designation</strong></td>
<td><strong>N</strong></td>
</tr>
<tr>
<td>Interrupting Current I_{AR} (kA RMS) 50/60 Hz</td>
<td>254VAC</td>
</tr>
<tr>
<td>508VAC</td>
<td>50</td>
</tr>
<tr>
<td>635VAC</td>
<td>50</td>
</tr>
<tr>
<td>Short-time Withstand Current I_{SW} (kA RMS) 50/60 Hz</td>
<td>0.5s</td>
</tr>
<tr>
<td>Extended Instantaneous Protection (kA RMS - 0% to 20%)</td>
<td>285</td>
</tr>
<tr>
<td>508VAC</td>
<td>50</td>
</tr>
<tr>
<td>635VAC</td>
<td>50</td>
</tr>
<tr>
<td>Close &amp; Latch Ratings (kA RMS) 50/60 Hz</td>
<td>200</td>
</tr>
<tr>
<td>Rating Plug Range</td>
<td>200A to 800A</td>
</tr>
<tr>
<td>Endurance Rating (switching operations with maintenance)</td>
<td>Mech.</td>
</tr>
<tr>
<td>Elec.</td>
<td>15,000</td>
</tr>
</tbody>
</table>

Frame Size III

<table>
<thead>
<tr>
<th>Frame Rating</th>
<th><strong>3200</strong></th>
<th><strong>4000</strong></th>
<th><strong>5000</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rating Designation</strong></td>
<td><strong>M</strong></td>
<td><strong>F</strong></td>
<td><strong>H</strong></td>
</tr>
<tr>
<td>Interrupting Current I_{AR} (kA RMS) 50/60 Hz</td>
<td>254VAC</td>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>508VAC</td>
<td>150</td>
<td>200</td>
<td>85</td>
</tr>
<tr>
<td>635VAC</td>
<td>85</td>
<td>200</td>
<td>85</td>
</tr>
<tr>
<td>Short-time Withstand Current I_{SW} (kA RMS) 50/60 Hz</td>
<td>0.5s</td>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td>Extended Instantaneous Protection (kA RMS - 0% to 20%)</td>
<td>254VAC</td>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>508VAC</td>
<td>150</td>
<td>200</td>
<td>85</td>
</tr>
<tr>
<td>635VAC</td>
<td>85</td>
<td>200</td>
<td>85</td>
</tr>
<tr>
<td>Close &amp; Latch Ratings (kA RMS) 50/60 Hz</td>
<td>100</td>
<td>40</td>
<td>85</td>
</tr>
<tr>
<td>Rating Plug Range</td>
<td>800A to 3200A</td>
<td>800A to 4000A</td>
<td>800A to 5000A</td>
</tr>
<tr>
<td>Endurance Rating (switching operations with maintenance)</td>
<td>Mech.</td>
<td>10,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Elec.</td>
<td>10,000</td>
<td>10,000</td>
<td>10,000</td>
</tr>
</tbody>
</table>

Maintenance means: Replacing main contacts and arc chutes (see operating instructions). Main contacts in breakers with Rating Designation M can only be replaced by Siemens personnel.

Do not apply breaker at 635V AC on a system with available fault current > 85kA RMS.
Low Voltage Switchgear

Type WL Low Voltage Metal-Enclosed Switchgear

Main and Ground Bus
The standard main bus is silver-plated copper. Tin-plated copper bus is optionally available. Vertical and horizontal bus bar utilize a channel shape design to maximize short circuit withstand capability and minimize heat rise. All bus joints include Grade 5 bolts and conical spring washers. Provisions for future extension of the main bus include plated joints and high tensile strength steel hardware.

The main three phase horizontal bus is arranged vertically one phase above the other with edge-to-edge alignment to provide high, short circuit strength. Insulated main bus with isolated vertical bus is optional.

Vertical bus ratings available are 1600, 2000, 3200, 4000 and 5000 amperes continuous current. Horizontal bus ratings available are 1600, 2000, 3200, 4000, 5000 and 6000 amperes. A neutral bus is furnished when specified, and can be rated 1600, 2000, 3200, 4000, 5000 or 6000 amperes continuous current.

A standard copper ground bus extends through all sections. Cable lugs are mounted to the ground bus in each section.

Standard short-circuit withstand (4 cycle) and short-time withstand (60 cycle) bus bracing is 100,000 amperes. Higher short-circuit withstand bus bracings (150kA and 200kA) are available.

Load side runbacks for feeder circuits are copper construction, are insulated with sleeve tubing in the main bus area, and are supported by high-strength bus bracing.

Control and Communication Wiring
Standard control and communication wiring is #14 AWG extra-flexible, stranded copper type SIS. Terminations are made with compression-type, insulated terminals. Control and communication wiring is installed and accessed from the front of the switchgear structure. Each breaker compartment has a dedicated horizontal and vertical wireway.

For devices not having screw-type terminals, pressure terminals are used.

Insulation
The insulation used is a UL recognized thermoset material that has excellent heat resistance, flame retardance, dimensional stability and low moisture absorption.

Circuit Breaker Compartments
Typical circuit breaker compartments include primary disconnects, drawout rails, secondary disconnects, vertical wireway, horizontal wireway and, if applicable, TOC switch operator, MOC switch operator and associated interlocks. Drawout rails allow the breaker to be withdrawn from the compartment without additional extensions or adapters. Up to six (2 sets of three) current transformers for metering or relaying can be mounted in each compartment.

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Low Voltage Switchgear

Type WL Low Voltage Metal-Enclosed Switchgear

Options

Siemens High Resistance Grounding System

(1) The HRG section can be 22” or 32” wide. The HRG instrument compartment is 45” high and either 19” or 24” deep depending on whether the circuit breakers are fused. The HRG instrument compartment will house all of the high resistance grounding system components either on the door or in the device bucket except for the grounding resistors.

(2) The grounding resistor assembly will mount in the rear cable compartment of the switchgear on the runback support posts. It will typically mount behind the HRG instrument compartment where it cannot interfere with feeder breaker runbacks.

(3) In a typical Siemens HRG application with a close coupled main breaker section, a general purpose instrument compartment takes up the A compartment, the main breaker goes in the B compartment and the HRG instrument compartment takes up the C & D compartments. An alternate HRG main breaker section can have the HRG instrument compartment in the A & B compartments, main breaker in the C compartment and a general instrument compartment in the D compartment.

Switchgear Mounted Hoist

The integrally mounted hoist, standard on walk-in outdoor and optional on indoor switchgear enclosures, travels along rails on top of the switchgear to assist in breaker handling.

TOC and MOC Switches

The Truck Operated Cell (TOC) Switch provides interlocking control or remote indication of the breaker racking position. The cubicle mounted auxiliary switch or Mechanism Operated Cell (MOC) switch provides interlocking control or remote indication based on the main contact position (open or closed).

Shutters

These provide protection against accidental contact with primary disconnects in a compartment when the breaker is removed. Shutters automatically close when the breaker is withdrawn and are padlockable and field installable.

Key Interlock

This provides a mechanical means for operating circuit breakers and other devices only when predescribed conditions are met.

Test Set

A portable breaker test set is available as an option and supports testing the full range of functions and protective settings supplied with the breaker trip unit.

Metering and Auxiliary Compartments

Compartments are available to house devices such as voltage transformers, metering, control power transformers, and supervisory devices.

Instrument and Control Transformers

Voltage transformers and control power transformers are mounted in auxiliary compartments. These transformers are protected by primary pull-out type current-limiting fuses and secondary fuses. Current transformers are normally mounted on the compartment primary disconnect studs where they are readily accessible.

Miscellaneous

- Each switchgear lineup includes a breaker lifting device that is adjustable for use with Size II and Size III breakers
- An optional portable breaker hoist is available if the integrated breaker hoist and track is not specified
- A test cabinet is also available as an option. The test cabinet is wall mounted necessary equipment for testing electically-operated breakers that have been removed from the breaker compartment. The test cabinet doesn’t include or replace a breaker trip unit tester
- 4” high formed steel channel sills are available for indoor switchgear enclosures

Outdoor Switchgear

Type WL switchgear is available in two outdoor (NEMA 3R) enclosures. Walk-in and non-walk-in versions are available to meet your particular application.

For protection from snow, rain and other foreign matter, both outdoor enclosures rest on a six-inch high, formed steel base which provides rigid support and a tight bottom seal. A heavy duty protective undercoating is applied to the underside of all outdoor enclosures to protect against moisture and corrosion. Shielded ventilation housings permit proper air circulation while excluding dirt and foreign matter.

In the walk-in outdoor enclosure a lighted, unobstructed service aisle is provided at the front of the switchgear allowing inspection and maintenance without exposure to the elements. An access door equipped with an emergency bar release is located at each end of the aisle.

The following features are standard with walk-in outdoor enclosures.

(1) Space heaters in breaker compartment and bus compartment.

(2) Screens and filters for exterior door ventilation louver.

(3) Incandescent lighting receptacle with three-way switch at each aisle access door.

(4) Duplex receptacle with ground fault protection at each aisle access door.

(5) Load center for power distribution to lights, receptacles, switches and heaters.

For non walk-in outdoor enclosures, space heaters and screens/filters for ventilation louvering are standard with lighting, receptacles, switches and load centers offered as options.
Low Voltage Switchgear

Type WL Low Voltage Metal-Enclosed Switchgear

Dimensions

Indoor Front Elevation View

Indoor Floor Plan and Cable Space Details

Note: Dimensions shown in inches and (mm).

1. Reduce by 7.88" if upper neutral is present with cables above or if a lower neutral is present with cables below.
2. Reduce by 4.00" if an 800-3200A breaker is located in the bottom compartment.
4. Reduce cable space by 4.00" x 4.82" if Neutral Riser is present. (Consult Factory).
5. 4.10 (104) if W=22; 4.60 (117) if W=32.

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Low Voltage Switchgear

Type WL Low Voltage Metal-Enclosed Switchgear

General Notes:
- Any 22’ wide section can be 32’ wide if more conduit working room is needed
- For bus duct connections – if incoming is top, Compartment A must be blank/instrument, if incoming is bottom, Compartment D must be blank/instrument
- Bused transition section is 22’ wide
- For close coupled transformer connections, Compartment A must be blank/instrument
- Utility metering is always in a separate section. Section width is dependent on utility

Note 1 – If a 4000 amp feeder breaker is installed in Compartment C, Compartment D must be a Blank or Instrument Compartment.
Note 2 – If a 4000 amp breaker is installed in Compartment B, Compartment A must be a Blank or Instrument Compartment.
Note 3 – Contact Sales for application guidelines related to this design.
Note 4 – If a 3200 amp breaker is installed in Compartment B, the middle level through bus is not available.
Note 5 – If a 3200 amp breaker is installed in Compartment D, the lower level through bus is not available.
Note 6 – If incoming is bottom, feeder breakers can mount in compartments A and/or B.
Note 7 – If a 3200 amp breaker is installed in Compartment B, Feeder Breaker in Compartment A is limited to 1600 amp.
Note 8 – If a 3200 amp breaker is in Compartment BC, the maximum breaker in Compartment A is 1600 amp and if a 4000 amp breaker is in Compartment BC, the maximum breaker in Compartment A is 800 amp.

Switchgear Depth Dimensional Information
(Dimensions below are for internal frames – not total structure depth)
- Non-fused indoor – 60” standard, 70’ and 80’ optional
- Fused indoor – 65’ standard, 75’ and 80’ optional
- Non-fused non-walk-in outdoor – 60” standard and 75’ optional
- Fused non-walk-in outdoor – 65” standard and 75’ optional
- Non-fused walk-in outdoor – 60” standard and 75’ optional
- Fused walk-in outdoor – 65” standard and 75’ optional
- Walk-in outdoor aisle is 42” deep
- Sections with cable connected main, tie and/or feeder breakers that are 3200 amp or greater must be minimum depth of 70’ for unfused breakers and 75’ for fused breakers.

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# Low Voltage Switchgear

## Type WL Low Voltage Metal-Enclosed Switchgear

### Selection

**Tie Sections – Non-Fused Breakers**

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<thead>
<tr>
<th>Feeder Breaker</th>
<th>Tie Breaker</th>
<th>Refer to Note 7</th>
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<tbody>
<tr>
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<tr>
<td>800, 1600, 2000</td>
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<td></td>
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</tbody>
</table>

**Main and Tie Sections – Non-Fused Breakers**

<table>
<thead>
<tr>
<th>Feeder Breaker</th>
<th>Blank or Instrument Compartment</th>
<th>Refer to Note 7</th>
</tr>
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<tr>
<td>800, 1600, 2000</td>
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<td></td>
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</tbody>
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Low Voltage Switchgear

Type WL Circuit Breakers

Rogowski Coil CT Technology

A Rogowski coil is an ‘air-core’ toroidal coil placed round the conductor. The alternating magnetic field produced by the current induces a voltage in the coil which is proportional to the rate of change of current.

The direct output from the coil is given by \( V_{out} = M \frac{dI}{dt} \) Where \( M \) is the mutual inductance of the coil and \( \frac{dI}{dt} \) is the rate of change of current. To complete the transducer the voltage is integrated electronically so that the output from the integrator is a voltage that accurately reproduces the current waveform.

Coil and Integrator:

The combination of a coil and an integrator provides an exceptionally versatile current-measuring system which can be designed to accommodate a vast range of frequencies, current levels and conductor sizes. The output is independent of frequency, has an accurate phase response and can measure complex current waveforms and transients.

Linearity:

One of the most important properties of a Rogowski coil measuring system is that it is inherently linear. The coil contains no saturable components and the output increases linearly in proportion to current right up to the operating limit determined by voltage breakdown. The integrator is also inherently linear up to the point where the electronics saturates. Linearity makes Rogowski coils easy to calibrate because a transducer can be calibrated at any convenient current level and the calibration will be accurate for all currents including very large ones. Also, because of their linearity, the transducers have a very wide dynamic range and an excellent transient response.

Coil Winding

With a Rogowski coil it is important to ensure that the winding is as uniform as possible. A non-uniform winding makes the coil susceptible to magnetic pickup from adjacent conductors or other sources of magnetic fields. We have developed special machines for making accurate windings. Coils come in a range of styles including rigid and flexible coils but we have developed several other variations to meet specific needs.

Output Indication

The output from the integrator can be used with any form of electronic indicating device that has an input impedance greater than about 10kohm such as a voltmeter, oscilloscope, transient recorder or protection system.

Split Coils

Some designs of coil can be fitted on the conductor without the need to disconnect the conductor. Most flexible coils can be fitted this way and it is also possible to build split rigid coils. Split iron-cored devices such as current transformers are subject to appreciable amplitude and phase errors if the halves are misaligned by even a small amount. Rogowski coils do not have this problem. Misalignment of the joining faces of a split Rogowski coil has only a small effect on the amplitude and no effect on the phase.

Electronic Trip Unit

Selection Criteria for WL Circuit Breakers

The basic criteria for selecting circuit breakers is:

- Maximum Available Short Circuit at the installation point. This value determines the short circuit current interrupting rating or short circuit current withstand rating of the circuit breaker.
- Rated Current \( I_n \) which is to flow through the respective circuit breaker continuously. This value may not be greater than the maximum rated current of the circuit breaker. The rated current for the WL is determined by the rating plug, up to the maximum frame rating.
- Ambient Temperature of the circuit breaker. This is usually the temperature inside the cubicle.
- Design of the circuit breaker.
- Protective Functions of the circuit breaker. These are determined by the selection of the appropriate trip unit.

Dynamic Arc-Flash Sentry (Patent Pending) A unique feature of the WL trip unit allows the system designer to achieve lower levels of arc flash energy and delayed tripping for selective trip coordination purposes.

Rating Plug

The Rating Plug is a replaceable module that enables users to reduce the rated device current for optimum adaptation to the system; e.g., during startup of a plant section. The Rating Plug should be selected so that it corresponds to the rated current of the system.

Switch-selectable \( I_2t \) or \( I_4t \) Characteristic Curve Improved Overload Protection.

The best possible protection is assured when all protective devices in the system are optimally coordinated. To achieve optimum selectivity and coordination, the long-time characteristic can be switched between \( I_2t \) and \( I_4t \), to improve coordination with fuses or inverse relays.

Switchable Parameter Sets

To allow the protection to adapt to changes in system needs such as switching between utility and generator feeds, WL Circuit Breakers support ETUs with two independent parameter sets. Switching between the parameter sets occurs in less than 100 ms and can be done remotely or via a contact input to an optional CubicleBUS module.

For more information, please visit http://automation.usa.siemens.com/consultant/ or contact your local sales office.
## Low Voltage Switchgear

### Type WL Circuit Breakers

#### Trip Unit Functions

<table>
<thead>
<tr>
<th>Basic Protective Functions</th>
<th>ETU745</th>
<th>ETU748</th>
<th>ETU776</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-time overcurrent protection</td>
<td>L</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Short-time delayed overcurrent protection</td>
<td>S</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Instantaneous overcurrent protection</td>
<td>I</td>
<td>●</td>
<td>–</td>
</tr>
<tr>
<td>Neutral protection</td>
<td>N</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Ground fault protection</td>
<td>G</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

#### Additional Functions

| Selectable neutral protection | ● | ● | ● |
| Defeatable short-time delay | ● | ● | ● |
| Defeatable instantaneous protection | ● | – | ● |
| Selectable thermal memory | ● | ● | ● |
| Zone selective interlocking | ○ | ○ | ● |
| Selectable I²t or fixed short-time delay | ● | ● | ● |
| Adjustable instantaneous pick-up | ● | – | ● |
| Selectable I²t or I²t long-time delay | ● | ● | ● |
| Adjustable short-time delay and pick-up | ● | ● | ● |
| Selectable and adjustable neutral protection | ● | ● | ● |
| Dual protective setting capability (DAS)* | – | – | ● |
| Extended instantaneous protection | ● | ● | ● |

#### Parameterization and Displays

| Parameterization by rotary switches (10 steps) | ● | ● | – |
| Parameterization by communication (absolute values) | – | ● | ● |
| Parameterization by menu/keypad (absolute values) | – | -- | ● |
| Remote parameterization of the basic functions | – | – | ● |
| Remote parameterization of the additional functions | – | – | ● |
| Alphanumeric LCD | ○ | ○ | – |
| Graphical LCD | – | -- | ● |

#### Metering Function

| Metering function Plus | ○ | ○ | ○ |

#### Communication

| CubicleBUS | ● | ● | ● |
| Communication via PROFIBUS-DP | ○ | ○ | ○ |
| Communication via the MODBUS | ○ | ○ | ○ |
| Communication via the Ethernet (BDA) | ○ | ○ | ○ |

- ○ standard
- ● not available
- ○ optional
- * DAS- Dynamic Arc Flash Sentry, Siemens patent pending protective feature (Fixed short-time delay only)

For more information, please visit [http://automation.usa.siemens.com/consultant/](http://automation.usa.siemens.com/consultant/) or contact your local sales office.
Features

- Industry standard MODBUS or PROFIBUS communication available on all WL breakers from 200A to 5000A
- The high modularity of the WL Circuit Breakers and accessories allows simple retrofitting of all communication components
- The ability to connect additional input and output modules to the breaker-internal CubicleBUS of the WL opens up a range of opportunities to reduce secondary device count and wiring and to increase functionality implemented in switchgear
- Innovative software products for local configuration, operation, monitoring and diagnostics of WL Circuit Breakers using MODBUS, PROFIBUS or via Ethernet/Intranet/Internet

- Complete integration of WL Circuit Breakers in all Totally Integrated Power and Totally Integrated Automation Solutions

Metering Function/Metering Function PLUS

The integrated metering function can be installed on all ETU745, ETU748, and ETU776 trip units and provides a viable alternative to external multi-function measuring instruments in many applications. Metering Function can measure the following:

- Currents
- Voltages
- Power
- Energy
- Power Factor
- Frequency

All metered quantities are delivered as real time values with min/max recording. The metering module also contains additional alarm setpoint and protective relay functions (e.g. trip on overfrequency or undervoltage, and alarm on reverse power or over ampere demand).

The Metering Function PLUS has two additional wave form buffers and supports harmonic analysis. With the two independent wave form buffers, the current and voltage waveforms can be recorded, and allows detailed diagnostic triggering on events.

If the Metering Function /Metering Function PLUS is ordered together with the circuit breaker, it is already installed and ready for operation. As a retrofit part, the metering function is simply attached to the ETU and connected to the CubicleBUS.
Low Voltage Switchgear

TPS3 Family of Hardwired Surge Protective Devices

Product Overview

TPS3 Integral or Internally Mounted SPDs for Switchgear

Siemens Integral TPS3 06 and L6 are UL 1449 3rd Edition SPDs that can be factory installed in Siemens WL low voltage metal-enclosed switchgear, utilizing optimal electrical system connections to minimize impedance losses. This results in the some of the industry’s best “installed” Voltage Protection Ratings. These SPDs share the following features:

TPS3 Features

- UL 1449 3rd Edition and UL 1283
- UL Type 1 (consult factory) or Type 4 tested as Type 1 or 2 SPDs
- 20 kA In (most models)
- 200 kA SCCR (most models)
- UL96A Lightning Protection Master Label Compliant
- 100 – 500 kA surge current capacity per phase
- EMI/RFI filtering or Sine Wave tracking
- Monitoring – LEDs, Audible Alarm, Dry Contacts, and Ground Integrity Monitoring Diagnostics

Ordering Information

Catalog # TPS3 □□□ □ 0

Voltage Code Surge Current (kA)
A = 120/240 V, 1Ø, 3W
B = 120/240 V, 3Ø, 4W
C = 120/208 V, 3Ø, 4W
D = 240 V, 3Ø, 3W
E = 277/480 V, 3Ø, 4W
F = 480 V, 3Ø, 3W
G = 600 V, 3Ø, 3W
K = 380/220 V, 3Ø, 4W
L = 600/347 V, 3Ø, 4W
S = 400/230 V, 3Ø, 4W

- Example: TPS3C0640X0 = SPD for a 208/120 V low voltage switchgear with a surge current capacity of 400 kA per phase and a surge counter option
- When an option is not selected, include a zero (0) in the field

True 10 Mode SPD

Catalog # TPS3 □□□ □ 0

Voltage Code Surge Current (kA)
A = 120/240 V, 1Ø, 3W
B = 120/240 V, 3Ø, 4W
C = 120/208 V, 3Ø, 4W
E = 277/480 V, 3Ø, 4W
K = 380/220 V, 3Ø, 4W
S = 400/230 V, 3Ø, 4W

- Example: TPS3CL645X0 = 10 mode SPD for a 208/120 V low voltage switchgear with a surge current capacity of 450 kA per phase and a surge counter option

Please consult the factory for applications requiring SPDs with larger per phase surge current capacities and/or 10-mode style configurations.
Low Voltage Switchgear

Arc Flash Solutions

Arc Resistant Switchgear
- Insulated and isolated bus
- Separation barriers and top venting
- Breaker shutters

Arc resistant metal-enclosed low voltage switchgear is an optional product offering that contains and channels internal arcing fault energy. This new switchgear construction provides an additional degree of protection to the personnel performing normal operating duties in close proximity to the equipment while the equipment is operating under normal conditions. In each of the descriptions below, additional design features are indicated, all of which aid in directing faults upward away from personnel or reduce the chances of a fault by insulating and isolating live parts.

Front view

- Door gaskets and sealing trims
- Extra hinges
- Thumb screw latches added
- One piece breaker door
- Enhanced sill channel with internal plenum for arc venting

Rear view

- Pressure release vent in rear top cover
- Extra bolts and pressure dams in rear covers/doors
- Rear vent covers extended for vent flaps

Type 2B accessibility rating allows auxiliary/control compartment door to be open and still maintain arc resistant rating.

Breaker sealing frame maintains arc resistant rating with breaker in Connect, Test or Disconnect position.
Dynamic Arc Sentry

One of the trip units available for the Siemens WL Family of breakers is the ETU 776. It offers dual parameter sets that enable the trip unit to automatically lower the instantaneous setting and thereby lower the available energy in a fault condition. Commonly referred to as “maintenance mode”, making a breaker trip faster while engaged in any form of maintenance or just by being in proximity to energized equipment is an effective way to minimize arc flash dangers. If one is concerned about the effects of temporarily inhibiting selectivity, then rest assured that with the ETU 776 single step changes are possible giving engineers the ability to clear faults faster with minimum effect on coordination. In the example below the effects of the DAS system may be seen.

Example 1

WL Breaker with ETU 776
Under normal conditions, the switchgear’s calculated arc flash energy will require PPE level 3 protection for anyone within the arc flash boundary. Incorporating the features built into the DAS system, and using the ETU776 trip unit, the system changes to parameter set B. In the second figure the instantaneous has been changed to a lower setting and the calculation shows a reduction of arc flash energy. The resultant PPE level has been reduced to 0.

Below is another example of the benefit of the DAS, or even manual switching, of breaker parameter set. The reduced settings set available in the ETU 776 can also be used to reduce the arc flash energy at downstream equipment. In the first figure on the left with normal settings the arc energy at panel 1 requires PPE level 2. After switching to the parameter B settings, the PPE level at Panel 1 is reduced to 0.
Remote operation and monitoring

- Remote Monitoring for temperature, metering and maintenance data.
- Remote Control via communications with or without interposing relays.
- Remote Racking feature.
- Remote Operation for opening and closing via local hand held pendant station.

Remote Monitoring is an effective way to maintain separation between personnel and energized electrical equipment. With the latest equipment from Siemens, this is now easier and more cost effective than ever. Maintenance personnel and engineers can now view real-time electrical parameters, operating conditions (like temperature in the breaker and number of operations), and open and close breakers remotely. The WinPM.Net software with its Web Enabled interface allows multiple users to access only the information they are interested in from the convenience of their desks. Accountants can access cost allocation and utility billing information to enforce accountability for electrical resources and verify utility bills. Trip settings and other parameters for the LV power breakers can be modified and monitored remotely as well.

In addition, WL breakers with appropriate electrical controls and communication components, can be opened and closed through communications directly or with the use of interposing relays.

Real-time data from WL breakers with remote open/close capability
Remote Racking Device

Although it is always preferable to work on equipment that has been de-energized, in some cases it may not be practical. Siemens now offers the Remote Breaker Racking Device. This product uses an integral torque overload sensing mechanism and allows users to safely rack our WL breakers into the Connect, Test and Disconnect position from up to 30 feet away.

This allows the operator to be outside the arc flash boundary thereby providing additional personnel protection and reducing the PPE requirements. This system can be retrofitted to existing Siemens WL switchgear lineups.

Remote Operator Pendant

This hand held pendant allows a user to remotely operate (open/close) a WL breaker without being in front of the switchgear. Standard cable lengths are 30 feet with other lengths available. This pendant, along with the Remote Racking device, can be used to improve personnel safety by putting operators outside the arc flash boundary. Maintenance personnel can remotely open breakers and close breakers, without being in front of the equipment. The Remote Operator Pendant can be used in combination with the Remote Racking Device for added personnel safety.
Other protection options
- Infrared Viewing ports
- Zone Selective Interlocking
- High Resistance Grounding

Infrared Viewing Ports
Infrared viewing ports allow maintenance personnel to monitor temperatures of the cable and bus connection points in the rear of the gear while it is energized and under load. Excessive temperatures can be an indication of a problem with a connection.

Zone Selective Interlocking
Zone Selective Interlocking eliminates any intentional time delay in the event a fault occurs between two breakers in adjacent zones. In the schematic to the right, representative time delay values are shown for the breakers in each zone. If a fault occurs on the load side of the downstream breaker, the ZSI system enables the upstream breaker’s delay and allows the downstream device more time to independently clear the fault. If the fault occurs on the line side of the downstream breaker (between two zones), the delay in the upstream breaker will not occur. This allows the fastest tripping time for faults and will reduce the amount of arc energy which may be released. The ZSI function is available for short time delays and ground fault delays.

High Resistance Grounding
Research has shown that a high percentage of arc faults start as a phase to ground fault. High resistance grounding systems minimize the available phase to ground arcing current.

A high resistance grounding system reduces the magnitude of phase to ground faults. This will reduce the mechanical stress on equipment for the most common of faults and will reduce the magnitude of energy released.