



Upgrading your aging  
switchgear equipment is  
easier than you think.

Discover cost-effective modernization and upgrade solutions.

[schneider-electric.us/upgradesolutions](https://schneider-electric.us/upgradesolutions)

Life Is On

**Schneider**  
Electric

**CED**  
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A trusted partner of Schneider Electric

# Get the facts: Switchgear upgrade guide

With maintenance costs rising and older breakers becoming obsolete, it's not a matter of IF a malfunction will occur ... it's a matter of WHEN. Follow the steps below to help you **compare** options to find the best solution for your facility needs.

| Switchgear upgrade   | Switchgear replacement  |
|--|---|
| <p>Step 1: Know your options</p> <p>Modernize existing switchgear components to the latest technology and capabilities</p>   | <p>Step 1: Know your options</p> <p>Replace entire switchgear structure with new equipment</p>  |
| <p>Step 2: Assess the situation</p> <p><b>Workplace safety</b><br/>Upgrades are in compliance with NFPA 70E standards</p> <p><b>Desire to upgrade to current technology</b><br/>Can be done at a lower cost by modernizing equipment</p> <p><b>Cost savings</b><br/>Modernizing existing circuit breakers can help you save over 40% of the total cost of a project **</p> <p><b>Operating environment</b><br/>Equipment that is hard to access can be easily upgraded within the existing footprint</p> | <p>Step 2: Assess the situation</p> <p><b>Environmental impact</b><br/>More waste materials to be processed</p> <p><b>Site preparation</b><br/>More involved and time consuming</p> <p><b>Risk</b><br/>New switchgear can require new or spliced cabling, increasing risk</p>   |
| <p>Step 3: Weigh downtime</p> <p><b>Minimal to no downtime</b> required due to keeping existing structure intact</p>   | <p>Step 3: Weigh downtime</p> <p><b>Increased downtime</b> required for installation</p>  |
| <p>Step 4: Consider cost</p> <p><b>Lower cost now</b> by maintaining the existing footprint and reducing downtime</p> <p><b>Improved cash flow now</b> since retrofits can be spread out over time</p> <p><b>OpEx spend</b> — Upgrading is classified as an operating expense and typically easier to fund</p>   | <p>Step 4: Consider cost</p> <p><b>Higher cost now</b> due to new equipment prices, conduit movement, structure reconfiguration, and testing</p> <p><b>More upfront costs now</b> since replacement is usually done all at once</p> <p><b>CapEx spend</b> — New equipment requires capital funds, which are often limited</p> |



\$65 billion

worth of obsolete legacy systems are accounted for in electrical systems worldwide.\*



2 hours

of downtime per month costs the average plant \$2.4 million per year.\*

\*ARC Strategies – <http://iom.invensys.com/EN/pdfLibrary/ManagingObsoleteTechnologies-StrategiesandPractices.pdf>

\*\* “A Closer Look into the True Cost of Replacing Electrical Switchgear”  
<https://blog.schneider-electric.com/services/2017/08/11/closer-look-true-cost-replacing-electrical-switchgear/>



# Any brand. Any industry. Anytime.

Here are some of the reasons why our customers chose upgrade solutions:

- Reduced costs
- Less downtime
- Enhanced reliability
- Updated technology
- Digitization and connectivity

Here are some of our customers that chose upgrading solutions:

- Kimberly Clark
- VA Medical Center
- Public Services of New Mexico
- NSTAR
- Honda Motor Co.
- Astra Zeneca
- Ameren
- Miller Coors
- U.S. Steel
- Nestlé
- Oak Ridge National Laboratory
- And many more ...

# Two different modernization solutions provide the same end result

## Direct replacement

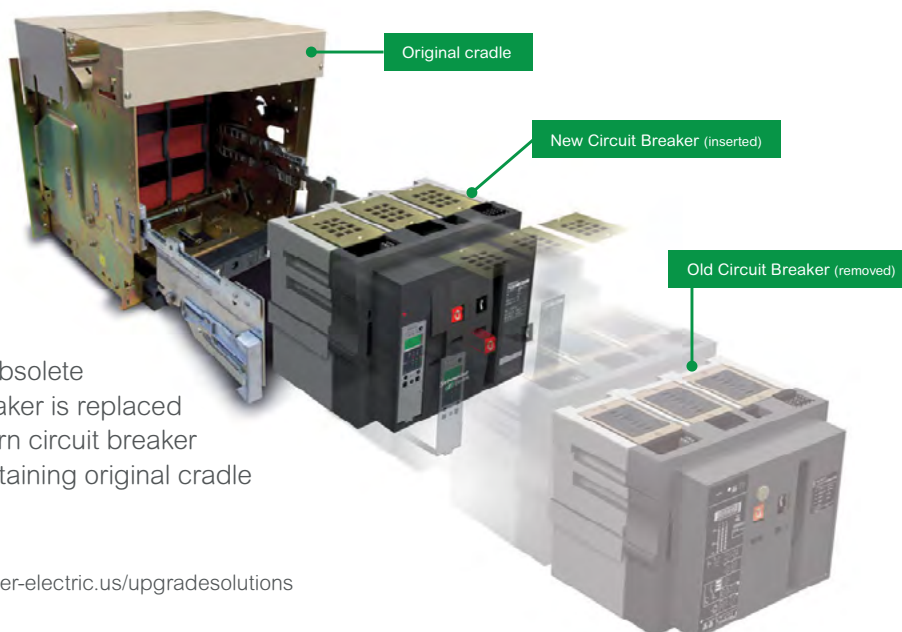
Circuit breakers are designed to fit into the existing cubicle with little to no modification to the switchgear cell. Direct replacement solutions reduce downtime since there is minimal outage on the equipment bus. Designs are available for any manufacturer's switchgear.

- **Low voltage** — A standard MasterPact™ cradle is installed into an adapter cradle to form one assembly, which is then installed into the switchgear cubicle. (This cradle-in-cradle assembly locks into place). The new MasterPact circuit breaker racks in and out of the adapter cradle. A new door is installed, however, cell interlocks, the racking mechanism, the primary/ secondary disconnects and the switchgear structure are not modified. Solutions are available for legacy circuit breakers and contactors.
- **Medium voltage** — The Magnum direct replacement circuit breaker will rack into the switchgear line-up and correctly interface with the existing compartment cell. The original racking mechanism, safety interlocks, and the primary/secondary disconnects inherent in the original equipment design are maintained and the switchgear structure is not modified.

Both the MasterPact NT/NW/MTZ and the Magnum circuit breakers are installed, tested, and commissioned by qualified field service personnel and are backed by a one-year warranty. Both the Low Voltage and Medium Voltage Direct Replacement breakers are design tested to ANSI C37.59.

## Check out these additional LV resources:

Visit our [Schneider Electric YouTube Channel](#) and search “Upgrade Solutions.”



**Figure 6**  
Aging or obsolete circuit breaker is replaced with modern circuit breaker while maintaining original cradle

  
**12 month**

extended warranty with the purchase of start-up and commissioning.\*

\*Additional 30 month warranty extension for drive start-up.

## Retrofill

The existing switchgear cell and bus are modified to accept the new circuit breaker. This option requires a longer bus outage (compared to the direct replacement option), during which time the internal circuit breaker cell is modified to accept the new circuit breaker. A retrofill solution is often used in lieu of the direct replacement option for larger devices, such as main circuit breakers and tie circuit breakers.

- **Low voltage** — Features a MasterPact cradle and circuit breaker, along with a new racking mechanism and primary and secondary connections in each switchgear cell. Existing cells are modified to accept the new cradle and circuit breaker, including a custom-engineered connection between the cradle and the switchgear line and load side bus. Custom designs are available for any manufacturer's low-voltage switchgear.
- **Medium voltage** — This solution upgrades switchgear by installing a new medium-voltage circuit breaker and cell into an existing line-up. Necessary modifications — including an all-new racking mechanism, primary and secondary disconnects, and customized connections — are made to the existing cell. Available designs include:
  - Air-magnetic to vacuum or SF<sub>6</sub>
  - Air-blast to vacuum or SF<sub>6</sub>
  - OCB switchgear to vacuum or SF<sub>6</sub> switchgear
  - Convert stationary circuit breaker to draw-out, or obsolete air circuit breaker to vacuum or SF<sub>6</sub>



Equipment is de-energized

### New cubicle doors

Both the direct replacement and retrofill solutions feature new cubicle doors to match the existing equipment and new circuit breaker face.



Equipment is de-energized

### Less downtime for installation

Downtime is minimized when compared with the demolition and replacement of existing equipment.

# MasterPact™ NT/NW/MTZ low-voltage circuit breakers

Providing the latest in circuit breaker technology, MasterPact NT/NW/MTZ circuit breakers feature high ampere interrupting and short-time current ratings, Modbus communication protocol, and field-installable devices such as sensor plugs and accessories.

In addition, MasterPact NT/NW/MTZ circuit breakers meet the requirements of UL489, UL1066, ANSI, IEC 60947-2, and CE Mark standards. Under normal operating conditions, MasterPact circuit breakers do not require maintenance. Completely modular in design, all replaceable parts can be installed with hand tools and require no critical adjustments.

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## Additional features include:

- Draw-out circuit breakers with three racking positions and status indicator on cradle
- Draw-out or fixed mount, 3- or 4-pole construction
- Integral ground-fault protection for equipment
- Protective relaying functions
- Zone-selective interlocking, which can reduce damage in the event of a detected fault

| Trip unit features   | MasterPact NT/NT Trip Unit Types |   |   |   | MasterPact MTZ |
|--|----------------------------------|---|---|---|----------------|
|  | Basic                            | A | P | H | Nx             |
| Open and close the circuit breaker   | –                                | ✓ | ✓ | ✓ | ✓              |
| Circuit breaker position and status (Open/Tripped/<br>Closed/ Connected/Test/Disconnected) | –                                | ✓ | ✓ | ✓ | ✓              |
| Display measurements at all settings   | –                                | ✓ | ✓ | ✓ | ✓              |
| View current and voltage waveforms   | –                                | – | – | ✓ | ✓              |
| Fine settings  | –                                | – | ✓ | ✓ | ✓              |
| Read all logged data   | –                                | – | ✓ | ✓ | ✓              |
| Maintenance record   | –                                | – | – | ✓ | ✓              |
| Protective relaying  | –                                | – | – | ✓ | DM             |
| ERMS   | –                                | – | – | ✓ | DM             |

\*DM=Digital Module



MasterPact Circuit Breakers, MicroLogic Trip Units and MasterPact MTZ

## Modernizing your aging switchgear is the smart thing to do!

The Internet of Things (IoT) is changing the way we receive and consume data. Everything seems to be connected, even switchgear! Make your switchgear smarter in order to help you make better decisions and gain greater control of your facility.

**EcoStruxure™ Asset Advisor:** This cloud-based service provides actionable recommendation. It helps to detect potential issues inside your electrical distribution equipment and to mitigate the risk of electrical failure by harnessing the emergence of IoT with breakthroughs in connectivity, sensor technology, and analytics.

**Smart Systems asset management:** For low-voltage installations, its simple, plug-and-play design connects your computer to circuit breakers to identify opportunities to help you reduce downtime and improve operational efficiency.

**Asset Connect:** Upgrade your installation with smart sensors, to transform non-communicating equipment into connected assets for continuous monitoring.

**MicroLogic™ trip units:** MicroLogic trip units are available for use with MasterPact circuit breakers. These trip units provide advanced functionality, such as a communications interface, bluetooth technology, power metering, and monitoring capabilities, which allow for integration and coordination of your electrical system. Functions include load protection, power measurement, power monitoring, and maintenance monitoring.

# Magnum medium-voltage circuit breakers

Magnum direct replacement circuit breakers are a family of products that upgrade existing medium-voltage switchgear to current switching technologies.

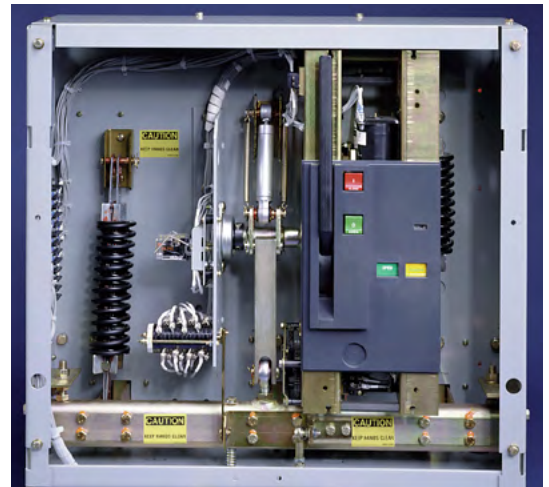
Built with new components and tested to ANSI standards, Magnum circuit breakers interface with the existing circuit breaker compartment components and maintain safety interlocks present in the original equipment design. To further simplify the modernization process, Magnum designs are available for any brand of medium-voltage switchgear.

## Features

- Available in 5 kV – 15 kV; upgraded MVA ratings available
- Low maintenance vacuum and SF<sub>6</sub> arc interruption technology
- Meets the requirements of ANSI/IEEE C37.59 standards
- High dielectric strength, moisture-resistant primary insulation
- Nuclear certification available
- No arc byproduct ventilated into the compartment
- Reduced power consumption of the control components
- Optional capabilities
  - Increased arc fault current interruption capacity
  - Arc flash reduction
  - Relay upgrade, improved accuracy and repeatability, and shorter interrupting time
  - Power monitoring and communication
  - Ground and test devices available
  - Remote racking solutions available

## Have a smaller cell size and footprint?

We now offer a 26" retrofill solution for 5 kV vacuum switchgear applications.



The operating mechanism on Magnum medium-voltage circuit breakers is simple to inspect and maintain.

Check out these additional MV resources:

**Medium-voltage direct replacement designs**  
Visit [schneider-electric.us/upgradesolutions](https://schneider-electric.us/upgradesolutions)

**Medium-voltage upgrade solutions demo videos!**

Visit [Schneider Electric YouTube Channel](https://www.youtube.com/channel/UC...) and search "Upgrade Solutions."



# Your single-source service provider

And when we say “single source,” we mean it! Our national team of qualified professionals has the expertise to service ANY brand of equipment. To see just how much we stand out from other providers, take a moment to review our qualifications.

## Mission

To enable you to operate at peak performance by delivering expert care throughout the life cycle of your electrical distribution system.

## Location



## Experience

- Over 200 professional engineers collectively registered in every state
- Over 20,000 power system studies, assessments, and designs
- Over 50 years of field services experience

## Expertise

- Maintenance and testing services
- Switchgear modernization solutions
- Power system engineering services
- Custom and turnkey solutions
- New installation services
- Emergency services 24/7
- Available 24/7 monitoring through EcoStruxure Asset Advisor

Committed to safety

8x

lower incident rating than national average

300+

operational safety awards by the National Safety Council in the past two years



National network

of qualified field service representatives, as defined by OSHA/ NFPA 70E



1 in 3 companies in the world

of qualified field service representatives, as defined by OSHA/ NFPA 70E

Committed to customers

81%

customer net promoter score, proving our best-in-class customer satisfaction

## How can we help you?

Our professional engineers and qualified field service personnel are ready and available to help you keep your facility safe, reliable, productive and efficient.

Emergency services available 24/7: **888-778-2733.**

Visit: [schneider-electric.us/electrical-maintenance](https://www.schneider-electric.us/electrical-maintenance)



Discover upgrades solutions for all LV and MV applications, including switchgear, motor control centers, relays, and much more. Visit us at [schneider-electric.us/upgradesolutions](https://schneider-electric.us/upgradesolutions)

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