2021

EXTERNAL PARTNER TRAINING

ReliaGear® LV SG

ANSI/UL Low voltage switchgear

Electrification Solutions

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Low voltage product team

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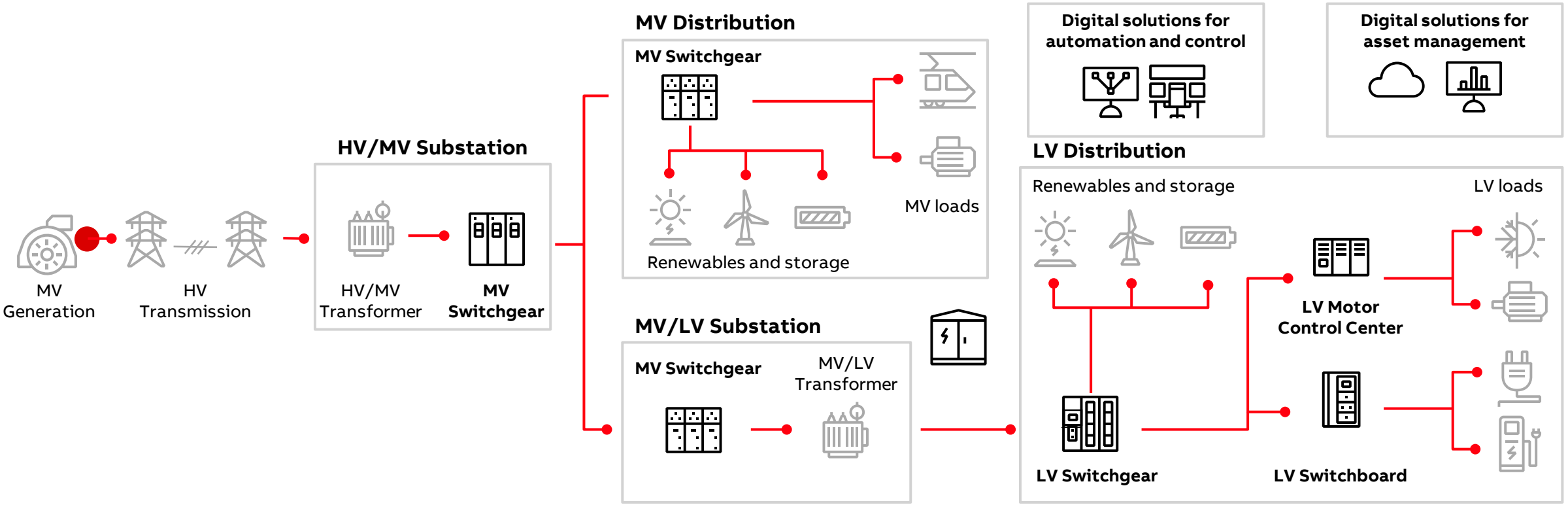
Agenda

1. Low voltage switchgear product offering
2. Product positioning
3. Product value proposition
4. Product features and scope
5. Configurations
6. Commercialization package
7. Q & A

ANSI/UL Low voltage switchgear



HV: High Voltage (above 66 kV) | MV: Medium Voltage (between 1 kV AC, or 1.5 kV DC, to 66 kV) | LV: Low Voltage (below 1 kV AC, or 1.5 kV DC)

HV | Medium Voltage | Low Voltage

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Product strategy

Low voltage switchgear

Product	Load center	Lighting panelboard	Power panelboard	Switchboard	LV Motor Control	LV Switchgear
Trademark name(s)	PowerMark Gold	ReliaGear LP	ReliaGear neXT	ReliaGear SB	ReliaGear LV MCC	ReliaGear LV SG/Entellisys
UL certification	UL 67	UL 67	UL 67	UL 891	UL 845	UL 1558
Typical application	Residential	Light commercial	Heavy commercial	Light industrial	Light/Heavy industrial	Heavy industrial
Maximum amperage	225	800	1,200	6,000	3,200	6,000

Factory quoted

ReliaGear family of low voltage products

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LV ANSI switchgear - Portfolio management

Non-arc resistant and arc-resistant switchgear

Active products

ReliaGear® LV SG

- Emax 2 ACB with Ekip trip unit
- 8 different communication protocols
- ABB Ability™ Ready
- RELT, 1% Metering
- Up to 6000 Amps H1 2023

MNS-SG AR

- Emax 2 ACB with Ekip trip unit
- 600 VA system up 4000 A, 100 kA
- C37.20.7 compliant Type 2B
- Plenum and plenum-less designs available

AKD-20®

Entellisys®

PBII SB

MaxSG

MNS-SG NAR

Limited products

ReliaGear® LV SG

Product positioning

Target segments

Increase focus in faster growing segments… Continue to build core…

Key growth drivers (>6% CAGR)

Data Centers

Healthcare

Fastest growing segments

Mission Critical messaging

Increase focus – Critical power team, FAEs, account managers

High-potential segments (3-5% CAGR)

F&B

Industrials

Utilities

Medium growth segments

Safe, smart and sustainable messaging

Expand focus – Industrial and Utility sales team, agents, partners & AM

Core market (1-2% CAGR)

Commercial Construction

Oil & Gas

Core segments for ABB

Safe, smart and sustainable and mission critical applications

Build on strengths in segments – segment managers, channel

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Product value proposition

ReliaGear LV SG switchgear

Overview

Incorporating the best of both: All-in-one innovation SACE® Emax® 2 ACB with Ekip trip unit technology, integrated into the proven AKD switchgear platform.

- 3P3W and 3P4W – 600/347 Vac, 480/277 Vac
- Fully rated 100 KAIC at 600/347 Vac, 480/277 Vac and 208/120 Vac
- Main circuit breakers: up to 6000 A
- Main bus: up to 8000 A
- Air circuit breakers: 250–5000 A
- UL1558 and CSA C22.2 No.31 compliant
- Enclosures: NEMA Type 1 and 3R
- Seismic ratings: 1.33g sds a z/h of 1 CBC-2019/IBC-2018
- Depths: 54-74 inches
- Widths: 15 - 22 – 30 – 38 - 49 inches

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ReliaGear® LV SG

What is improved?

- SACE® Emax® 2 air circuit breaker with Ekip trip units – “Intelligent Asset”
  - Integrated auto-transfer (consult factory)
  - 1% metering option
  - 8 different communication protocols
  - Modular and scalable options
- Compartment shutters standard offering
- 100 kA SCCR/85 kA ST rating in the E2.2 – highest rating in a smaller frame
- 100 kA SCCR/100kA ST E4.2 and still fit in a 22-inch section up to 2000 A
- Improved footprint in 5000 A main, tie + feeders (No extra blank section required
- Cradle mounted kirk lock, allows to swap breaker while retaining interlock
- E1.2 integration…15” minimum stack width
  - 4 high full rated 1200 A / 65KA SCCR / 50KA ST - **Best in Class**
  - E1.2 can be intermixed with E2.2/E4.2 feeders in 22/30W sections

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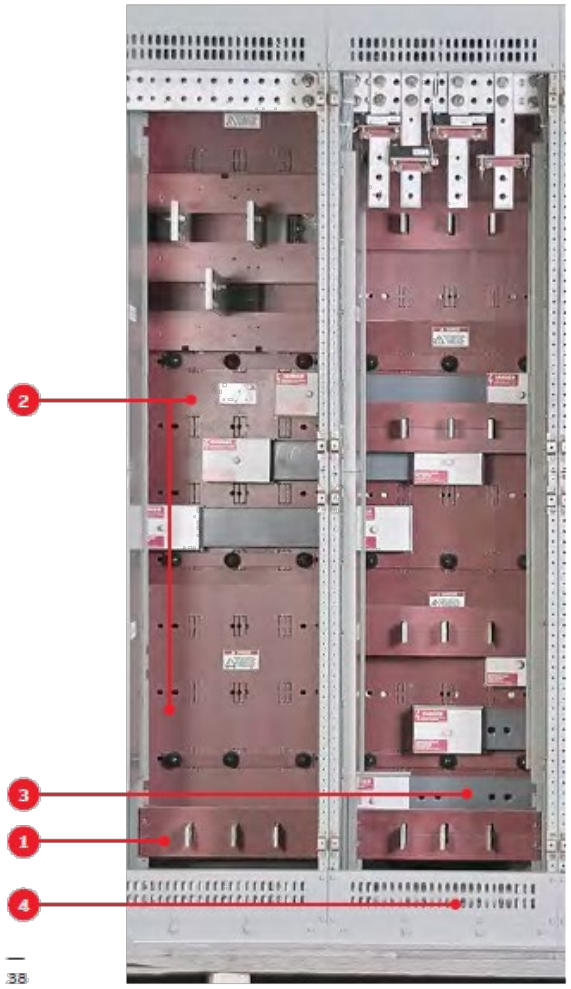
ReliaGear® LV SG

What is retained?

- Bus and structure design is the same AKD-20
- Insulated Main Bus + Phase-isolated Vertical Bus (up to 4000 A bus) 6000 A in mid-2023
- Closed-door racking
- Arc mitigation with RELT – embedded and ABB (NEC 240.87 compliance)
- Instantaneous Zone Selective Interlocking
- Multi-source GF (MSGF) is now Modified Differential GF - new name, same functionality
- External devices for complex ATO applications (PLCs, Multifunction Relays)
- NEMA 1 + NEMA 3R
- Cable compartments options



1. Feeder run backs
2. Vertical riser bus covers
3. Horizontal main bus
4. Ground bus (behind steel cover)

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ReliaGear® LV SG advantages

Safe

Enhanced protection

- Closed door racking
- Instantaneous ZSI
- Reduced Energy Let Through (RELT)
- Remote operation (via Ekip Com Actuator)

Smart

Meeting trending markets demands

- 1% metering-Certified Class 1 Energy and Power.
- 8 different communication protocols
- Modular and scalable options
- Integrated load shedding and auto transfer

Sustainable

Increased operational performance

- ABB Ability™
- Ekip Connect for settings uploads
- Ekip connect commissioning reports
- User replaceable accessories (fast and simple)

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ReliaGear LV SG

Safe, smart and sustainable

Value proposition

- ReliaGear LV SG incorporates the best of both worlds: cutting edge SACE Emax 2 ACB technology integrated into the proven AKD low voltage switchgear platform
- ReliaGear LV SG meets the ever-expanding needs of the marketplace with flexibility to scale for tomorrow by providing enhanced safety, reliability, circuit protection and diagnostics

Target markets

- This new generation LV switchgear platform provides the latest technological innovations and reliability
- ReliaGear LV SG switchgear meets the demands of industrial, utility, critical power and large commercial applications
  - Data centers
  - Hospitals
  - Oil, chemical and gas
  - Food and beverage
  - Universities and colleges
  - Water
  - Stadiums

Messaging

- New technology from Ekip Touch trip units offers best-in-class reliability, monitoring and diagnostics, and flexibility
  - Integrated auto-transfer
  - 1% metering option
  - 8 different communication protocols
  - Bluetooth connectivity
- Customers are now able to add additional protection and functionality to the breaker via ABB Ability™ Marketplace, while the breaker is operational, by using Ekip Connect Software

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Product features and scope

ReliaGear LV SG switchgear

Features and benefits

Features

- Advance electronics - Ekip Touch and higher Trip Units
- Watchdog inside Ekip TU improves reliability as electronic circuit periodically checks the continuity of internal connections
- Improved preventive maintenance capabilities with SACE Emax 2 Ekip Touch integration and/or Ekip Connect software
- E1.2 integration…15” minimum stack width**
- M-T-M or Utility-Gen auto transfer built in and integral 1% metering accuracy
- Modular thermal monitoring available with SACE Emax 2 Ekip Trip Unit

Benefits

- Reliability and functionally - update TU firmware, add additional protection features, measures, functionalities to the breaker via ABB Ability™ Marketplace with breaker in the closed position using Ekip Connect Software
- An alarm cause by trip coil, rating plug or current sensor (ANSI 74), a message shows in the Ekip Touch. If a protection function intervenes, the unit always checks that the circuit breaker has been opened through auxiliary contacts that indicate the position of the main contacts
- Ekip Touch and/or Ekip Connect software provides status of contact wear in terms of percentage, viewable via trip unit HMI or software
- Allows for maximum power density and optimization of lineups
- No external relays, PLCs or devices required. Optional sync check module on breaker for closed transitions. No external CTs, PTs or meters required
- Ability to signal preset alarms, and programmable commands based on the set thresholds for (3) analog inputs for temperature sensing (2 wires) and (1) analog input for 4-20mA current loop. It improved maintenance capabilities for temperature as condition monitoring solutions embedded in the system

**** Available in Phase 2**

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SACE Emax 2

Main pillar to ReliaGear LV SG

SACE Emax 2 improves the efficiency of all electrical plants, creating the new standard for:

1. **Performance** — Satisfying all major requirements at the right size
2. **Control** — Optimization of power flow even in emerging microgrid application
3. **Connectivity** — Integration into any digital systems
4. **Ease of use** — Simplified user experience during all customer interactions during the product lifecycle

SACE Emax 2 is far more than a circuit breaker

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Air circuit breakers

High performance for main or feeders

E1.2*

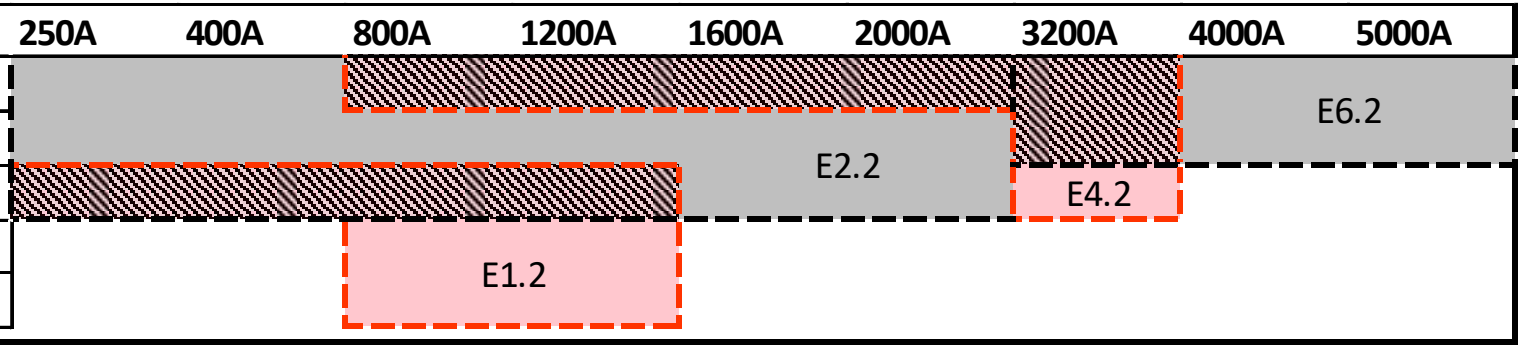
E2.2

E4.2

E6.2

Per UL 1066

kAIC Rating (508V)	Version
100	V-A
85	H-A
65	S-A
50	N-A
42	B-A



Rating Overlap

*Target for Q1 2021 release

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SACE Emax 2

Breaker frames and trip unit offering

4 Envelopes (E1.2, E2.2, E4.2 and E6.2)

- Drawout, 3P
- Circuit breaker and switch disconnectors
- Same electronic trip across the family
- Same auxiliary terminal box
- Same height and depth from E2.2 to E6.2

Ekip Touch: the smart trip unit

Ready to be upgraded and customized

- ABB Ability™ Marketplace ready
- Advanced protection sets included:
  - Modified Differential Ground Fault
  - 2I…Reduced Energy Let Through Ready
- Embedded Bluetooth antenna
- Internal voltage sensing pre-installed[1]

Ekip Hi-Touch: the ultimate trip unit

Ekip Touch Plus a lot more preloaded:

- Class 1% accuracy
- Directional protection for complex grids
- Dual setting for smart grids and arc-flash
- Enabled Internal voltage sensing and Self-power

LSI: Adjustable L, S and I

LSIG: Adjustable L, S, I, and G

LT adjustable from 0.4-1.0 in .001 increments

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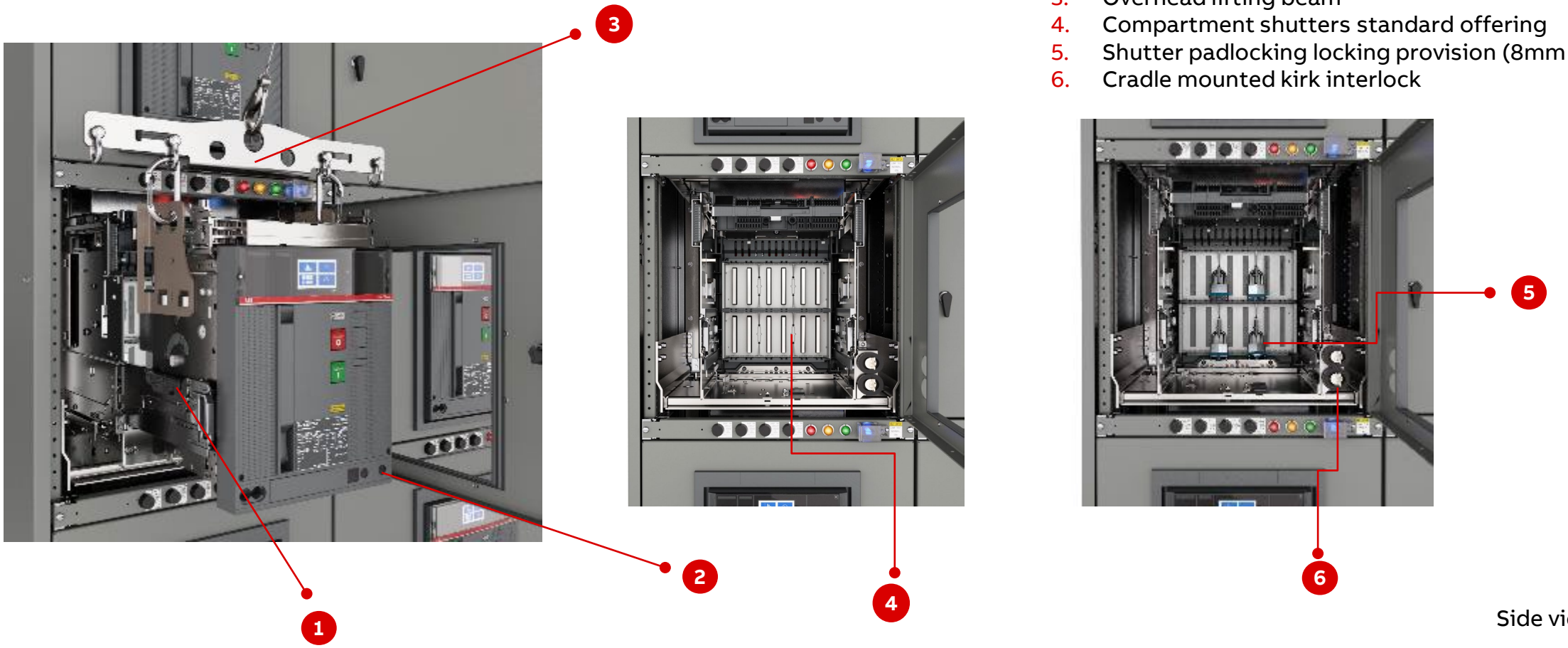
ReliaGear LV SG new designs

Drawout level overview

1. Breaker mount racking mechanism (E2.2 – E6.2)
2. Positive position racking indicator
3. Overhead lifting beam
4. Compartment shutters standard offering
5. Shutter padlocking locking provision (8mm dia.)
6. Cradle mounted kirk interlock



Side view

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What is All-In-One innovation?

Embedded functionality

Generator protection

Dedicated ANSI protection functions available with Ekip G trip units

Digital selectivity

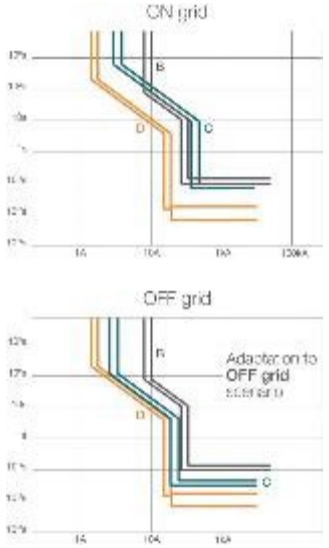
Cabled selectivity

Communication based selectivity

- Ekip link
- IEC 61850

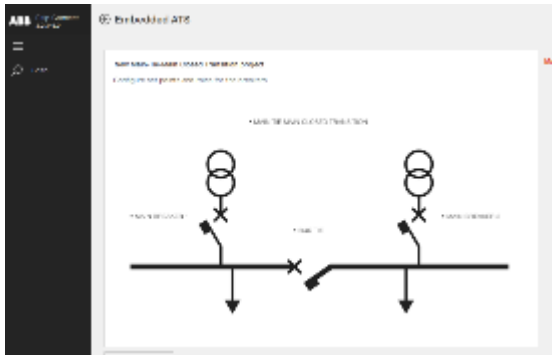
Adaptive protection

Dual setting capability to adapt protection levels to the real working conditions of the system



Embedded solutions

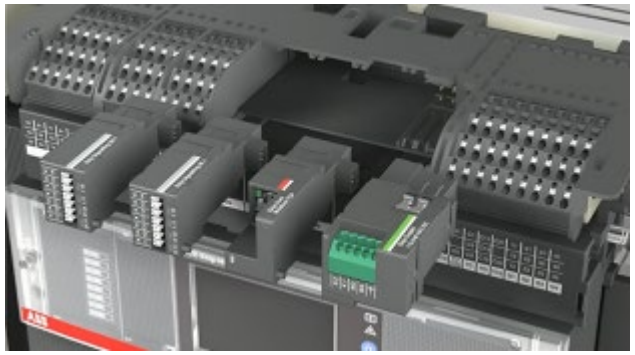
Example: embedded Automatic Transfer Switch



SACE Emax 2 option modules

Cartridge modules

- Ekip supply
- Ekip link
- Ekip com
- Ekip signaling
- Ekip synchrocheck



Expansion modules

- Ekip Signaling 4K: (4I + 4O): installed in the front of the breakers with Ekip Touch trip units for E2.2…E6.2
- Ekip Signaling 10K: (11I + 10O): external DIN rail mounted, up to four modules allowed per trip unit
- If fully equipped, E2.2 … E6.2 can provide up to 50 outputs and 54 inputs; up to 44 outputs and 48 inputs for E1.2

Ekip 4K

Ekip 10K

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SACE Emax 2

Connectivity

Plug and play modules

– Plug and play communication cartridge modules enable direct communication with the seven most common industrial communication protocols and the cloud:
  - Modbus RTU, Modbus TCP, Profibus DP, DeviceNet, ProfiNet, Ethernet/IP, IEC 61850 and Com Hub; Ekip Link also available
– Multiple modules can be used simultaneously
– Additionally, SACE Emax 2 offers a wide range of analog and digital I/O to acquire external measurement (i.e temperature) and signals

The most flexible and comprehensive connectivity offering

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SACE Emax 2

Connectivity

Embedded Bluetooth

- Easy protection setting and information access
- Possibility to upgrade the circuit breaker using software packages available on ABB Ability™ Marketplace
- Safe commissioning of the device
- Import and export of the CB settings
- Option available without Bluetooth

Easy and Fast Interaction

Safer interaction

Always connected and up to date

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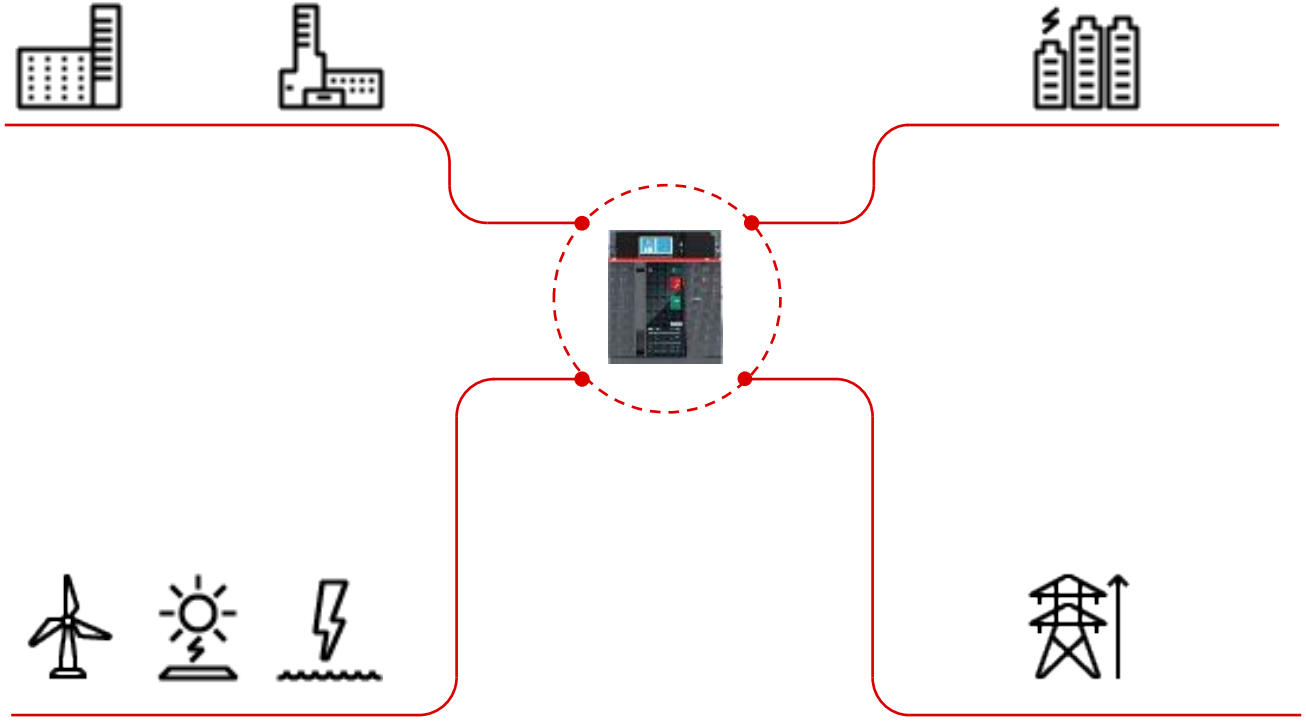
SACE Emax 2 - Trip Unit

High accuracy measurement

Certified for IEC 61557-12

- Class 1 in Energy and Power according IEC 61557-12
  - Accuracy: Current 0.5%, Voltage 0.5%, Power 1%, Energy 1%
- Low current detection, starting from 0.4% of In
- Perfectly suitable for SCADA integration
- Analysis of energy demand



Ready for energy efficiency

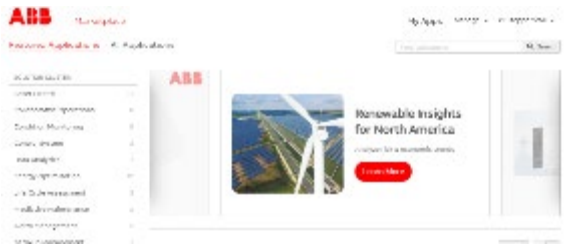
©ABB

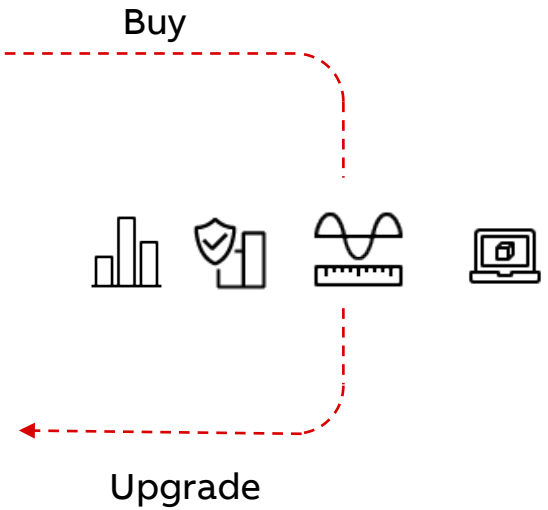
SACE Emax 2 – Ekip Trip Unit

Upgradable solution

SACE Emax 2 evolves during the lifecycle

- With dedicated software packages it is possible to fully customize the circuit breaker
- Using the new BLE connectivity through the ABB Ability™ Marketplace, SACE Emax 2 can be upgraded in the field using a smartphone and evolve during the lifecycle
  - Measurements
  - Protections
  - Network analyzer
  - Datalogger





Customized and scalable solutions

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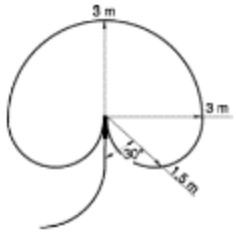
Arc flash mitigation optional

Active arc flash mitigation reduces equipment damage and downtime

TVOC-2 light sensing relay

- Detects arc flash and triggers breaker trip.
- Uses array of point-lens sensors to detect arc flash
- Sensors mounted in bus, cable and breaker compartments
- Response time <4ms + breaker clearing time
- Expandable up to 30 sensors per unit
- Optional current sensing unit



REA101 light sensing relay

- Fiber loop routed through equipment
- Current sensing capability with enable/disable control
- Triggers upstream breaker trip
- <4ms response time + breaker clearing time

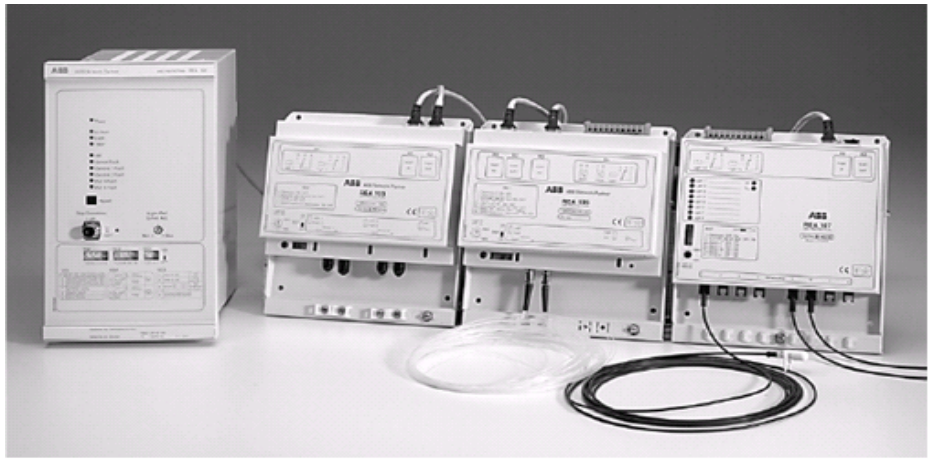


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ABB Ability™ energy and asset manager

Customer application

Smart breaker technology
process
engineering

Energy management

Predictive maintenance

Perform primary protections and advanced metering
Main protections
Embedded current and voltage sensors

Advanced communications
Embedded communications such as Modbus, IEC 61850, and EtherNet/IP

Reduce energy consumption
Energy metering and Power Quality
Spread connectivity
Avoid waste

Energy billing optimization
Tariff optimization
Load shifting/Peak shaving
Cost allocation

Health assessment
ABB or legacy GE installed switching device status based on condition monitoring, extending lifecycle

Operation strategy
Scheduling maintenance to ensure stable running without unexpected shutdown
Alerting via email/SMS

Intelligent protections

Smart facility management

Smart operation and maintenance

Configurations

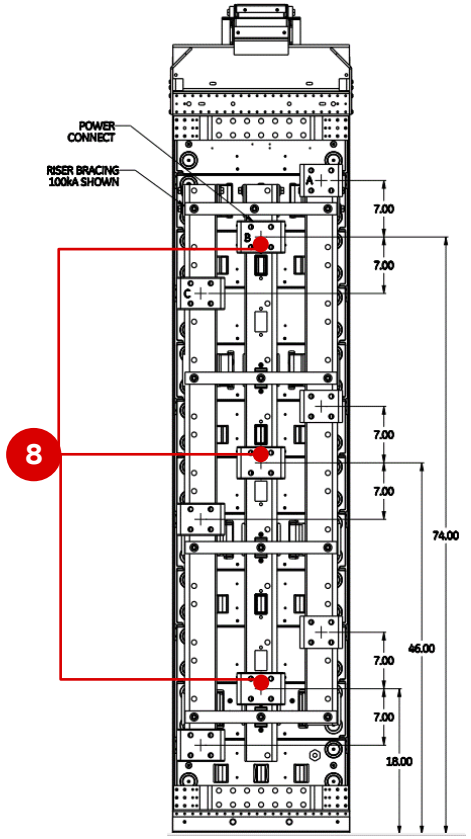
ReliaGear LV SG new designs

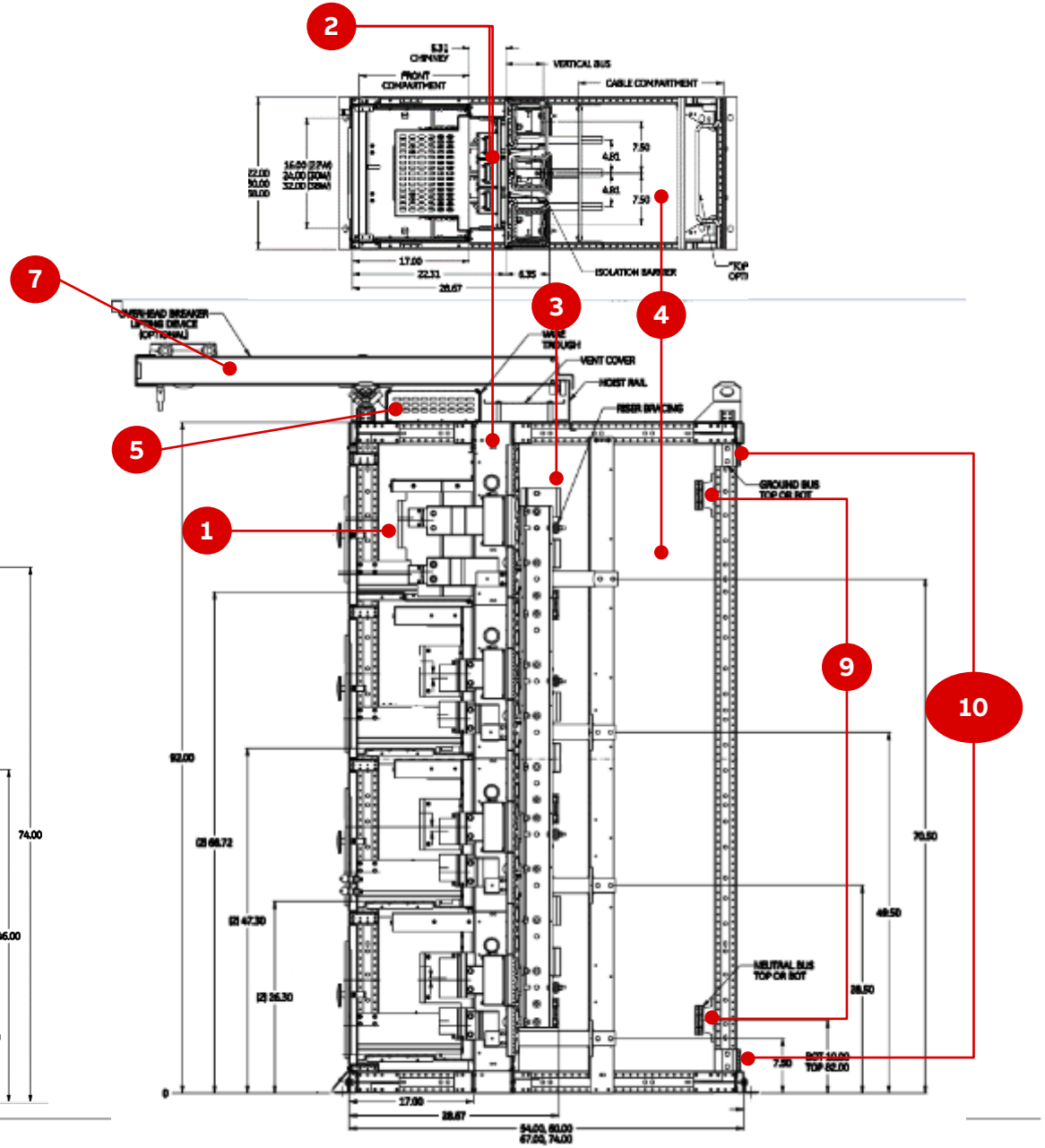
Subsystem level overview

Sub systems

1. Breaker compartment
2. Chimney
3. Bus compartment
4. Cable compartment
5. Top wire trough
6. Rear wire trough*
7. Overhead hoist
8. Main bus locations
9. Neutral bus locations
10. Ground bus locations
11. Main bus insulation and riser bus isolation covers*
12. Cable compartment segmentation*

*Not shown





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SACE Emax 2

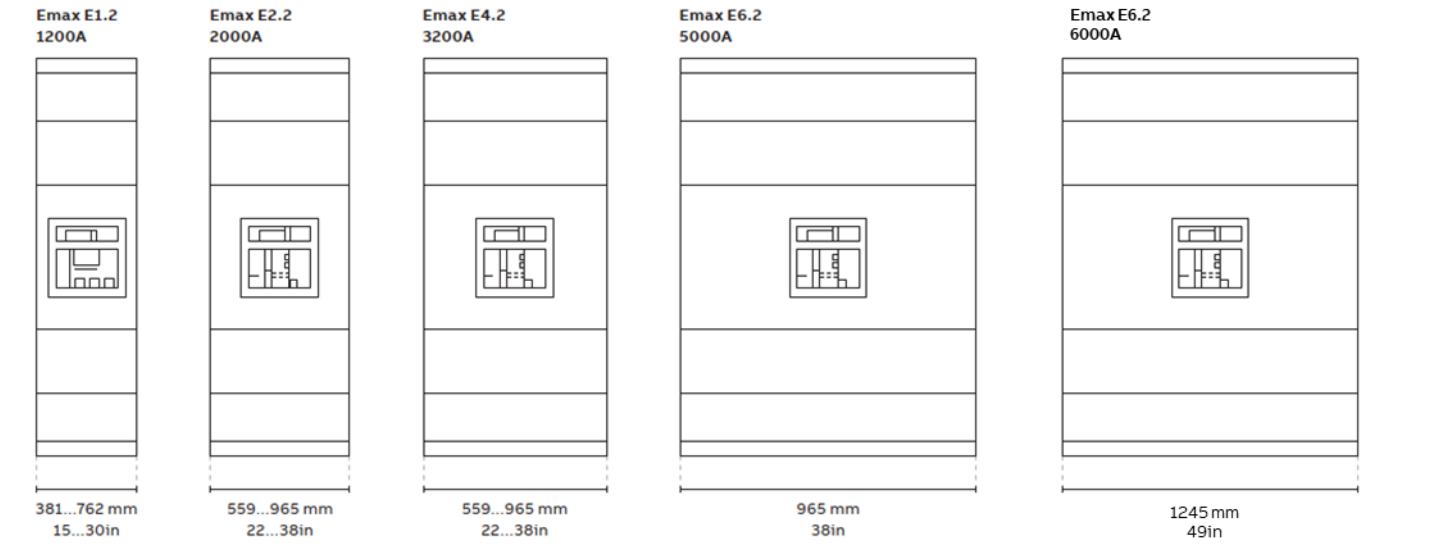
Footprint

More efficiency in switchgear

- Five construction sizes
- High short circuit rating in a compact size
- Flexible circuit breaker stacking capabilities
- Embedded functionalities, avoiding external devices, cables and extra space

Benefits

- Reduce equipment footprint
- Reduced busbar length, saving copper



Less system cost and more usable space for end user

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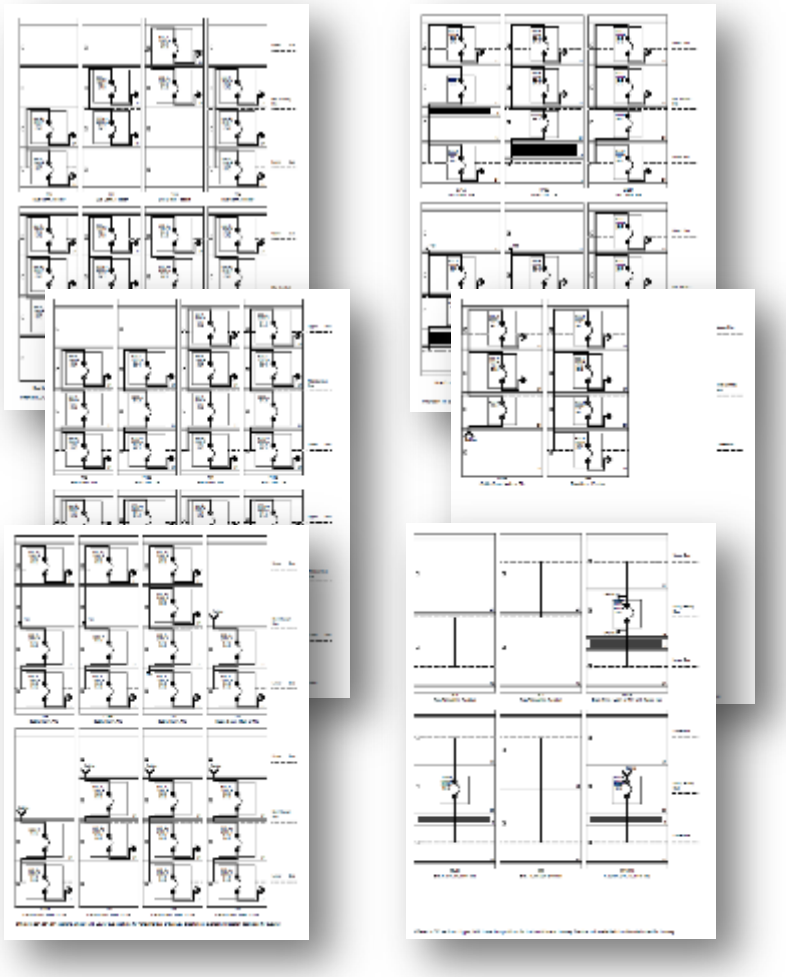
Configurations



- Bolted construction - no welding
- Seismic qualified - CBC-2019, IBC-2018, ASCE7-16, and IEEE 693-2018
- Pending renewal OSP-0043-10
- Standard depth is 54-inch (22.31-inch-deep front compartment plus 31.69-inch-deep rear compartment)
- Rear compartment depth can be extended 6, 13 or 20 inches (applies to all sections in line-up)
- Intermix sections allow 22-inch-wide breakers to be mounted in 30-inch or 38-inch-wide sections. Ideal for mixing feeders in main/tie sections
- Both frame options provide additional conduit space

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Commercialization package

ReliaGear LV SG

Low voltage switchgear support team

Global Product Manager	Rodrigo Morales
Product Specialist	Joseph Vetter
Proposals Manager	Randy Crow
Contract Manager	Dan Jones (Project Management)
Aftermarket parts	Ermilo Neira
Service	Matt Daly
Order entry	Empower

Special instructions:

- All quote requests to be submitted in SFDC (ABB1 or ABB2)
- Typical quote turn-around requested by Sales is 1-2 weeks
- **Post-Sales Service/Warranty: 1-888-GE- RESOLve (1-888-437-3765) Option #**2

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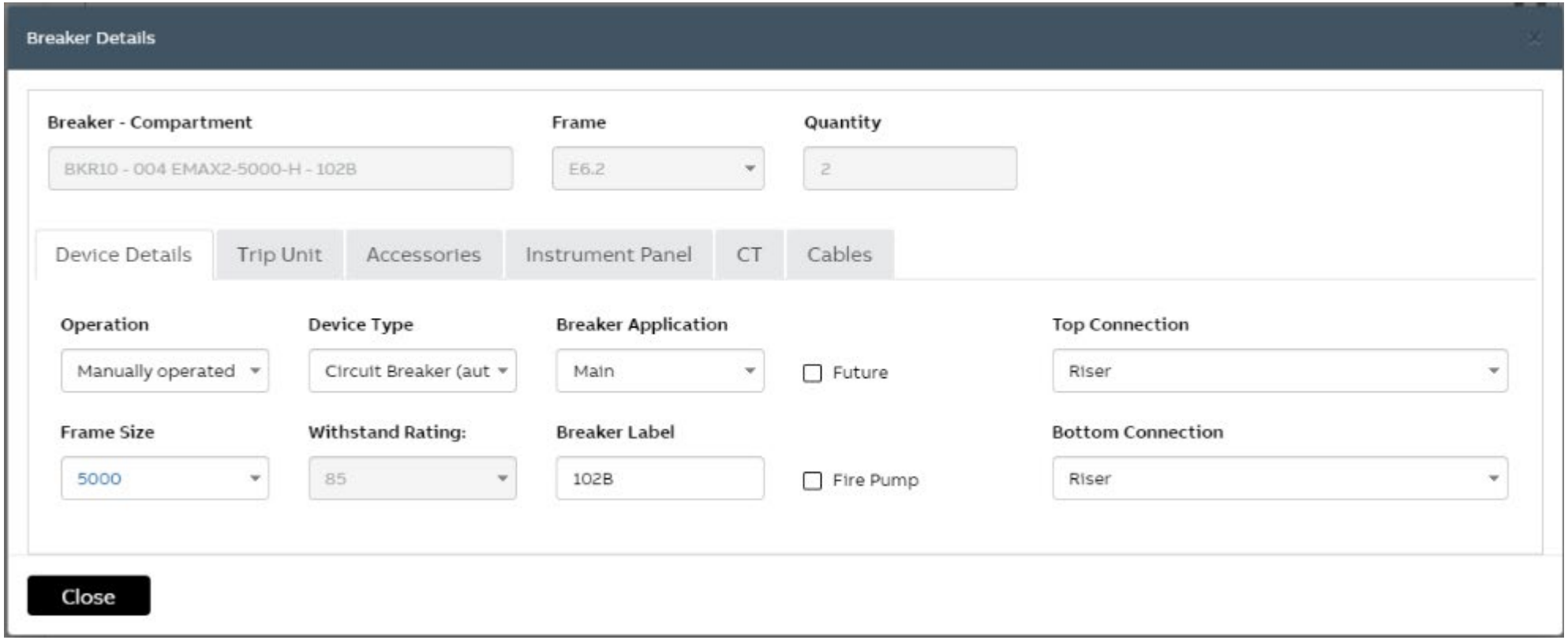
empower quotation

Sample breaker detail screen



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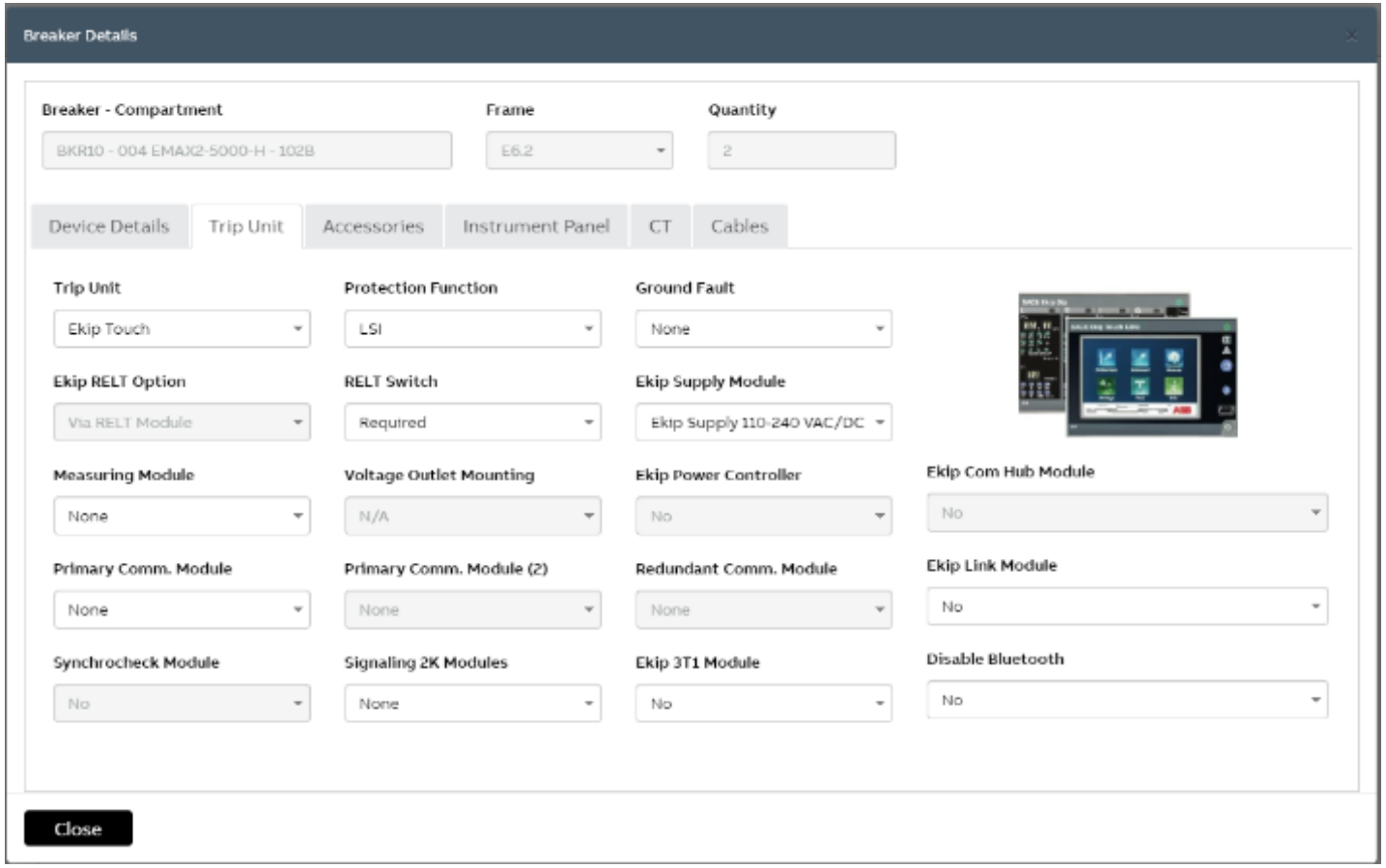
empower quotation

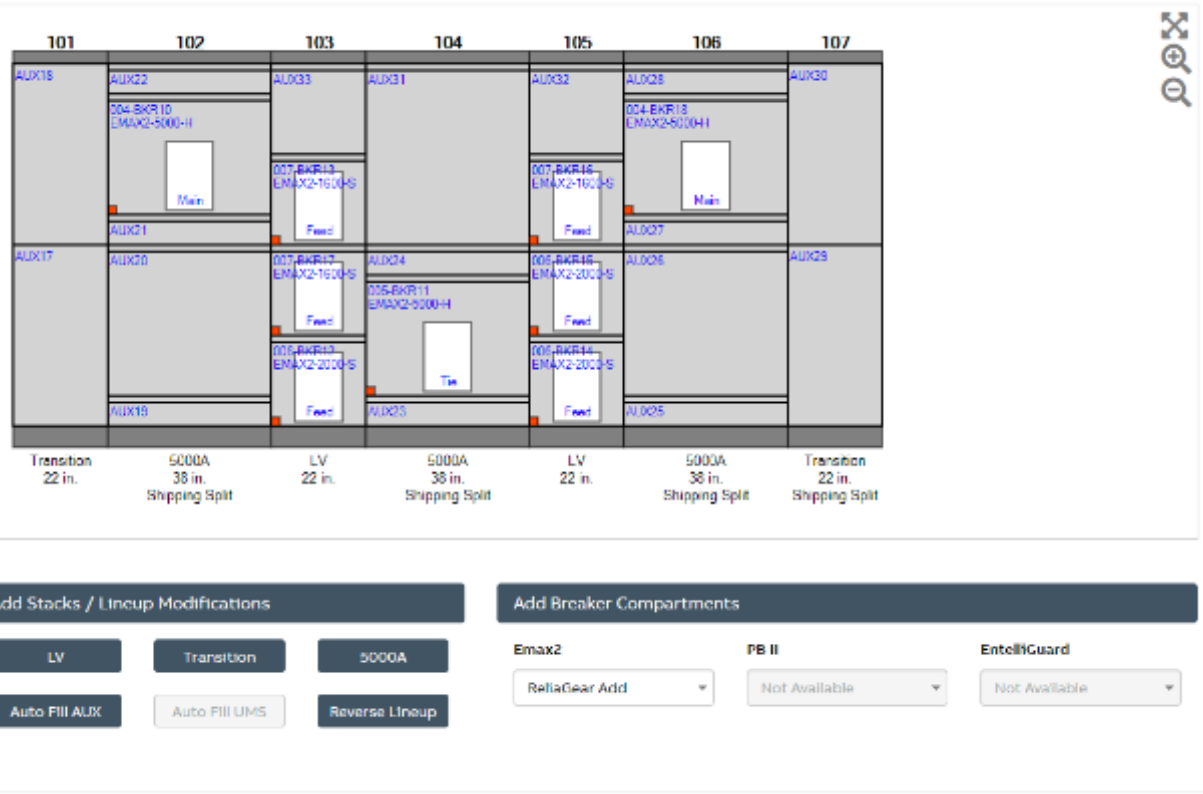
Sample breaker trip unit detail screen



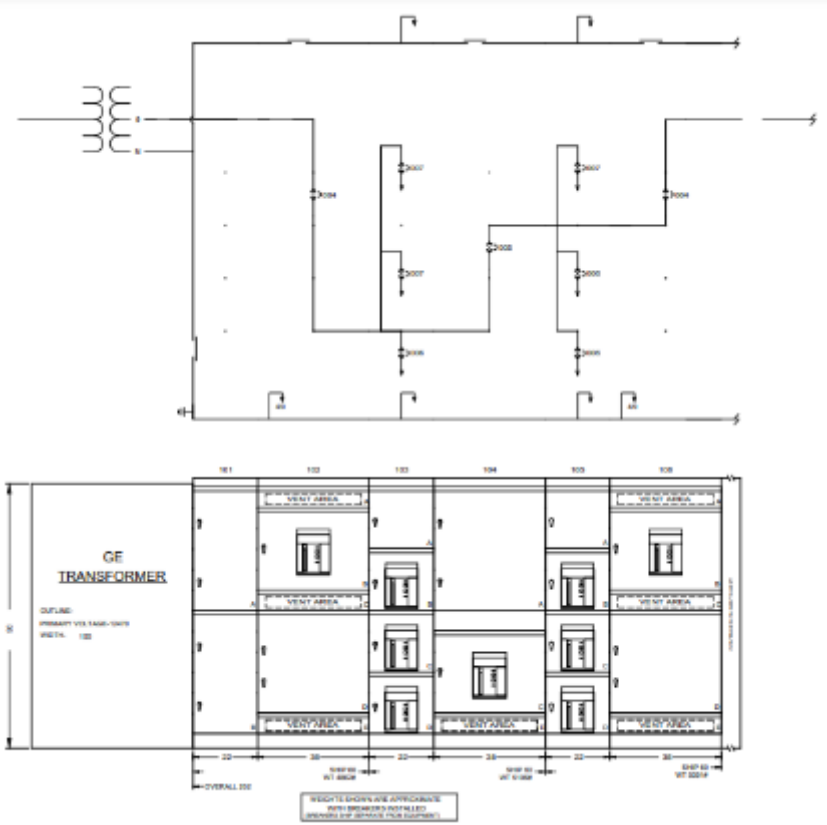
ReliaGear LV SG

empower front view example

Quote view



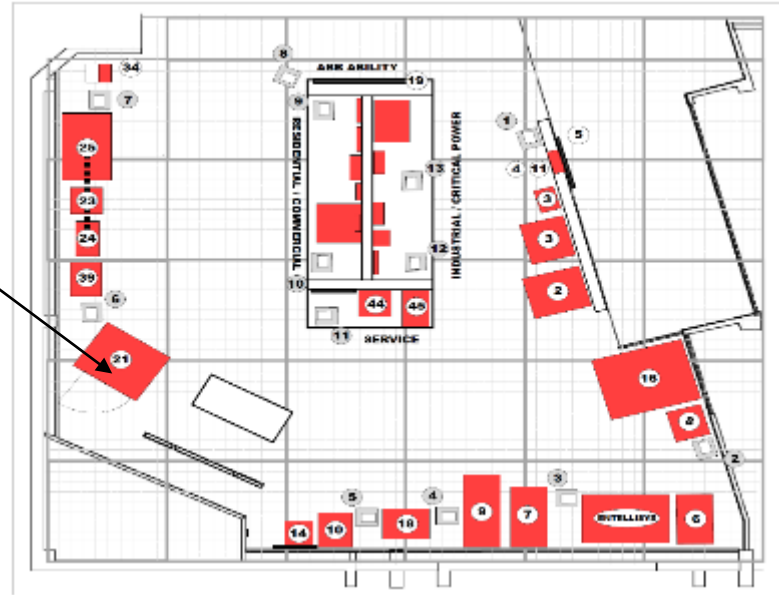
Customer view



Leveraging CX marketing plan

Roadshow and CXC

CXC



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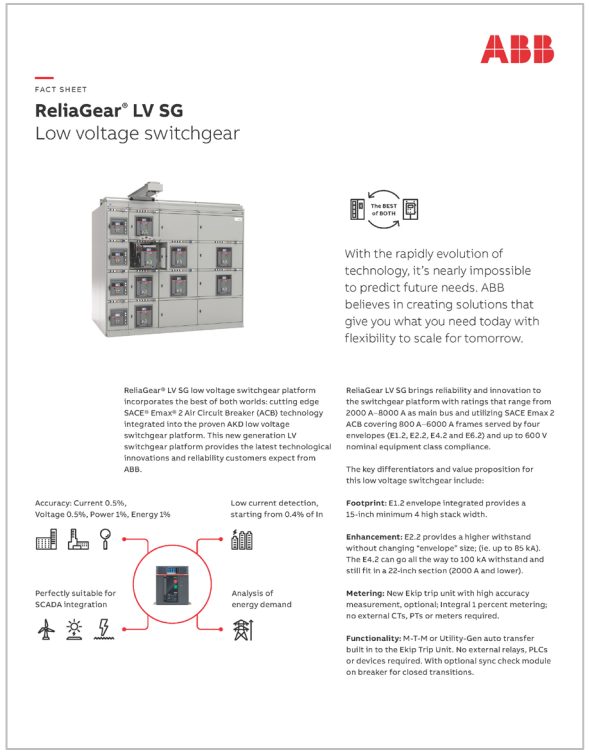
ReliaGear LV SG

Publications

Document

- ReliaGear LV SG Release Note: 1VAL106901-RN
- ReliaGear LV SG Release Note: 1VAL106902-RN
- ReliaGear LV SG Release Note: 1VAL106903-RN
- ReliaGear LV SG Fact Sheet: 1VAL106901-FL
- ReliaGear LV SG Descriptive Bulletin: 1VAL106901-DB
- ReliaGear LV SG Competitive Comparison: 1VAL106901-CC
- ReliaGear LV SG Technical Application Guide: 1VAL106901-TG
- ReliaGear LV SG IOMM: 1VAL106901-MB
- Microsite **for all of the above content**
- CSI Master Guideform spec



ABB

FACT SHEET

ReliaGear® LV SG

Low voltage switchgear

With the rapidly evolution of technology, it's nearly impossible to predict future needs. ABB believes in creating solutions that give you what you need today with flexibility to scale for tomorrow.

ReliaGear® LV SG low voltage switchgear platform incorporates the best of both worlds: cutting edge SACE® Emax® 2 Air Circuit Breaker (ACB) technology integrated into the proven AKD low voltage switchgear platform. This new generation LV switchgear platform provides the latest technological innovations and reliability customers expect from ABB.

ReliaGear LV SG brings reliability and innovation to the switchgear platform with ratings that range from 2000 A–8000 A as main bus and utilizing SACE Emax 2 ACB covering 800 A–6000 A frames served by four envelopes (E1.2, E2.2, E4.2 and E6.2) and up to 600 V nominal equipment class compliance.

The key differentiators and value proposition for this low voltage switchgear include:

Footprint: E1.2 envelope integrated provides a 15-inch minimum 4 high stack width.

Enhancement: E2.2 provides a higher withstand without changing "envelope" size; (ie. up to 85 kA). The E4.2 can go all the way to 100 kA withstand and still fit in a 22-inch section (2000 A and lower).

Metering: New Ekip trip unit with high accuracy measurement, optional; Integral 1 percent metering; no external CTs, PTs or meters required.

Functionality: M-T-M or Utility-Gen auto transfer built in to the Ekip Trip Unit. No external relays, PLCs or devices required. With optional sync check module on breaker for closed transitions.

Accuracy: Current 0.5%, Voltage 0.5%, Power 1%, Energy 1%

Low current detection, starting from 0.4% of In

Perfectly suitable for SCADA integration

Analysis of energy demand

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FOR INTERNAL USE ONLY

ReliaGear® LV SG

Competitive Comparison

ReliaGear® LV SG is the low voltage switchgear platform incorporating the best of both worlds: cutting-edge SACE® Emax® 2 air circuit breaker with Ekip trip unit technology, integrated into the proven AKD low voltage switchgear platform. Once again, demonstrating the innovation and reliability customers expect from ABB.

Ratings range from 2000 A–8000 A as main bus and utilizing SACE Emax 2 Ekip technology covering 800 A – 6000 A frames served by four envelopes (E1.2, E2.2, E4.2 and E6.2) and up to 600 VAC nominal equipment class compliance. While still maintaining UL1558 and IEEE/ANSI standards.

Non-arc-resistant ReliaGear LV SG differentiators and values

Differentiator	Value
Advance electronics - Ekip Touch and Trip Units	Reliability and functionality - update TU firmware, add additional protection features, measures, functionalities to the breaker via ABB Ability MarketPlace with breaker in the closed position using Ekip Connect Software
Watchdog inside Ekip TU improves reliability as electronic circuit periodically checks the continuity of internal connections	An alarm cause by trip coil, rating plug or current sensor (ANSI 74), a message shows in the Ekip Touch. If a protection function intervenes, the unit always checks that the circuit breaker has been opened through auxiliary contacts that indicate the position of the main contacts
Improved preventive maintenance capabilities with SACE Emax 2 Ekip Touch integration and/or Ekip connect software	Ekip Touch and/or Ekip Connect software provides the status of the contact wear in terms of percentage from the HMI display so this can be monitored when it may be time to have the breakers serviced
E1.2 integration…15" minimum stack width	Allows for maximum power density and optimization of lineups
M-T-M or Utility-Gen auto transfer built in and integral 1% metering accuracy	No external relays, PLCs or devices required. Optional sync check module on breaker for closed transitions. No external CTs, PTs or meters required
Modular thermal monitoring available with SACE Emax 2 Ekip Trip Unit	Ekip signaling 3T Module provides the ability to signal preset alarms, and programmable commands based on the set thresholds for (3) analog inputs for temperature sensing (2 wires) and (1) analog input for 4-20mA current loop. Thus, it improved maintenance capabilities for temperature as condition monitoring solutions embedded in the system.

Electrification websites

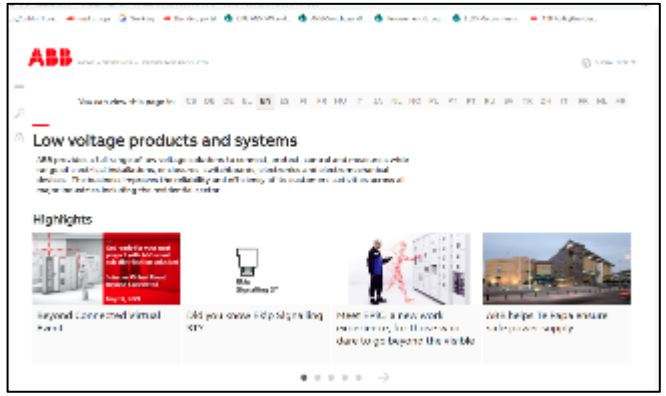
External, services and sales support portal

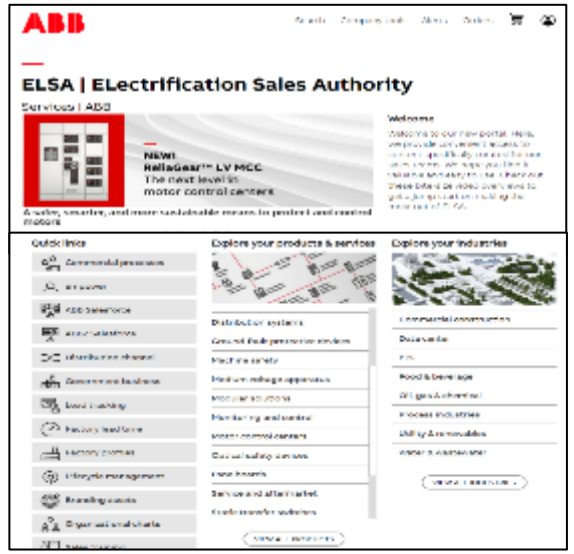
Global website: www.abb.com

US website: https://electrification.us.abb.com/

Electrification Sales Authority (ELSA): https://myrevbase.com/1608/v/866960?

- empower
- Salesforce/SFDC
- Branding
- Lead times
- Lifecycle management
- Events
- Roadshow
- Training





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Q & A

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