



OCTOBER 2020

Smart Solutions to upgrade a LV electrical installation

Intelligent Distribution webinar series

Speakers



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Agenda

- Why upgrade an electrical installation?
- Value of ABB solution
- Introduction to flexible solution to upgrade an installation
- Light upgrades
- Medium upgrades
- High upgrades
- Predictive feature with digitally enabled products

Poll



Upgrade & Update

Market Trends

40 years switchboard

Lifecycle of a switchboard is around 40 years



New technologies

Technologies are changing every 3-5 years or less



Upgrade

To keep up with new technologies, the goal is to upgrade the plant with minimum impact



Why upgrade an electrical installation?

Unlock new functionalities to improve

Continuity of Service



Growing power demand



Extreme weather conditions



Human error



Equipment failure



124%

increase of power outages in the last two decades, according to research by the University of Minnesota

Critical power solutions include cutting-edge technologies such as predictive maintenance, extensive diagnostic data, and quickly replaceable critical modules to keep you up and running.

Maximize Plant Reliability

Energy Efficiency

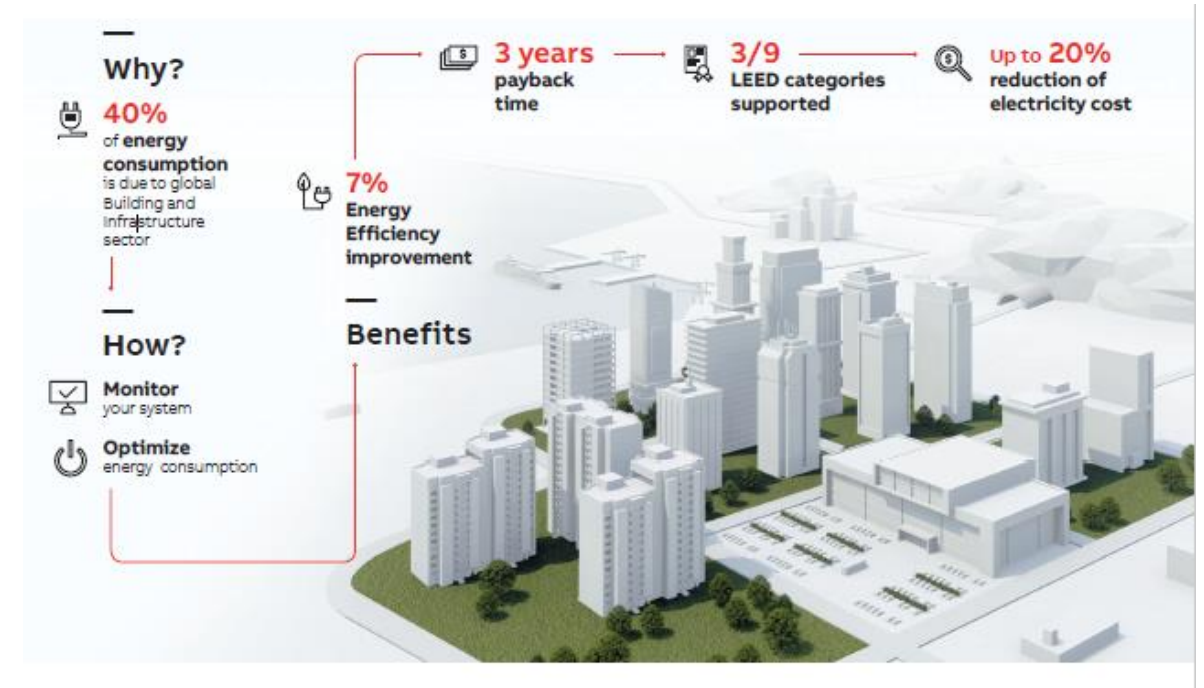
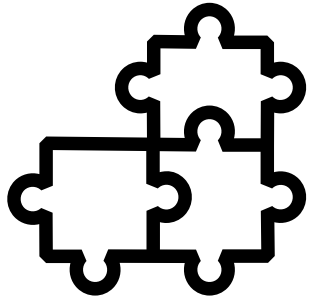


ABB value proposition

ABB solution to upgrade & update an electrical installation

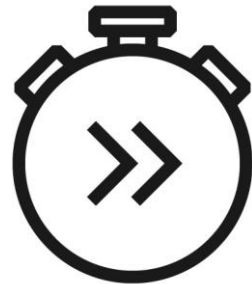
Flexibility

Maximum flexibility to choose the most suitable solution for your low-voltage distribution



Speed up your project

Up to 70% cost saving to upgrade an electrical installation, if compared to a traditional system replacement



Safety and protection

ABB and 3rd party equipment can be easily upgraded, with solutions certified for the global market



Sustainability

Smart upgrade and update solutions extend the electrical system lifespan allowing the system to be kept in service, efficiently, for as long as possible, minimizing CO2 emissions and raw materials utilization



ABB Upgrading solutions: Tailored according to needs

Our Offer



1. Light upgrade

Once you have a new digital enable product, add further digital functions or solutions

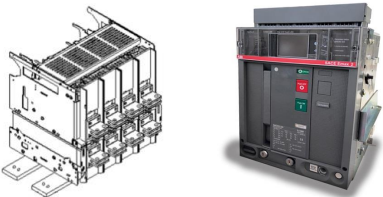
- No downtime
- No impact on the electrical installation



2. Medium upgrade

Unlock digital functionalities by digitally enabling the products

- No or minimal downtime
- Very light impact on the electrical installation



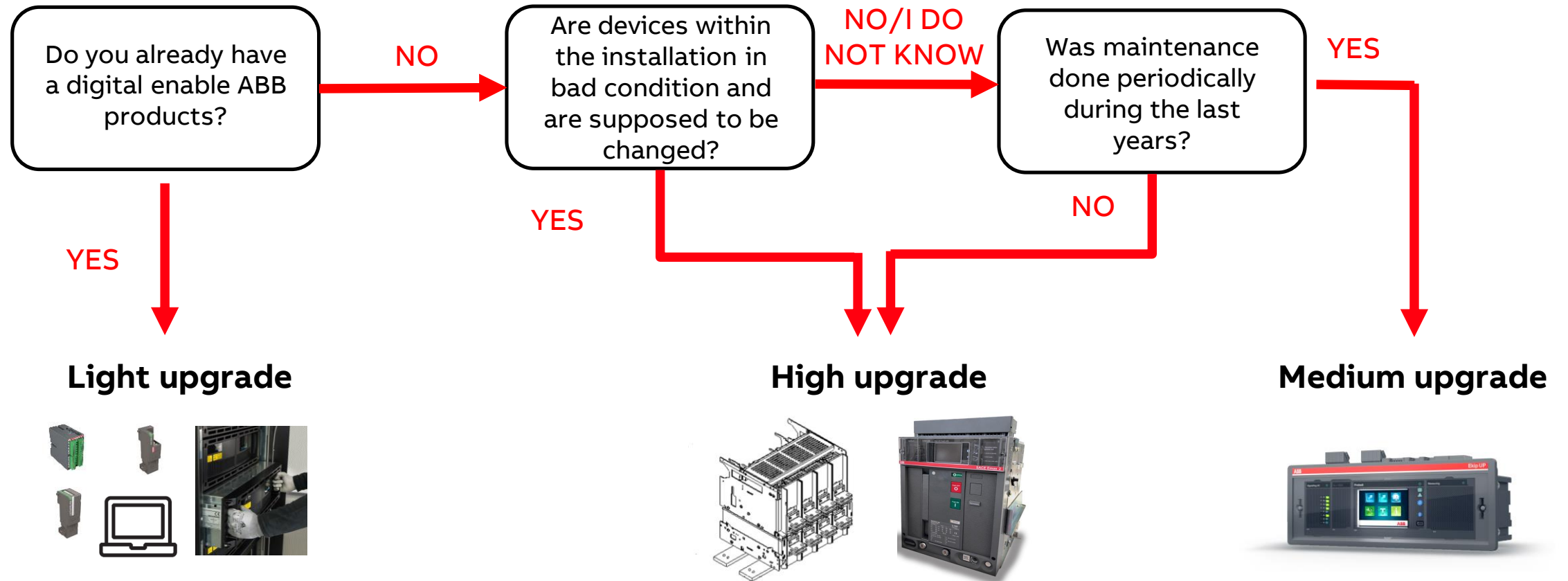
3. High upgrade

Replace aged devices with ABB retrofitting kits

- Minimal downtime
- Minimized installation impact

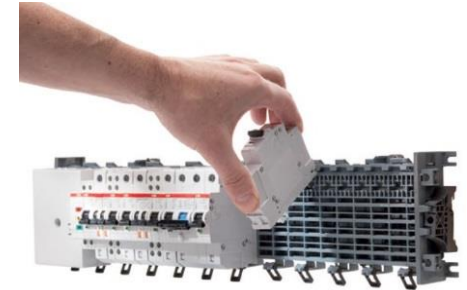
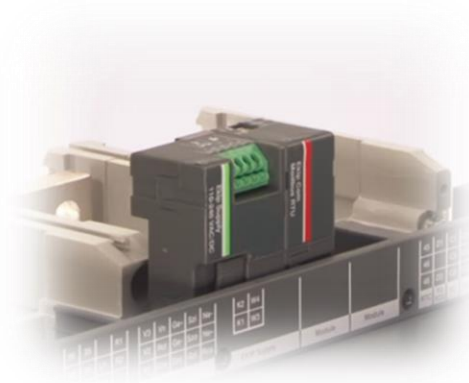
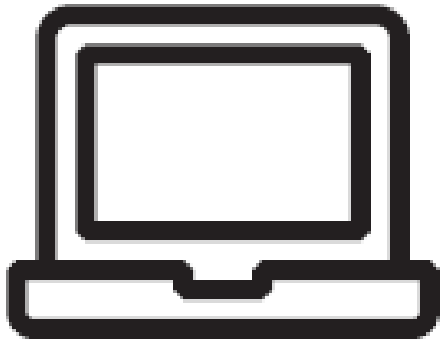
ABB Upgrading solutions: Tailored according to needs

How to upgrade your device?



Light Upgrade

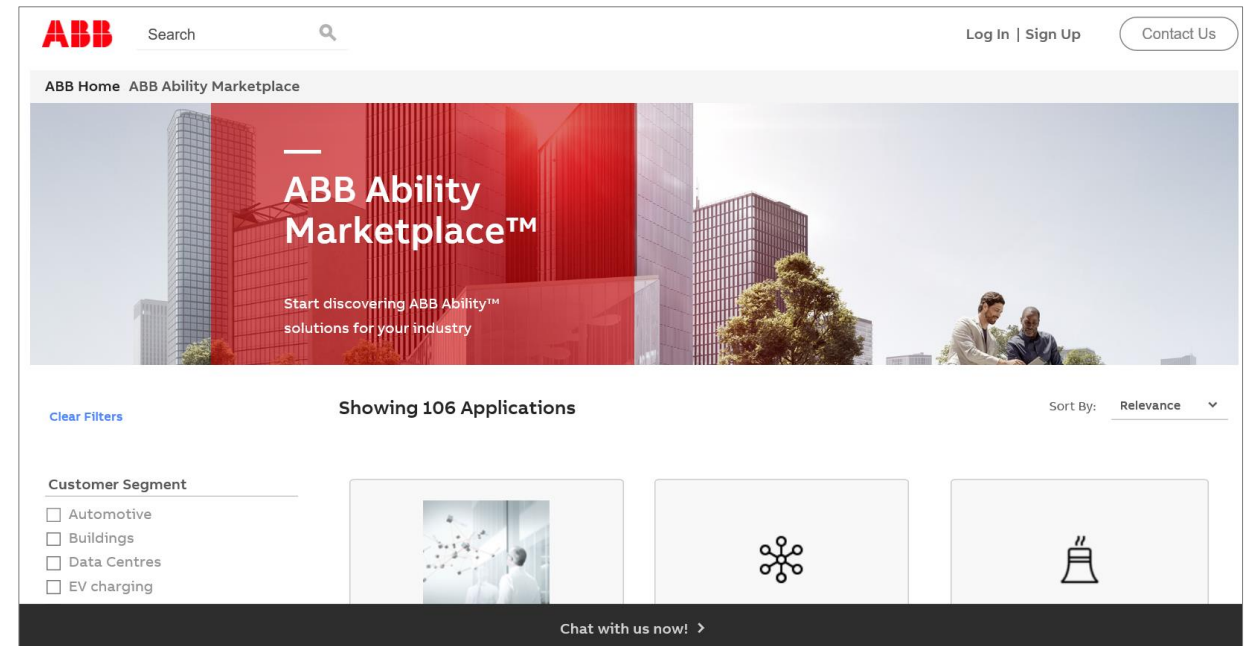
With digitally enabled ABB products



Light upgrade

ABB Ability Marketplace

Once you have the latest generation of ABB devices...



... keep upgrading your installation according to your needs

Light upgrade

Ekip Modules

Ekip Com Modules



Protocols available:

- Modbus RTU*
- Modbus TCP*
- Profibus-DP*
- DeviceNet*
- Profinet*
- Ethernet IP*
- IEC 61850
- Link (internal property)
- HUB (for cloud connectivity)
- + Digital I/O modules

Ekip Cartridge



Ekip Signalling



**Ekip CI –
Contactor Interface**



Ekip Supply



Ekip Synchrocheck



Ekip Signalling 3T



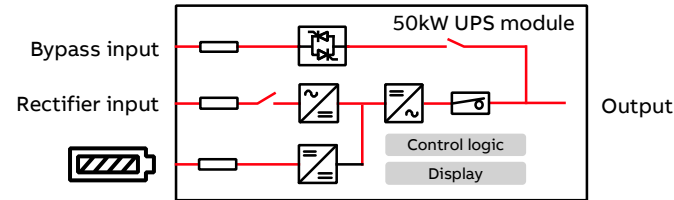
Light upgrade

DPA UPS Modules – perfect solution for critical power application



Secured uptime and reliable performance

with **decentralized paralleling architecture (DPA)**, where every UPS module has all essential functions eliminating single point of failures



Online swappable module for continuous uptime

If one UPS module needs to be removed or added to the system, this can be managed fast and seamlessly. The DPA 250 S4 has a very robust design and features strong and practical handles. It is only possible to insert modules into the rack in the correct orientation and the slide rails have mechanical stoppers to stop the module from sliding out too far, thus preventing an unintentional drop



< 10 min service time

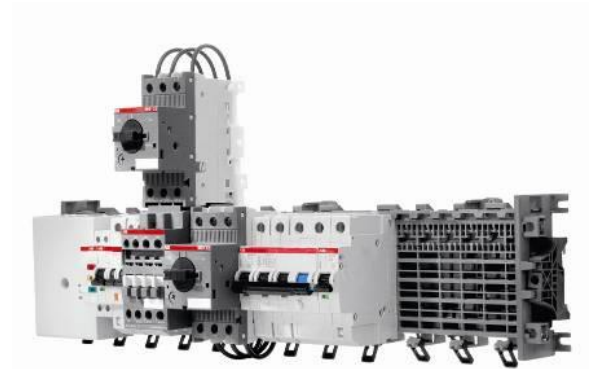
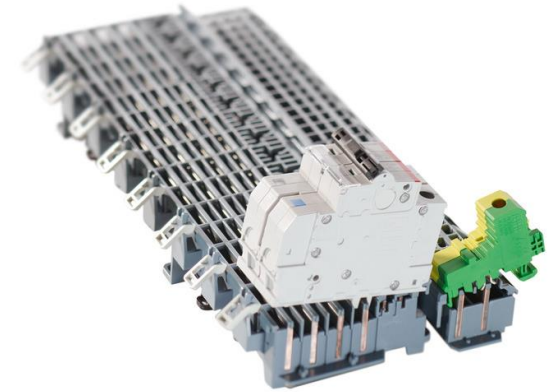
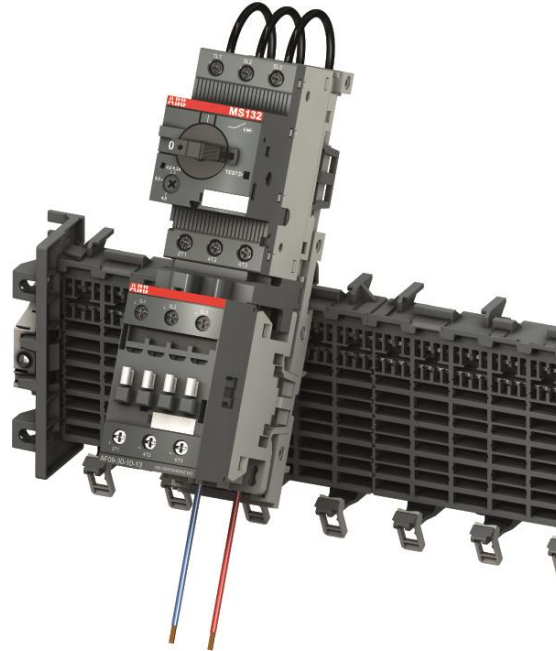
It takes only 10 minutes to extract a module, replace consumable parts, insert it back to the system and turn it back online

Light upgrade

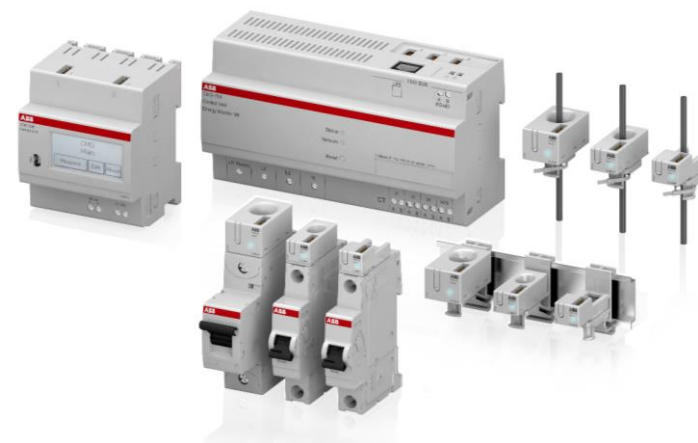
Smart solution for sub-distribution

Smissline TP technology

- Safe: load-free plugging in and unplugging possible live
- Flexible: rapid replacement, easy expansion, mixed-pole layout possible
- Economical: saves time and space thanks to the plug-in technology
- Flexible bus bar 125A and 250A
- Five different types of protection devices in one system



Medium upgrade



Medium upgrade

Ekip UP

Why?

- In the last ten years, **more than 350M Circuit Breakers** have been installed worldwide **without advanced features** for monitoring or for resources optimization
- **Around 15%** of switching devices in new low voltage switchgears are used with **external trip units**
- Ekip UP is the new product range of digital units which ensure **metering and protection to mains, feeders and generators**
- Part of **ABB Ability™** smart power portfolio, Ekip UP upgrades low voltage systems in the next-generation electrical distribution plants

What?

How?

- The **plug & play device** guarantees monitoring, protection and control for low voltage switchgear in a single unit with **reduced impact on design**
- **Minimize downtime** for installation on existing switchgears



Leveraging our digital innovations

Medium Upgrade

Future proof

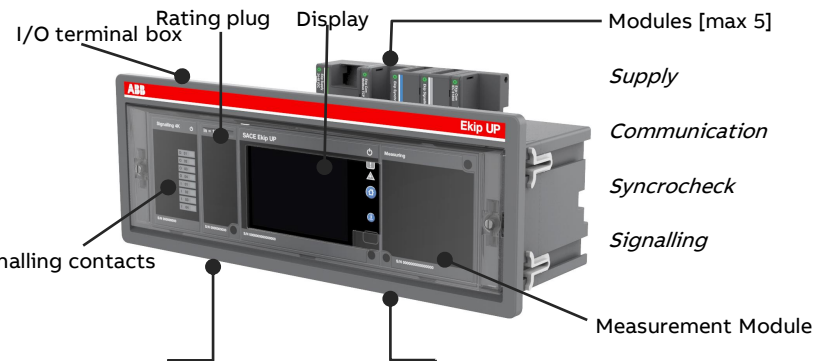


- **UP- date** basic switchboards with the latest protection and monitoring innovations
 - Interfacing with all switching devices (**ABB or not ABB**)
 - 100% applicable for every low-voltage brownfield scenario
- **UP- grade** the efficiency of existing facilities
 - 40% operational cost saving via the energy management system and **predictive maintenance**
 - 70% more cost-effective solution compared with traditional retrofitting approach
- **UP - load** electrical system data to the cloud-connected ABB Ability platform
 - enabling full plant control
 - in less than 10 minutes, **no need of external gateway**
- **UP- time** with easy installation
 - **50% time saving** when retrofitting, with minimum downtime during commissioning and **affordable solution**
 - completely reduced impact on switchboard design



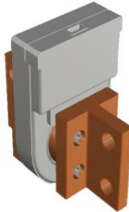
Medium Upgrade

Modular accessories



Rogowski coils

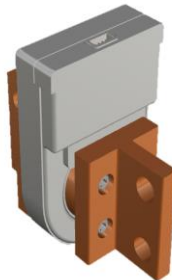
Type A



Iu: up to 2000 A

Busbars:
2x60x10mm

Kit: 3p / 4p



Iu: up to 4000 A

Busbars:
4x10x100mm

Kit: 3p / 4p

Type B



Iu: 400A

Busbars:
1x30x10
Cables:
1x240mm²

Kit: 3p / 4p



Iu: 1600A

Busbars:
2x60x10mm

Kit: 3p / 4p

2500A
coming
soon!

Type C*



Iu: up to 6300 A

Kit: 3p / 4p

Diameters: 100,
120, 200, 290



Positioning
device

Medium Upgrade

Arc Flash Protection

Arc Guard TVOC-2

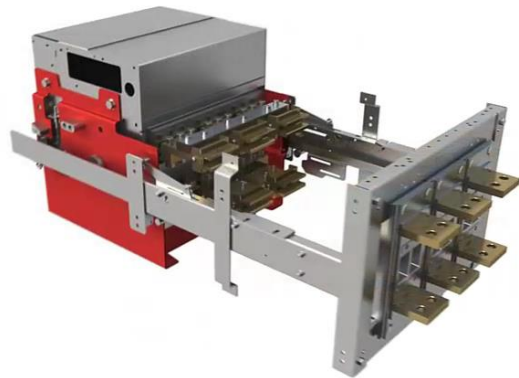
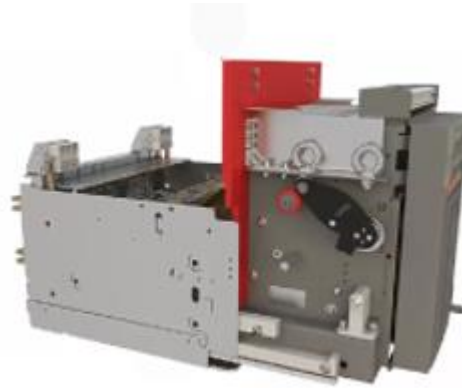
The Arc Guard TVOC-2 builds on the well-appreciated TVOC design and offers unmatched arc monitoring. The TVOC-2 is an optical detection system that together with an external breaker can limit the damage done to personnel and equipment in case of an arc accident happening

Main benefits

- Increased safety to personnel and equipment
- Minimizes downtime after arc accident has happened
- Easy-to-read interface makes reading status information quick and easy
- Simple start-up menu quickens installation and setup
- Can easily be expanded with up to 30 sensors to increase cabinet coverage from a single TVOC-2
- No calibration needed ensures reliable function and quick installation



High upgrade



Poll



Retrofit kits

Time to Retrofit

ABB Circuit Breakers history



Otomax
1961



Novomax G30
1970



Novomax
1980



Megamax
1990



Emax
1996



New Emax
2004



Emax 2
2013



Isol
1956



Fusol
1965



Modul
1970



Limator
1980



Isomax
1993



Tmax
2000



Tmax XT
2009-2018

High upgrade

Time to retrofit

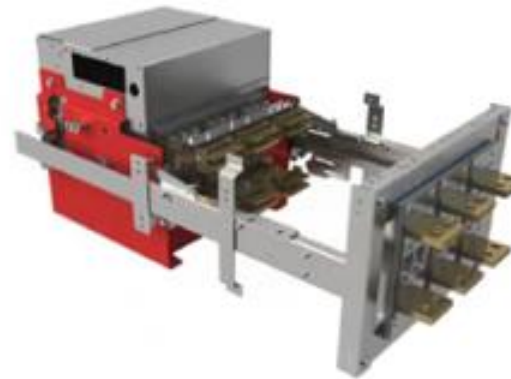
Hard Bus Retrofill (RF)

The complete breaker is removed from the switchboard and the new one is installed using a pre-designed busbar connection and protection shields



Cradle in Cradle (CiC)

The fixed part of the new CB is modified to be inserted in the old fixed part



Direct Replacement (DR)

The moving part of the new CB is modified to simulate the moving part of the old CB



Retrofit kits

Time to retrofit

New Switchgear vs Retrofit kt

New switchgear replacement

- Different footprint
- Lower uptime

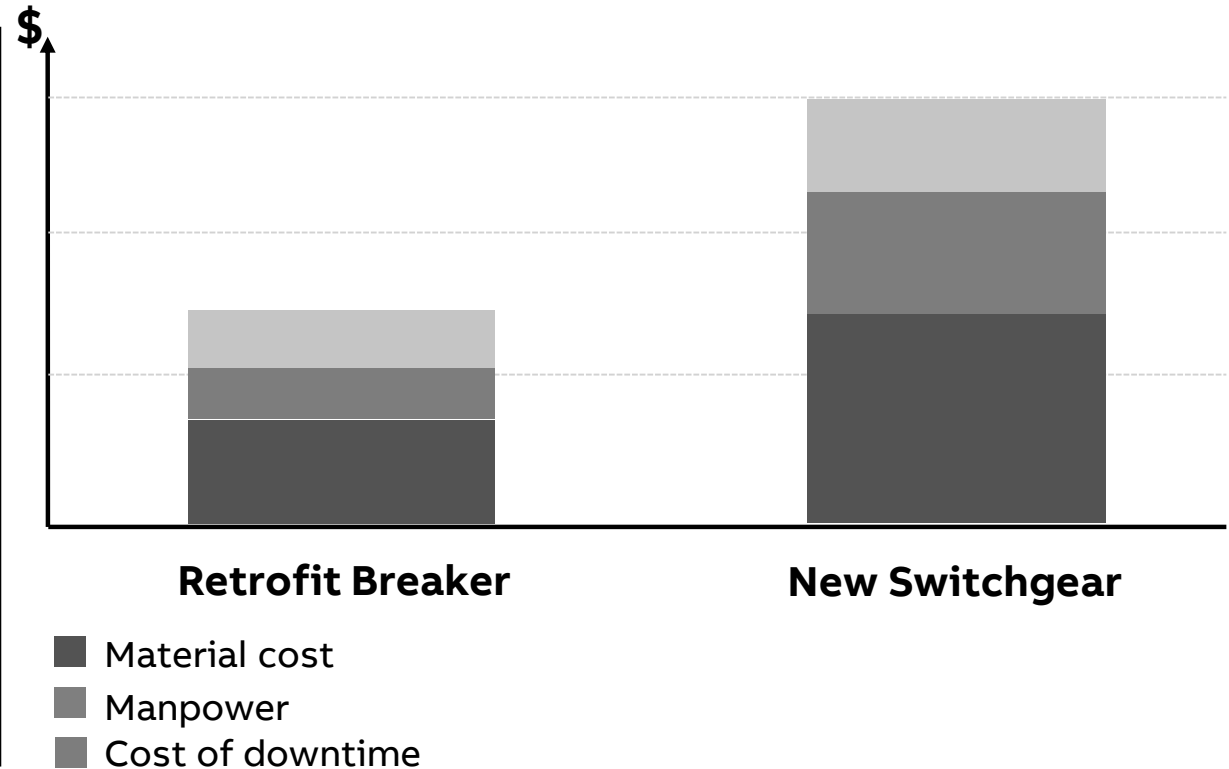


Retrofitting kits solutions

- Same footprint
- Higher uptime



Direct Replacement
Megamax to Emax 2



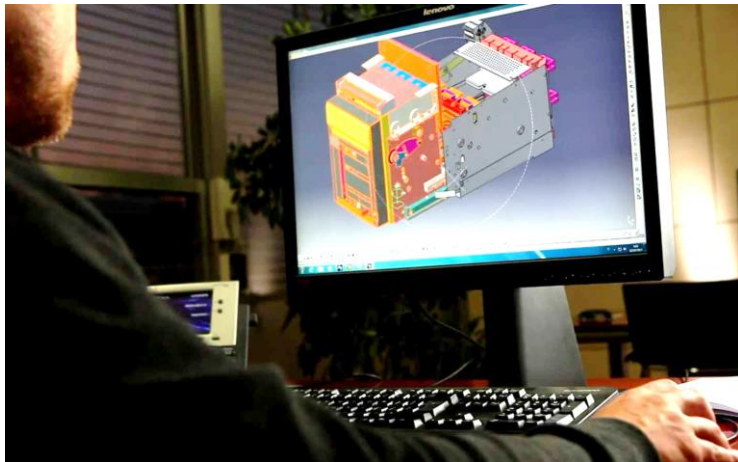
Retrofit kits

Time to retrofit

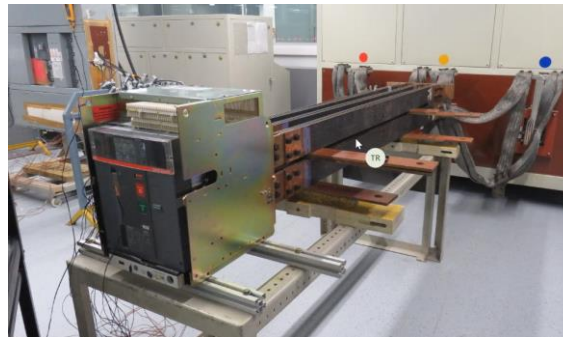
Retrofitting kits development

R&D service competence center

- R&D Team focused on retrofitting solutions
- Know-how about old and new breakers



- Accredited laboratory for testing
- Declarations of conformity



Direct Replacement during temperature rise test



Retrofit kits

Time to retrofit

Retrofitting kits development

Dalmine (IT), Service factory

Dedicated plant for service LV breakers

- Around 60 people (white/blue collars)
- IEC/UL/CCC certified production site



Medium and Low voltage
service production site

Test performed in the factory

- Zero series test before product launch
- Routine test for each product before delivering

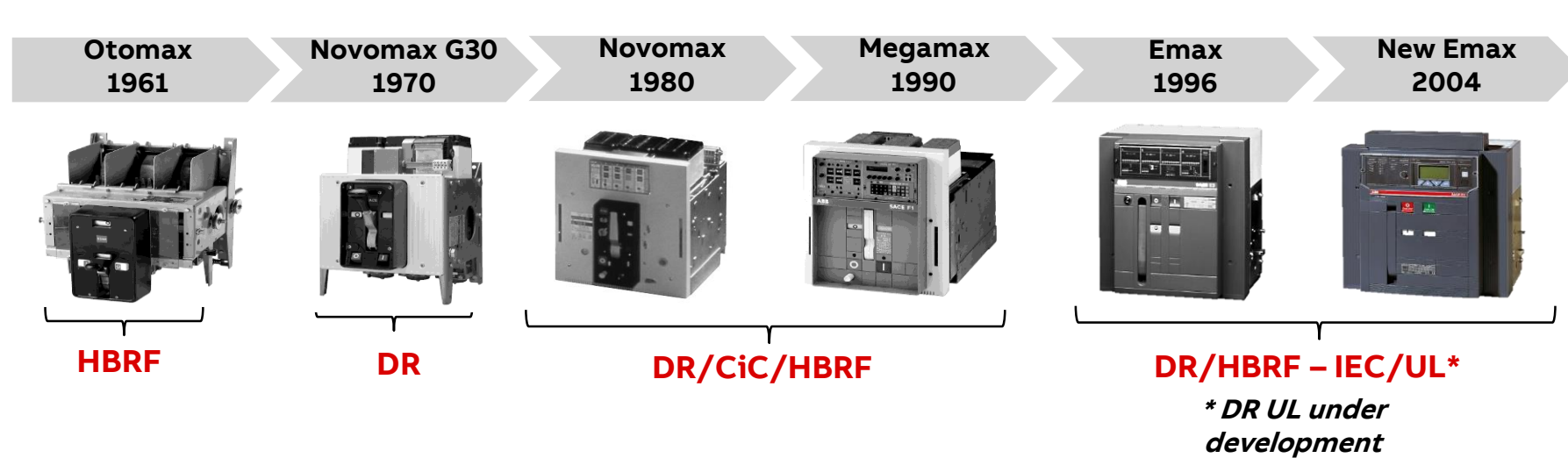


High upgrade

Which devices is it possible to retrofit with ABB latest generation of circuit-breakers?

Solutions for ABB devices

Upgrading for ABB ACBs with Emax 2



DR: Direct Replacement
CiC: Cradle in Cradle
HBRF: Hard Bus Retrofill

Upgrading for ABB MCCBs with Emax 2 - Tmax XT



High upgrade

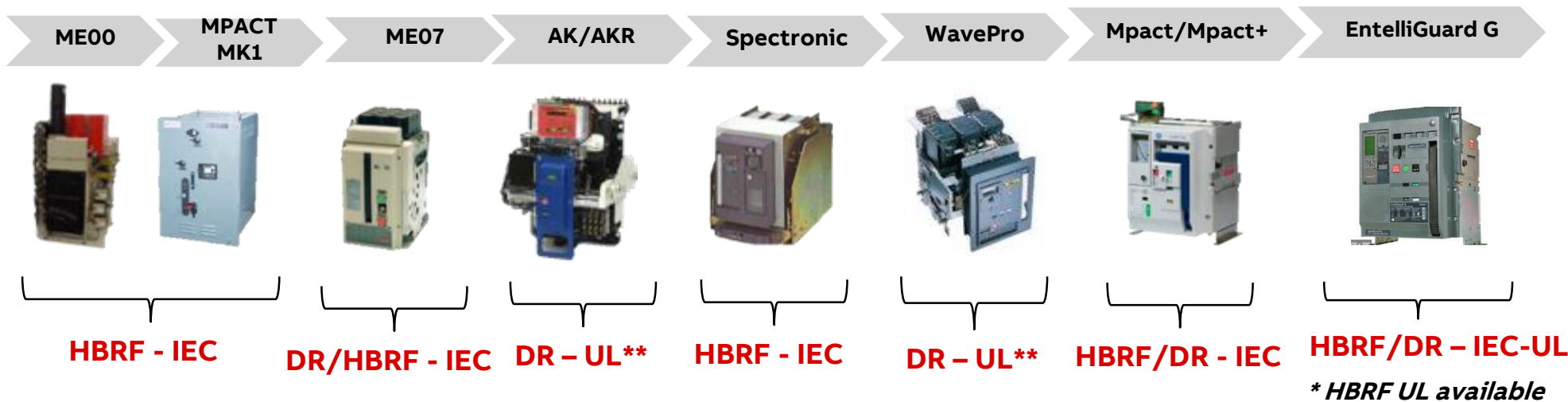
Which devices is it possible to retrofit with ABB latest generation of circuit-breakers?

Solutions for non-ABB devices

GE ACBs to upgrade with Emax 2 - Availability during 2020/2021

1968

2008



DR: Direct Replacement
CiC: Cradle in Cradle
HBRF: Hard Bus Retrofill

Masterpact M to Emax 2



High upgrade

Which devices is it possible to retrofit with ABB latest generation of circuit-breakers?

Useful documents before ordering

- Product presentation
- Correspondence tables

Support for the installation

- Instruction sheet
- Electrical drawings
- Video Manual

Masterpact M vs Emax 2 Direct Replacement

Correspondences between Masterpact M and Emax 2 for this retrofitting solution:

Original CB:	M08		M10		M12		M16		M20		M25	
Masterpact M												
Performance Levels	N1	H1	N1	H1	N1	H1	N1	H1	N1	H1	N1	H1
Iu @40°C	800	800	1000	1000	1250	1250	1600	1600	2000	2000	2500	2500
Poles	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p	3p/4p
Emax 2 Advanced	DR											
Replacement Solution												
Performance Levels	E2.2N	E2.2N	E2.2N	E2.2N	E2.2N	E2.2N	E2.2B	E2.2N	E2.2N	E2.2H	E2.2N	E2.2H
Iu @40°C	800	800	1000	1000	1250	1250	1600	1600	2000	2000	2500 ⁽¹⁾	2500 ⁽¹⁾
In (Rating Plug)	800	800	1000	1000	1250	1250	1600	1600	2000	2000	2500 ⁽¹⁾	2500 ⁽¹⁾
Icu 400-415V	40	65	40	65	40	65	40	65	55	75	55	75
Icu 440-500V	40	65	40	65	40	65	40	65	55	75	55	75
Icu 690V	40	65	40	65	40	65	40	65	55	75	55	75
Icw (1s) - 690V [kA]	40	50	40	50	40	50	40	50	55	75	55	75

(1) = Derating up to 2300A with fixed part with HR terminals; Ics is 100% of Icu for all the sizes.



Video manual

Direct replacement Masterpact M to Emax 2

Enjoy the video available in five languages and discover how the retrofit-kit installation is as easy and fast as you wish.



High upgrade

Why to choose ABB?

Value Propositions



Safety & Protection

Highest **quality** level confirmed by certified products
ABB original brand means buying robust design



Easy to install

Easy installation without dismantling the existing cradle for DR
Fast installation requires **less than 1 hour** keeping the uptime



High upgrade

Why to choose ABB?

Value Propositions



Sustainability

Retrofitting enable a **circular economy** by extending the lifespan of your electrical system minimizing CO₂ emissions and raw materials usage

Natural source saving during last 5 years with ABB retrofitting kits

- 4 ktons of copper
- 6 ktons of steel
- 30 ktons of CO₂ equivalent



Continuous operation

PREDICT feature in **ABB Ability™ EDCS** for Predictive Maintenance keeping it efficient as long as possible
Ekip power controller to improve energy efficiency



The screenshot displays the IBM Watson Analytics 'File Activity' dashboard. The top navigation bar includes 'File Activity' and 'Newly Registered'. The main content area features a pie chart titled 'Newly Registered' and a table of file activity. The table columns are File Name, File Type, File Size, File Date, File Location, and File Status. The data shows various file types like PDF, Word, and Excel, with sizes ranging from 1 KB to 1 MB. The status column shows 'Uploaded' and 'Downloaded'.

File Name	File Type	File Size	File Date	File Location	File Status
File 1	PDF	1 KB	1/1/2016	File 1	Uploaded
File 2	Word	1 KB	1/1/2016	File 2	Uploaded
File 3	Excel	1 KB	1/1/2016	File 3	Uploaded
File 4	PDF	1 KB	1/1/2016	File 4	Uploaded
File 5	Word	1 KB	1/1/2016	File 5	Uploaded
File 6	Excel	1 KB	1/1/2016	File 6	Uploaded
File 7	PDF	1 KB	1/1/2016	File 7	Uploaded
File 8	Word	1 KB	1/1/2016	File 8	Uploaded
File 9	Excel	1 KB	1/1/2016	File 9	Uploaded
File 10	PDF	1 KB	1/1/2016	File 10	Uploaded
File 11	Word	1 KB	1/1/2016	File 11	Uploaded
File 12	Excel	1 KB	1/1/2016	File 12	Uploaded
File 13	PDF	1 KB	1/1/2016	File 13	Uploaded
File 14	Word	1 KB	1/1/2016	File 14	Uploaded
File 15	Excel	1 KB	1/1/2016	File 15	Uploaded
File 16	PDF	1 KB	1/1/2016	File 16	Uploaded
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Poll



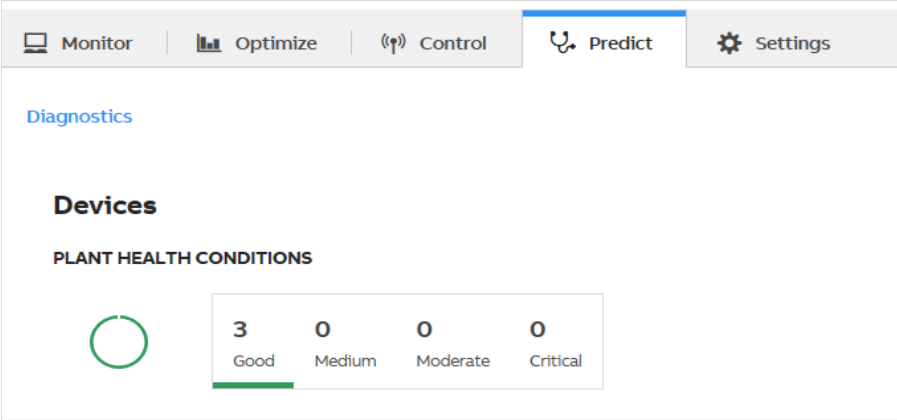


ABB Ability™ Electrical Distribution Control System (EDCS)

Predict feature

You can have

- Overall plant health conditions
- Smart visualization (traffic light) to monitor the system at a glance, with proactive alerts
- Optimized maintenance reduces operation and maintenance costs












Product name		Linked device	Serial Number	Health conditions	Next maintenance	Latest maintenance	
 E2.2N-2500 M3 PCB			BD11112575	 Good	11/07/2022	10/02/2020	>
 GG07S-630 Predict UP		GG07S-630	BA21072120	 Good	05/01/2024	10/02/2020	>
 E2.2N-2500 PCB M3			BD11112575	 Good	11/03/2020		>

ABB Ability™ Electrical Distribution Control System (EDCS)

Predict feature

For each device you see a Health Conditions asset curve (100% -- > 0%) based on an algorithm that considers

- Circuit breaker age (production and installation date)
- Utilization conditions (n° of mechanical openings, voltage, reason of opening, meaning manually/remotely or for a trip - L, S, I, G)
- Environmental conditions (some of them like humidity/vibration/temperatures could be directly measured through Ekip 3T sensor)
- Maintenance activity performed

In the curve is highlighted

- Next maintenance date (purple vertical line)
- Expected aging trend up to the next maintenance date (blue dotted curve)

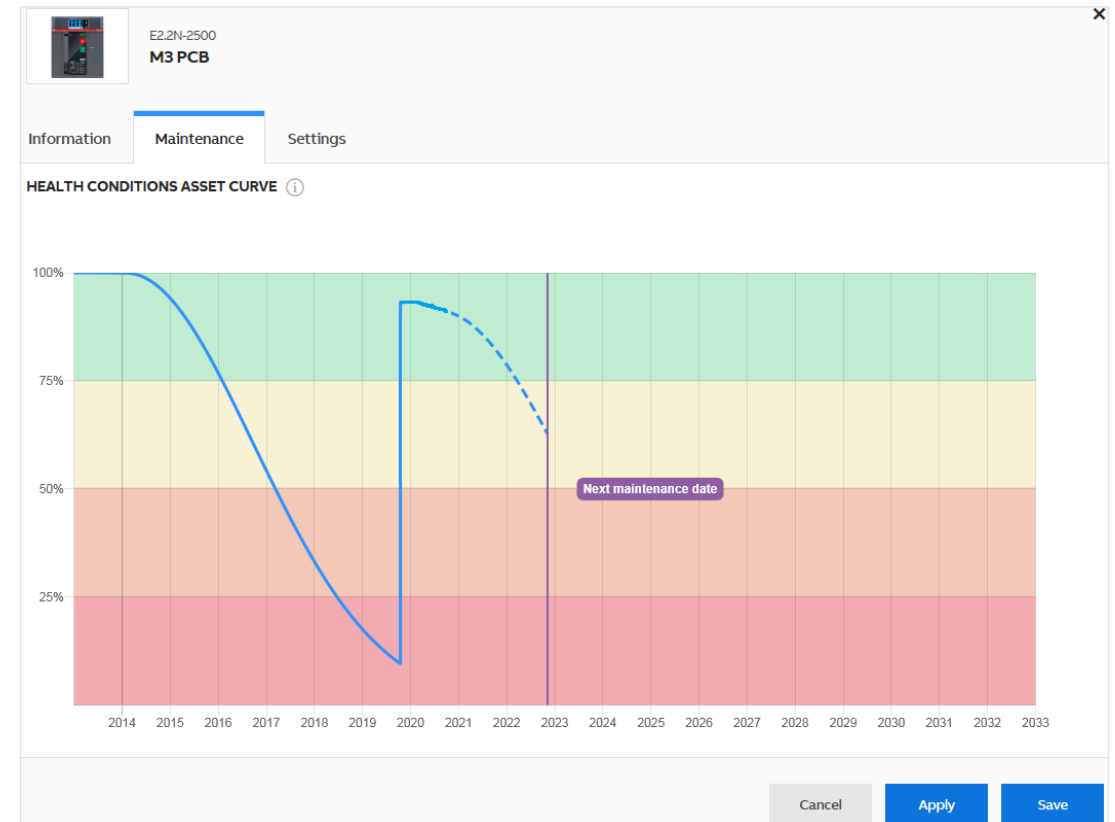


ABB Ability™ Electrical Distribution Control System (EDCS)

Predict feature: environmental conditions

Environmental conditions

- **Dust** can influence the lubrication capacity on operating/rotating parts
- **Humidity** can influence the electronics behavior
- **Temperature** can influence the plastic insulation
- **Vibration** can influence the connections between parts (screws, plugs, connectors, ...)
- **Corrosion** level can effect on metals

The mix of all the parameters could influence the health conditions of the device

Environment	Environment1	Environment2
Temperature	0...25°C	0...25°C
Vibration	Low	Medium
Corrosion	Low	Low
Humidity	<70%	70...85%
Dust Level	Low	High

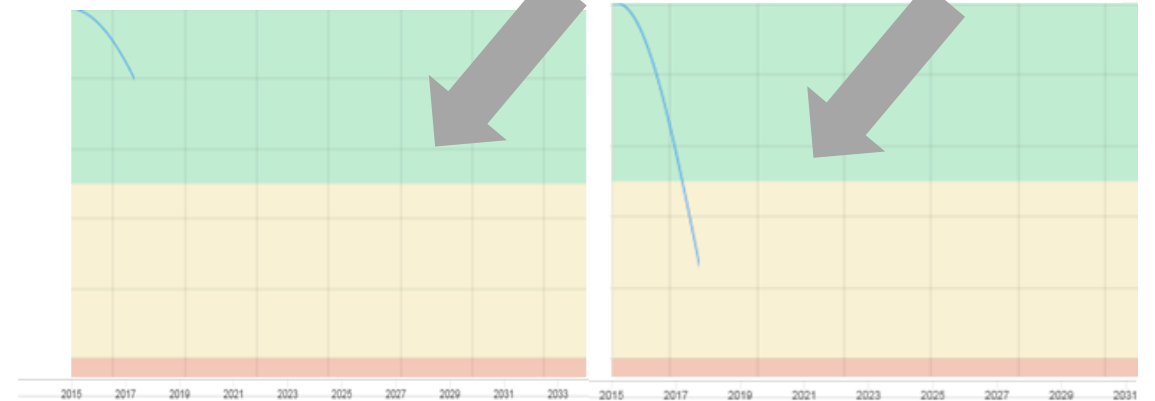


ABB Ability™ Electrical Distribution Control System (EDCS)

Predict feature: maintenance

Maintenance

The effect of maintenance is related to

- Maintenance activity performed
- Parts replaced

Maintenance can be effective in Predict only if it is performed by authorized personnel

- ABB Service (L2 or L3) and ABB Service partners
- End users field operator who has successfully attended a MAN Training

Once the field operator is connected to Internet, maintenance data is sent to ABB Ability™ EDCS

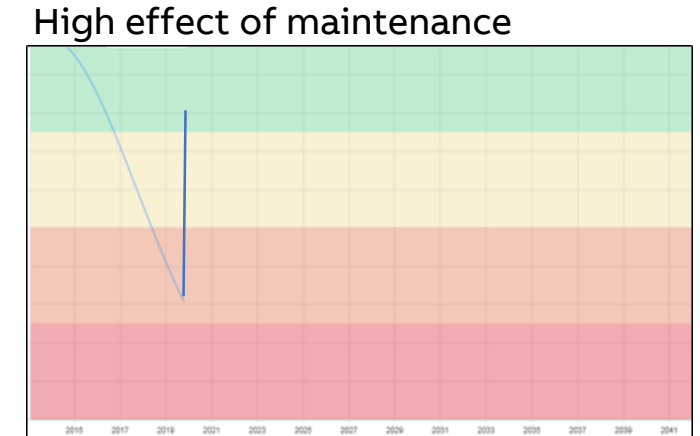
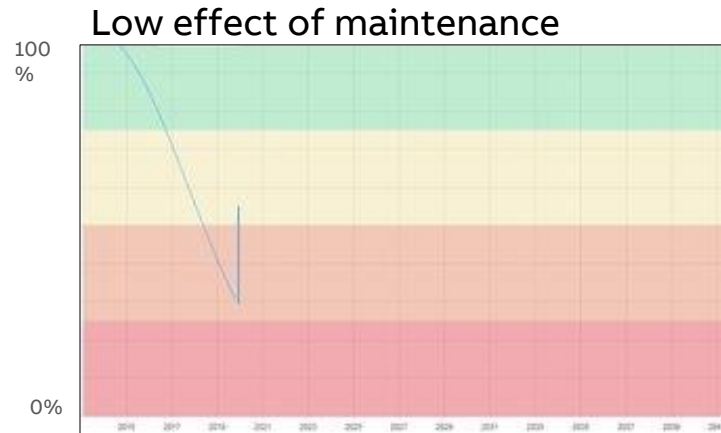


ABB Ability™ Electrical Distribution Control System (EDCS)

Predict feature: tools

Tools

For Maintenance

Maintenance is tracked in **Ekip Connect 3** in a dedicated Service section



Ekip Connect 3.2.5.2

For Predict feature

License of ABB Ability EDCS (Premium or Standard + Predict Add-on in Marketplace)

ABB Service can assist you during commissioning and/or maintenance phase with:

- On-site Field Service Engineers (FSE)
- From remote with Remote Assistance (beg 2021)

The screenshot displays the ABB Ekip Connect 3.2.5.2 interface. The top navigation bar shows 'Service' and a breadcrumb trail: 'ABB SACE BUILDING > Maintenance 17 Giugno 2020 > Device QG4-Trafo 4'. Below this, the 'General Information' tab is active, showing 'QG4-Trafo 4'. The main content area is titled 'QG4-Trafo 4 - Maintenance Report' and contains a table with two columns: 'Checks' and 'Inspection of insulating parts (if accessible)'. The 'Checks' column lists various maintenance tasks, and the 'Inspection of insulating parts' column lists specific inspection items. At the bottom, there is a 'Final Notes' section with a text input area.

Checks	Inspection of insulating parts (if accessible)
Contacts (breaking, fixed and mobile)	Cleaning Matchboard removal (if needed) Check of Contact wear Verification of oxidation Verification of alignment Restoration of alignment (if needed) Verification of sequence
Checks	Cleaning and lubricating Closing spring functionality YO coil functionality (if present) YC coil functionality (if present) YU coil functionality (if present) Spring Charging Motor functionality (if present) Sensor Chain and connections Opening test Trip Test Lubrication with suitable lubricant No alarm presence
Device Control	Locks inspection Maintenance Label presence and cleaning
Not resolute maintenance	<input type="checkbox"/>
Adjustment of the arc contacts gap distance	<input type="checkbox"/>
Cleaning of the arcing contacts	<input type="checkbox"/>
Final Notes	

ABB Ability™ Electrical Distribution Control System (EDCS)

Predict feature applicability

Air circuit breakers



Moulded case circuit breakers



Retrofit kits with Emax 2/Tmax XT7



Success Story

With Ekip UP

China's largest distributor of industrial electrical components and power distribution technologies, Zhongyeda Electric Company in Shantou, Guangdong, has selected ABB Ability™

Electrical Distribution Control System (EDCS) to reduce its energy and maintenance costs and to deliver digital upgrades to its new 20,000 sq.m. headquarters and factory

Jason Wu, Zhongyeda Electric General Manager, said:
“Zhongyeda wanted **digital functionality to help lower our operational and maintenance costs**. The **rapid digital upgrade** has given our operations **improved energy efficiency analysis and asset health management** and has made our facility more intelligent”

[Link](#)



Success Story

Direct Replacement Megamax - Emax 2

Thanks to ABB and its service-provider partner, China's first football stadium has reached its goal of an electrical makeover before the season's opening match

Timeline for implementing the needed upgrades was critical

15 advanced Direct Replacement (DR) Megamax to Emax 2 breakers were installed

The service team also installed an ABB Ability™ Electrical Distribution Control System enabling engineers to evaluate the system's predictive maintenance capabilities

[Link](#)



Smart Solutions to upgrade a LV electrical installation

Useful links

- Smart Upgrade and Update web Page: [link](#)
- Smart Upgrade & Update article: [link](#)
- Smart upgrade for Emax 2: [link](#)
- Low-Voltage products Predictive Maintenance [link](#)
- Smart Metering and Monitoring Web Page: [link](#)
- Smart Switchgear Web Page: [link](#)
- Efficiency of Electrical System. Introduction to IEC 60364-8-1: [link](#)
- Smart Switchgear for Building and Infrastructure: [link](#)

Intelligent Distribution webinar series

Stay tuned

Next webinar

Switches and Fusegear have never been more connected

Learn how to implement measuring and monitoring capabilities when using Switches and Fusegear in applications like Compact Sub-Stations (CSS), general electrical distribution and critical power



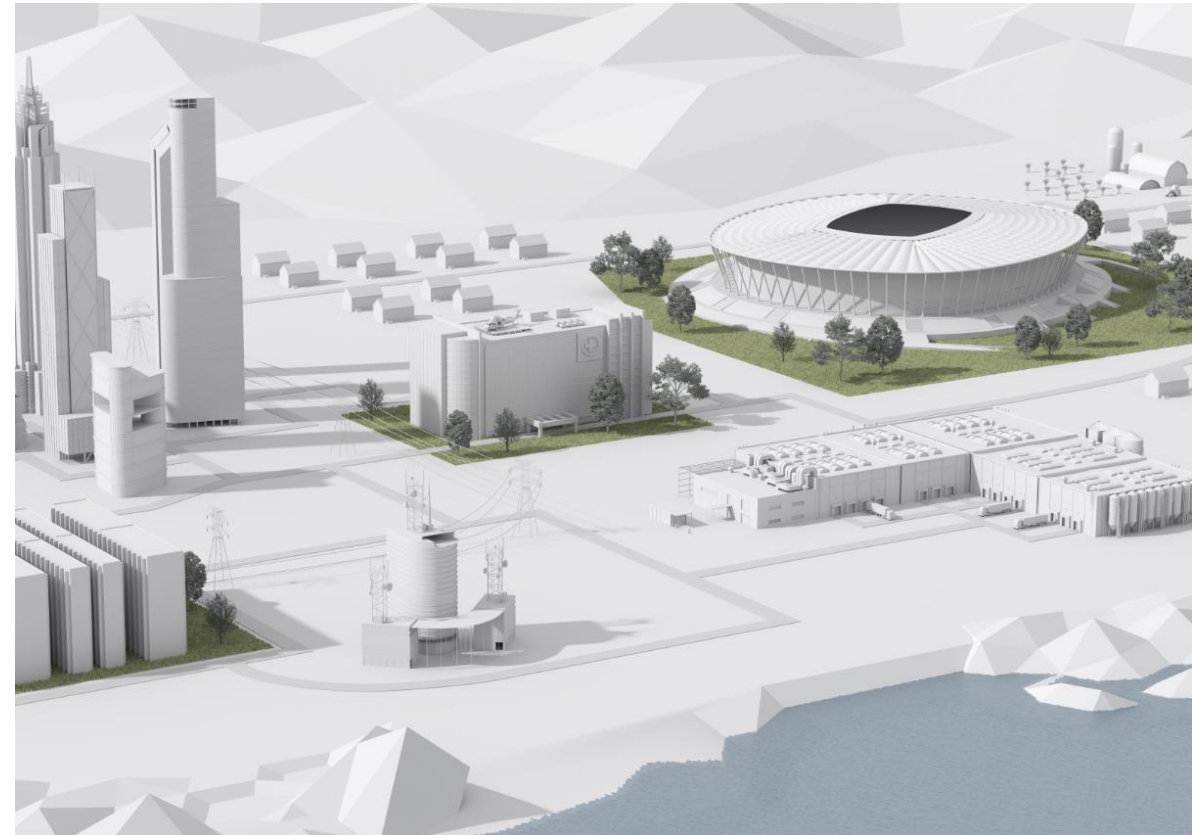
Wednesday, November 18th



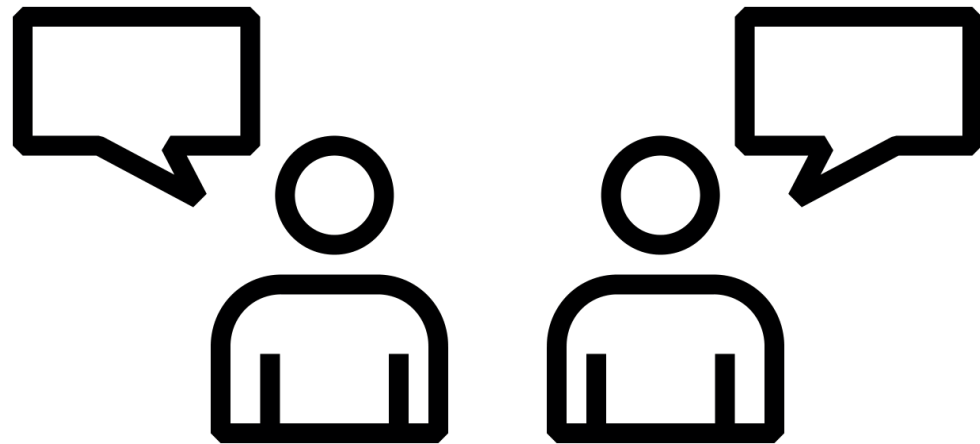
9:00 AM CET

4:00 PM CET

We will get in touch with you soon



Q&A



ABB