

DESCRIPTIVE BULLETIN

ReliaGear® ND

ANSI narrow frame metal-clad switchgear



ReliaGear® ND is an IEEE C37.20.2 compliant, 5 and 15 kV metal-clad switchgear platform featuring a narrow width, two-high breaker configurations and the compact, easy to maintain Vmax/A™ breaker.

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ReliaGear® ND

Introduction

ReliaGear® ND is an IEEE C37.20.2 compliant, 5 and 15 kV metal-clad switchgear platform featuring a narrow width, two-high breaker configurations and the compact, easy to maintain Vmax/A™ breaker.

Measuring in at 26 inches wide, 98 inches tall and 77 inches deep one-high or 85 inches two-high, ReliaGear ND is a compact solution for installation space constraints. Utilizing the ABB Vmax/A breaker, maintenance and down-time costs are greatly reduced due to its modular design and quick change trip and close coil and charge motor design.

Product highlights

ReliaGear ND's compact, space saving design also provides the following benefits:

- 26-inch frame width for both 5 and 15 kV, 1200 and 2000 A switchgear ratings
- Minimal depth of 77 inches for one-high and 85 inches for two-high breaker construction for both 5 and 15 kV
- Separate low voltage compartment
- Low voltage instrument mounting space available on breaker doors to efficiently use mounting locations even with a small footprint
- Closed-door breaker racking and closed-door insertion and removal of PT and CPT draw-out units
- Available for top and/or bottom cable and bus duct entry
- Reduced shipping splits due to decreased frame weights and sizes saves onsite installation time
- Viewing windows for verification of breaker/PT/CPT truck position and breaker status
- UL certified

Delrin arc-quenching contacts

For PT and CPT contacts, ABB uses Delrin arcquenching contacts. A sleeve, with a round conductor probe, is inserted into a receptacle with recessed contacts. Due to the unique properties of Delrin, which include selflubrication, arcs created during load break conditions are extinguished by a gas emitted by the Delrin material as it heats instead of drawing the arc outside of the contact boundary as they separate. The recessed contact design blocks access to the live bus, thereby eliminating the need for shutters in PT and CPT compartments.

Galvanized steel construction

ReliaGear ND is built using galvanized steel construction for increased protection from rust, scratches, and corrosion. Galvanized steel is used inside low voltage compartments for its increased illumination properties to provide for better instrument viewing.

ReliaGear ND accessories

- Breaker lift truck
- Mechanically operated Ground & Test Device
- Breaker test cabinet
- Breaker test jumper
- Breaker racking crank
- PT/CPT draw-out unit levering handle
- SmartRack™ electric racking device

ReliaGear ND options

- REA arc protection relay system
- Digital switchgear with current and voltage sensors and IEC 61850-based communications Reference Descriptive Bulletin 1VAL108401-DB
- SwitchgearMD™ 24x7 monitoring system
- Tin-plated main bus
- Surge arresters
- Cable supports
- Ground studs
- Ground (zero sequence) CTs
- UFES active arc mitigation system

ReliaGear ND enclosures

- Indoor enclosures (IEEE C37.20.2, Category B)
- Outdoor Non-Walk-in (ODNWI) enclosures
- Outdoor sheltered aisle, single or double row walk-in enclosures
- eHouse (PDC) enclosures

Table 1: ReliaGear ND ratings

Characteristic	Unit	Rated maximum voltage level*	
		5 kV	15 kV
Rated nominal voltages	kV	2.4, 4.16, 4.8	6.9, 7.2, 8.4, 11, 12, 12.47, 13.2, 13.8, 14.4
Main bus continuous current	A	1200, 2000	1200, 2000
Short circuit current (rms)	kA	25, 31.5	25, 31.5
Rated frequency	Hz	50, 60	50, 60
Low Frequency Withstand (rms)	kV	19	36
Impulse level; (BIL, crest)	kV	60	95

* Ratings given are for service conditions within temperature and altitude limitations as defined by IEEE C37.20.2 metal-clad standard.

Vmax/A™ breaker

Compliant with IEEE C37.04, C37.06, and C37.09, the Vmax/A is a reliable, narrow and lightweight breaker used in the ReliaGear ND platform.

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Vmax/A breaker

The Vmax/A breaker features a modular, easy to maintain design with only a single screw to remove the smart coil assembly and spring charged motor. Using this design, maintenance time on breakers is greatly reduced - lowering maintenance costs and limiting employee exposure to the switchgear, increasing personnel safety.

The Vmax/A breaker’s lightweight design, with optional roll-on-the-floor wheels, provides direct roll-in access to lower breaker cubicles without the use of a lift truck for convenient removal and insertion of breaker elements.

ANSI/IEEE interlocks are provided on a robust racking truck, that provides superior reliability and safety, exceeding the requirements of ANSI/IEEE standards.



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Table 2: Vmax/A breaker ratings

Voltage (kV)	Main bus	Isc (kA)	Interrupt (kA)	Close & latch (kA)	BiL	Low frequency withstand (kV)	Interrupt time (cycles)	No load mech endurance
5	1200	25	25	65	60	19	3	10000
		31.5	31.5	82	60	19	3	10000
	2000	25	25	65	60	19	3	10000
		31.5	31.5	82	60	19	3	10000
15	1200	25	25	65	95	36	3	10000
		31.5	31.5	82	95	36	3	10000
	2000	25	25	65	95	36	3	10000
		31.5	31.5	82	95	36	3	10000

Instrument transformers

Current transformers

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Current transformer

ReliaGear ND is designed and tested for use with the ABB SCH-3U and SCH-3UD current transformers, with accuracy classes up to C200. These CTs are used for voltage ratings of 5 and 15 kV. Each breaker can accommodate up to two load side and one bus side CT for a total possible three current transformers per phase.

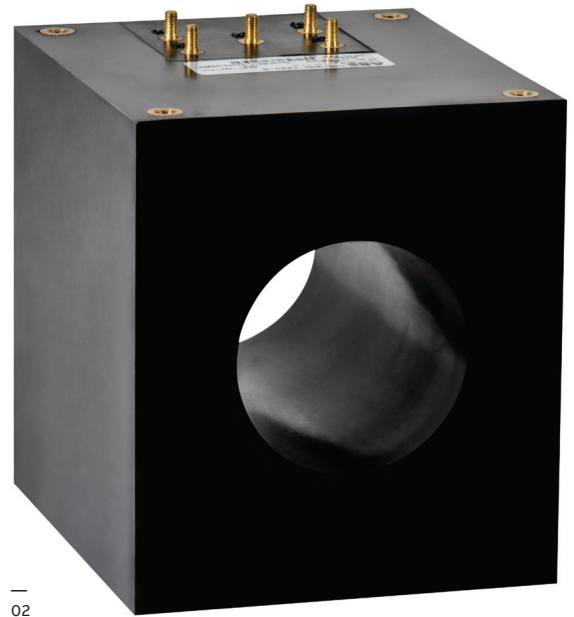
The SCH-3U and SCH-3UD current transformers are available in single- and multi-ratio styles with primary ampere ratings from 50-2000 A. These current transformers are used as a source of current for both relaying and metering.

The ring-type core is insulated and toroidally wound with a fully distributed secondary winding. The protective case, made of an impact-resistant polycarbonate, is assembled using self-tapping screws. Secondary terminals are 10-32 brass terminal screws with hardware.

These units meet all applicable IEEE and NEMA standards and are UL Recognized components.

Product features

- 600 V indoor
- 10 kV BIL
- 60 Hz
- 50- 2000 A primary amperes
- Mechanical rating: 180 x normal



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Potential transformers

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15 kV PT transformer

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04
5 kV PT transformer

15 kV potential transformers

For 15 kV applications, ReliaGear ND is designed and tested for use with ABB VIZ-75, VIZ-11, and TJC5 indoor potential transformers (PT). All PTs are fused and can be used for metering and relaying applications. PTs are mounted on draw-out trays that are available in both single-phase and three-phase configurations including wye-wye, open delta, line-line, and line-ground connections.

ABB VIZ primary and secondary coils are wound using special winding and shielding techniques for improved voltage stress distribution. The coils are designed to withstand continuous operation at either 1.1 or 1.25 times the line-to-line voltage level for Z burden units, and 1.9 times the line-to-ground voltage level for Y burden units.

Each coil is insulated with Mylar film to provide a high dielectric strength between layers. The coils and core are combined to create a complete winding structure that is assembled to a support frame. The entire assembly is vacuum-cast in polyurethane for added insulation and protection.

These units meet all applicable IEEE and NEMA standards and are UL Recognized components.



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5 kV potential transformers

For 5 kV applications, ReliaGear ND is designed and tested for use with the ABB VIY-60 indoor potential transformers.

The VIY-60 indoor potential transformers are fused and are used for metering or relaying applications.

ReliaGear ND utilizes drawout trays for the PTs that offer closed door push/pull operation for increased safety. These trays are available in both single-phase and three-phase PT applications, and include both wye-wye and open delta configurations.

The primary and secondary coils are wound using special winding and shielding techniques for improved voltage stress distribution. The coils are designed to withstand continuous operation at 1.1 times the line-to-line voltage level and the line-to-ground voltage level for Y burden units.

Each coil is insulated with Mylar film to provide a high dielectric strength between layers. The coils and core are combined to create a complete winding structure that is assembled to a support frame. The entire assembly is vacuum cast in polyurethane for added insulation and protection.

These units meet all applicable IEEE and NEMA standards and are UL Recognized components.

Distribution protection and control

Relion® relays

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Relion 615 series

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Relion 620 series

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REX 640

ABB's Relion® family of protection and control relays for distribution applications provides the performance, safety, and ease-of-use that switchgear specifiers and users demand. The Relion 615, 620 and 640 series offer complete protection and control for feeders, motors, and transformers in switchgear applications and are characterized by their flexibility and performance in today's and future distribution schemes.

The IEC61850 implementation in Relion includes fast peer-to-peer communication over the substation bus. GOOSE communication is used between Relion devices in switchgear to form a stable, reliable, and high-speed bus bar protection system, provide fast and dependable auto transfer schemes and zone interlocking. Separate hard-wiring is not needed for the horizontal communication between the switchgear cubicles.

Relion relays for feeder protection offer an optional cable fault detection function that can detect extremely short duration underground faults. These faults are typically undetectable by conventional protection where there is no operation of the breaker. This feature helps users to learn of these events faster, resulting in reduced down time.

ABB's COM600 Grid Automation Controller can be used as a local HMI to display switchgear single line diagrams and the status of devices such as breakers and protection relays. COM600 also provides gateway functionality to enable switchgear integration into SCADA systems. It can be easily installed as part of the switchgear control devices.

Relion 615R, 615, 620 and 640 series relays include:

- Comprehensive set of protection and metering functions for feeders, transformers, and motors
- Draw-out design
- Integrated open/close push buttons and local/remote selector with indicating lights
- Protection and control for one and two breakers, as well as breaker-and-a-half schemes
- Enhanced safety with optional arc fault protection in all relays
- Web browser based user interface accessible through an RJ45 front port
- Trip coil monitoring
- Monitoring of breaker health parameters such as travel time, number of operations, wear and tear, and spring charging time
- DNP3 and Modbus protocols included standard in all relays
- Relion relays are fully IEC61850 compliant for communication and interoperability of substation automation devices
- Fully ANSI and RoHS compliant, as well as UL listed



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Switchgear asset health monitoring

ReliaGear ND can be provided with integrated IR windows, from multiple manufacturers, on the rear door to facilitate thermal monitoring of the cable connections.

For users wanting a greater peace of mind, ReliaGear ND also comes with a 24x7 monitoring solution for temperature, humidity, and partial discharge activity.

The temperature monitoring is done using either IR sensor technology or SAW sensor technology. The PD activity is monitored with UHF antennas and specialized signal processing.

The monitored data is available locally, as well as remotely in the user's SCADA or historian systems.



ReliaGear® ND MV SG Digital

An ABB Ability™ solution

ReliaGear® ND MV SG Digital is an advanced medium voltage switchgear solution — reliability and simplicity are its hallmarks. Digitalization of the protection and control system simplifies construction while increasing safety and versatility. ABB is taking the next dramatic leap forward in advancing the technology of switchgear solutions.

Product and process optimization



Reduced footprint

Sensors are more compact than traditional instrument transformers

Bus/line potential transformer compartments can be eliminated

Up to **25%** less space needed



Optimized weight

Conventional instrument transformers weigh 40-60 lbs

Sensors weigh 1.5-4.5 lbs

Up to **25%** weight reduction



Faster delivery to site

More efficient engineering versus conventional protection and control

Late customization possible

Up to **30%** faster delivery



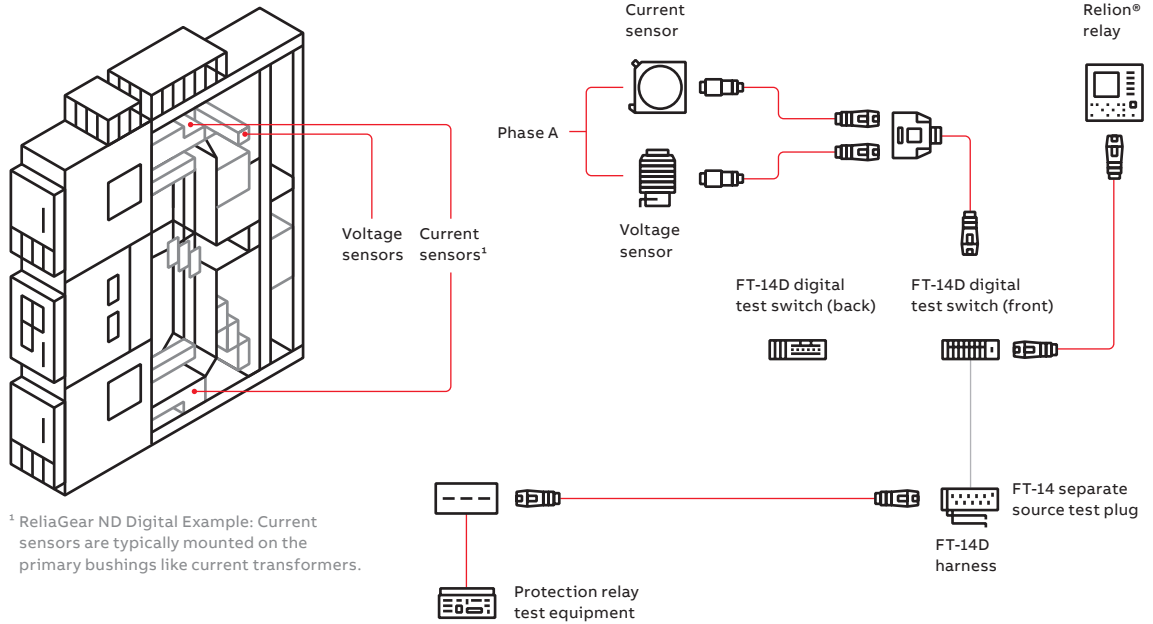
Faster installation/commissioning

Fewer frames to install and fewer inter-frame connections

Fewer components to test and reduction of inventory

25% reduction

- 08 Minimized analog wiring in the switchgear increases reliability
- 09 Rogowski coil
- 10 Resistive voltage divider



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Next level safety

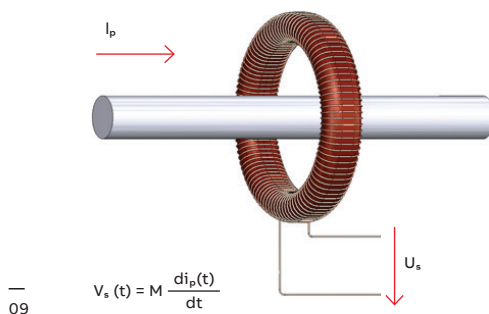
- Minimizes the amount of operator interaction while troubleshooting and servicing
- No potential exposure to open secondary CT circuits
- Minimizes potential for high voltage exposure with closed door racking

Next level sustainability

- Reduces resource consumption in manufacturing
- Significant savings of CO₂ over lifetime
- Energy loss is minimized

Current sensors

- Rogowski coil
- Output voltage is proportional to the derivative of primary current
- Output voltage is integrated by protective relay
- No saturation (air core)
- Open CT hazard eliminated
- Linear through the entire measuring range
- One sensor for all current ratings for up to 4000 A



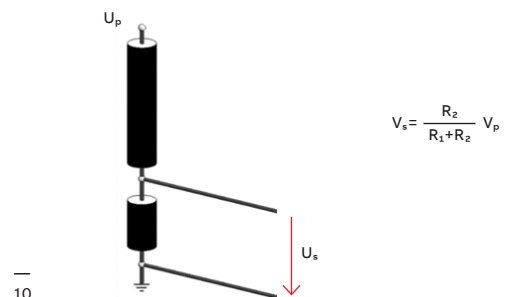
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Next level reliability

- Sensors are immune against grid disturbances such as Ferro resonance phenomena
- Less wiring required – Decreased risk of potential operator error
- IEC 61850 + Ethernet-based GOOSE messaging digital communication enables fast and precise actions in case of malfunction

Voltage sensors

- Resistive voltage divider (RVD) sensors
 - Passive elements
 - No fuses required
- No Ferro resonance (non-inductive)
- Inherently safe as they fail open
- One sensor for all voltage ranges
- Three-phase configurations (wye-wye, open delta) are configured in the IED



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