

ABB



Future-Proofing Australian Infrastructure: The IPD Guide to the **ABB SACE Emax 3**



Introduction: The ROI of uptime

For modern, high-productivity businesses, the cost of an unexpected power failure goes far beyond just replacing a blown component. According to the Uptime Intelligence 2025 survey, power failures now account for more than half of all digital infrastructure outages. Commercially, the stakes have never been higher: over 50% of significant outages cost upward of \$100,000. For many industries the cost can be much higher; 1 in 5 data centre operators report their most recent major outage cost over \$1 million.

The ABB SACE Emax 3 is engineered specifically to prevent these million-dollar incidents. It's not just a traditional air circuit breaker; it's a proactive power management platform designed to extend equipment life, minimise unplanned downtime, and optimise maintenance resources.

So, how does proactive power management translate directly to your bottom line?

By combining embedded power sensors and data analytics, the Emax 3 provides real-time information on usage, system health, and environmental conditions. It turns raw data into actionable warnings and maintenance recommendations, allowing operators to act before a fault occurs. Shifting from a reactive "fix-it-when-it-breaks" approach to a predictive model has been shown to lower overall maintenance costs by 25%.

By mitigating operational risk and delaying the need for premature equipment replacement, this proactive approach transforms infrastructure investment into long-term competitiveness. This tangible return on investment is built on three core pillars:

- **Adaptive:** Driven by the software-defined Ekip Aware trip unit, the Emax 3 allows for digital upgrades (such as advanced protections and custom logic) without requiring hardware replacements.
- **Reliable:** Features Class 0.5 energy metering, continuous thermal monitoring, and on-premise predictive maintenance algorithms.
- **Secure:** Protects personnel with integrated arc-flash mitigation and defends data as the world's first air circuit breaker with IEC 62443-4-2 Security Level 2 certification.

From Predictive Maintenance to "Lifecycle Budgeting"

Traditional, time-based maintenance is inherently flawed. It is labour-intensive and frequently leads to higher service costs – and ironically, can sometimes cause maintenance-related breaker failures due to unnecessary human intervention.

Predictive maintenance, on the other hand, has been shown to improve productivity by 25%, reduce breakdowns by 70%, and lower maintenance costs by 25%.



Predictive maintenance, on the other hand, has been shown to **IMPROVE PRODUCTIVITY** up by **25%**



The Emax 3 shifts facilities from potentially expensive reactive maintenance strategies to proactive, data-driven predictive maintenance. Its ability to anticipate service requirements is driven by an on-premise algorithm operating without requiring a cloud connection, analysing the following real-time data inputs:

- **Utilisation Conditions:** Real-time current, voltage, contact wear, number of mechanical operations, and internal temperature.
- **Environmental Conditions:** Ambient temperature, humidity, vibration, corrosive environments, and dust levels.

It provides maintenance teams with two highly actionable outputs: a 0-100% Health Index and an exact "Next Maintenance Date".

For Operations Directors, this introduces the concept of Lifecycle Budgeting. Instead of waiting for a sudden failure, teams can track the health of specific internal components (such as shunt coils and motors) and financially plan for their repair or replacement months or years in advance, shifting unexpected CapEx into planned OpEx.

Digital Intelligence & System Integration

The Emax 3 acts as the intelligent brain of the switchboard, maximising efficiency by eliminating the need for external devices.



Embedded Energy Metering & Power Quality

The Emax 3 replaces external meters by using internal Rogowski coils to achieve Class 0.5 accuracy for active power and energy, strictly complying with the IEC 61557-12 standard. It also features an embedded Network Analyzer for THD/TDD analysis and Data Logger Pro to capture high-resolution pre- and post-fault waveforms.

The Operator Benefit: For facility and maintenance managers, this completely eliminates the need to buy, wire, and find panel space for external meters. By processing these functions internally, operators save valuable switchboard real estate, drastically reduce installation costs, and eliminate the potential failure points associated with complex external wiring loops. Furthermore, the detailed event tracking provided by the Data Logger enables the team to perform thorough root-cause analysis immediately after a fault, without needing to bring in third-party testing equipment.



**Continuous Thermal Monitoring**

Facilities can replace periodic, manual thermography with 24/7 temperature monitoring. The Emax 3 incorporates T-Sense Ambient and Busbar wireless sensors on a Bluetooth Low Energy (BLE) mesh network, supporting up to 16 sensors per breaker without an external concentrator. For wired solutions, Ekip Temperature 4T modules support PT100/PT1000 probes for up to four busbar joints, featuring 24 customisable thresholds that can trigger automatic logic-based actions.

The Operator Benefit: This puts an end to dangerous, labour-intensive manual thermal inspections. Operators gain real-time, proactive visibility into the exact health of critical connection points, allowing them to detect loose joints or rising temperatures well before they escalate into costly failures or arc flashes. If temperatures reach critical levels, the system can automatically trigger preventive measures – such as turning on cooling fans or safely opening the breaker – ensuring absolute peace of mind and uninterrupted operation.

**BMS Connectivity & Custom Automation**

The breaker provides a single source of truth directly to Building Management Systems (BMS), supporting 7+1 industrial communication protocols including Modbus TCP, Profinet, IEC 61850, and Ethernet/IP.

Using Ekip Connect 3 software, engineers can build drag-and-drop automation logic without external PLCs. This includes ready-to-use Automatic Transfer Switch (ATS) templates for Main-Gen and Main-Tie-Main setups, supported by the Ekip Synchrocheck module for perfectly phase-matched, safe closed transitions.

The Operator Benefit: Operators benefit from a highly streamlined architecture that reduces overall system complexity by up to 25% by removing the need for external control devices. During routine testing or emergency generator changeovers, the Ekip Synchrocheck module allows power sources to safely run in parallel, transferring loads seamlessly without dropping critical operations. Ultimately, this provides a unified, highly responsive power distribution network that operators can monitor and control through a single, simplified digital interface.

Ultimate Safety, including arc flash protection and remote racking

Safety is a foundational element of the Emax 3 design, specifically engineered to protect operators from catastrophic electrical hazards.

Active arc-flash mitigation: By embedding the protection module directly into the breaker and eliminating third-party external relays, the Emax 3 completely removes a step in the communication chain. Utilising light detection, it can clear arc faults in under 40 milliseconds. It utilises "dual-condition logic," requiring both a light flash and a simultaneous current spike to trigger, completely preventing nuisance tripping from camera flashes or handheld work lights.

Reduced Energy Let-Through (RELT): Compliant with NEC 240.87, RELT allows technicians to temporarily set a faster instantaneous trip time while working near live equipment. This mode triggers a highly visible blue color change on the display when active and can be safely engaged remotely via mobile app.

Remote racking: The Remote Racking Device (RRD) removes personnel from the line of fire entirely, allowing operators to safely rack the breaker in and out while standing safely outside the arc flash boundary.

Cyber-secure by design

With the number of cloud-connected industrial devices doubling in the last three years, cybercrime is now the world's third-largest economy. Bad actors are increasingly targeting smart building infrastructure, hospitals, and data centres, looking for vulnerabilities to shut down power or manipulate protections.

The Emax 3 addresses this head-on as the world's first air circuit breaker to achieve the stringent IEC 62443-4-2 Security Level 2 (SL-C 2) certification. Its technical defenses include:

Firmware & storage: Digitally signed firmware updates with strict anti-rollback protection and anti-tampering secure storage for device parameters.

Role-Based Access Control (RBAC): Permissions are strictly divided into Owner, Admin, Engineer, Operator, and Viewer profiles, restricting exactly who can alter critical trip settings.

Secure communications: Features Modbus TCP Security Protocol with TLS encryption and HMI PIN-protected BLE pairing to prevent unauthorised wireless access.

Why cybersecurity is important

Case study: Polish grid attack

In December 2025, the Ministry of Digital Affairs in Poland reported that hackers had targeted power infrastructure including wind and solar farms, a heating and power plant, and a private manufacturing company.

Thankfully, significant impact on the organisations' infrastructure was avoided, but the attack exposed a vulnerability in the energy distribution network.

By ensuring your facility's electrical infrastructure has the highest levels of cybersecurity, you can protect your business against similar malicious attacks.

The Path to Upgrading

Electrical switchboards typically have a lifecycle numbered in the decades, yet digital technology evolves every 3 to 5 years. The Emax 3 provides a holistic modernisation path without the need to rip and replace entire switchboards.

- **Smart Upgrade:** For older systems, ABB's strategy provides flexible solutions such as retrofit kits to renew older low-voltage distribution systems, keeping them compliant and highly efficient without the cost of complete switchboard replacement.
- **Seamless Emax 2 Migration:** For more recent legacy systems, the Emax 3 allows for a 1-to-1 frame migration from the Emax 2. It shares the exact same dimensions, mounting points, minimum enclosure requirements, and power connections.
- **Future-Proofing via Software:** Once installed, hardware obsolescence is a thing of the past. Future upgrades – like adding network analysers or custom automation logic – are executed digitally via the ABB Ability Marketplace.

Skip the compliance testing

Switchboard builders can utilise the official Device Substitution Declaration (ISDH002310A1002) to migrate from Emax 2 to Emax 3 legally without needing to retest the panel for IEC 61439-2 compliance.



Partnering with IPD

Australian organisations require more than just an advanced breaker; they require a dedicated, local partner to support this critical infrastructure over its 30-year lifespan.

As ABB's master distributor in Australia, IPD invests heavily in local stock holdings. This ensures smooth supply chains, shorter lead times, and the ready availability of Emax 3 units and compatible accessories.

With their dedicated team in Australia, IPD goes beyond simply shipping boxes. They locally accessorise and customise the Emax 3 to meet a customer's exact site specifications prior to delivery. Backed by a national sales and engineering team, IPD works directly with consultants, switchboard builders, and end-users to design complete, end-to-end power distribution architectures – from the Emax 3 ACB right down to the distribution boards, fully integrated with HVAC and communication networks.

**Get in touch to find out how you can
future-proof your protection with Emax 3**
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