



2024

# EnRack and EnRack+ controllers

Pendant controllers for Breaker Borne Racking (BBR) system

External customer training

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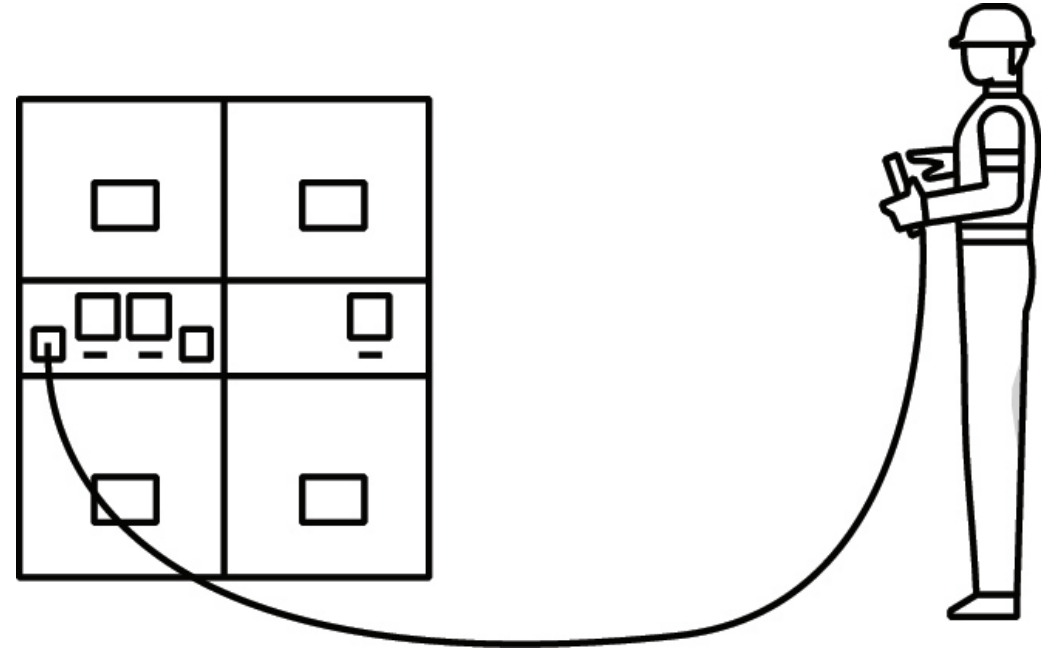
# Agenda

- What is the BBR and EnRack?
- Features
- General application notes
- Applicable switchgear and breaker products
- EnRack pendant variants features, operations and technical data
- Connection block diagram – how it all fits together
- Pendant operating procedure
- Available documentation

# What is the BBR and EnRack?

## Description

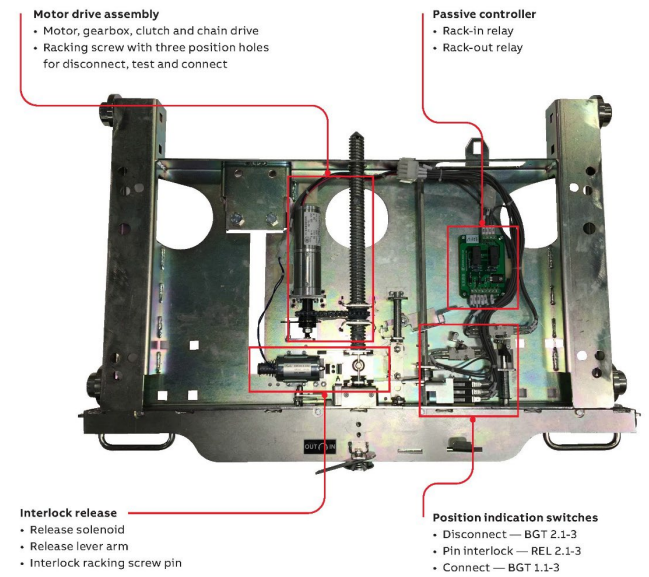
- BBR = Breaker Borne Racking system – the breaker truck has an integrated motor for electrically racking the breaker
  - BBR is UL Listed and tested to IEEE C37.09
- EnRack/EnRack+ are the pendant controllers used to operate the BBR system
- For use with all ADVAC, AMVAC and ADVAC G breakers for all ratings
  - BBR currently not for use with G&T devices or auxiliary units (future plans include this capability)
- For use on Advance, Advance 27, SafeGear and SafeGear HD
- Reference flyer #1VCP000972 for more information on BBR



# ABB metal-clad switchgear

## Breaker racking options

- Manual
- Electrical
  - Local
  - Remote
    - SmartRack™
    - BBR + Enrack/EnRack+



# Switchgear and breakers for EnRack and EnRack+

MV AIS arc-resistant and non-arc-resistant



Advance®/Advance® 27



SafeGear®/ SafeGear® HD

Product name	Voltage class			Maximum main bus (A)	Short circuit (kA)	Arc-resistant	EnRack/EnRack+	Breakers with BBR
	5	15	27					
Advance	x	x		4000*	25, 31.5, 40, 50, 63	N/A	EnRack or EnRack+	ADVAC & AMVAC Model 4; ADVAC G40/G50; ADVAC 63
Advance 27			x	2000	16, 25	N/A	EnRack or EnRack+	AMVAC
SafeGear	x	x		4000*	25, 31.5, 40, 50	2, 2B, 2BC @ 10-cycles 2, 2B @ 0.5 sec	EnRack or EnRack+	ADVAC & AMVAC Model 4; ADVAC G40/G50
SafeGear HD	x	x		4000*	50, 63	2, 2B	EnRack or EnRack+	ADVAC 63; ADVAC G63

# Features

## EnRack and EnRack+ controllers

- Pendant controller used to operate the Breaker Borne Racking (BBR) system available on ABB breakers
  - Breakers can be supplied with BBR and not EnRack. If EnRack is supplied, breakers must have BBR system installed
  - Allows operators to stand up to 50 feet\* from the switchgear, outside the arc-flash boundaries while performing racking operations
  - Only one EnRack pendant controller is needed per lineup, but more can be supplied if desired
  - EnRack+ includes racking in and out, as well as opening and closing the breaker
  - BBR allows use of both manual racking tools and SmartRack electric racking system
- Switchgear is available with UL labeling when used with BBR and EnRack/EnRack+
  - For use with all ADVAC, AMVAC and ADVAC G breakers for all ratings
  - BBR currently not for use with G&T devices or auxiliary units
  - Cat 5E Ethernet cables are used to connect pendant to LV door and from LV door to LV compartment wiring
  - EnRack pendant controller uses interposing relays and electronics to process the signals, which reduces the size and weight of the cable and pendant
  - Operates at 24 Vdc, requiring a constant power supply (one PS may serve more than one breaker)

\* Contact factory for longer stand-off distances

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# EnRack

EnRack is the name for the basic controller

## Functions and components

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- Provides personnel safety by allowing operators to stand at a distance, up to 50 feet away, while racking the breaker in or out
- Provides real-time status and position indication on display screen
- Displays codes on screens if errors occur
- Small, lightweight and easy to operate
- Displays the stored information about event logs
- Utilizes a permissive button to prevent unintended operations
- Currently for use with breakers only.
- EnRack solution consists of three major components:
  - Pendant controller (one per lineup or substation)
  - Control module (one per breaker)
  - Relay module (one per breaker)
- Switchgear available with UL labeling using EnRack



# EnRack+

EnRack+ is the name for the high-end controller

## Functions and components

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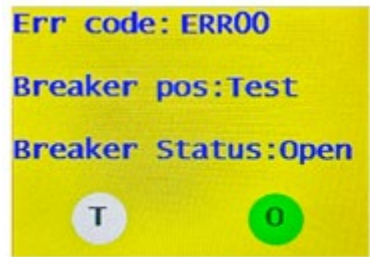
- Same features and functions as basic EnRack and includes breaker open and close functions
- Allows operators to rack and operate the breaker while standing outside the arc-flash boundary
- Displays the stored information about event logs
- Currently for use with breakers only
- EnRack+ solution consists of three major components:
  - Pendant controller (one per lineup)
  - Control module (one per breaker)
  - Relay module (one per breaker)
- Switchgear available with UL labeling using EnRack+





# EnRack display

Sample screen shots of the EnRack pendant controller display



Position Indicator      Status Indicator

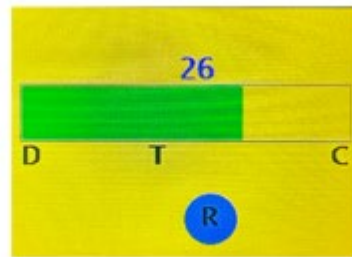
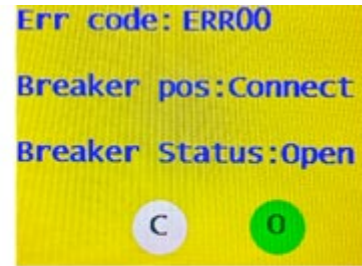
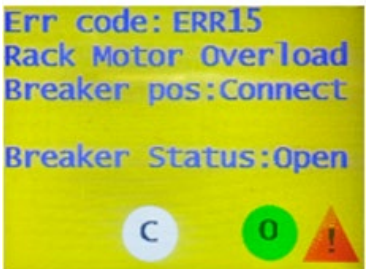


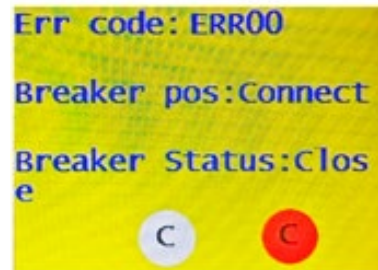
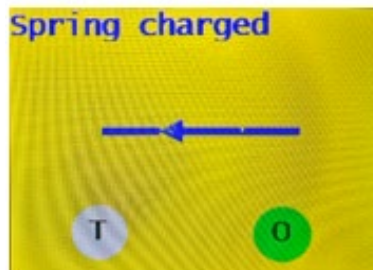
Figure 8      Status Indicator



The green bar shows the progress of the racking operation



Error Indicator



SYMBOL	DESCRIPTION
	OPEN
	CLOSE
	BREAKER CLOSE
	BREAKER OPEN
	RACKING
	TEST
	RACK-IN
	RACK-OUT
	DISCONNECT
	CONNECT
	ALARM

# EnRack vs EnRack+ operations

- Emergency stop button allows operator to stop the integral racking at any time
- Permissive button is included to prevent accidental operation. Both permissive button and operation button must be depressed simultaneously for at least one (1) second to perform operation



Operation	EnRack	EnRack+
Breaker rack-in	✓	✓
Breaker rack-out	✓	✓
Breaker position indication	✓	✓
Breaker open	-	✓
Breaker close	-	✓
Breaker status indication	✓	✓
Breaker close spring charge indication (optional)	-	X
Alarm/error indication (relay output)	✓	✓
Emergency off/stop based on additional relay	✓	✓
Motor overload indication (optional) if OLR connected	✓	✓
ERROR indication on LCD	✓	✓
RESET alarm/error key	✓	✓
Permissive/enable key for control operation	✓	✓
Pendant connected indication (relay input)	✓	✓
Pendant enable/disable control externally (digital input)	✓	✓
Compartment door open/close monitor (optional)	✓	✓
Firmware download (ABB service people)	✓	✓
Event logging	-	✓
Selection of country of operation	-	✓
Service data (# of open, close, rack-in, rack-out etc.)	-	✓

# EnRack modules

## Controller and Relay modules

### Application notes

- Serve as the interface between the BBR and pendant
  - Receive rack-in and rack-out commands from the pendant and then send signals to BBR via Relay module
  - Receive breaker position feedback signals (disconnect, test, connect, racking, etc.), processes signals, then sends that information to the pendant using RS485 Modbus RTU communications
- Must be located inside a LV compartment, on back of instrument door or in LV wiring areas in the front sides of the breaker compartment
- One Controller and one Relay module are required for each breaker
- Switchgear available with UL labeling when used with BBR and EnRack/EnRack+
- BBR and EnRack not available for use with 24VDC, 48VDC, 220VDC or 240VAC control power. Use of 120VAC control power requires an AC to DC converter



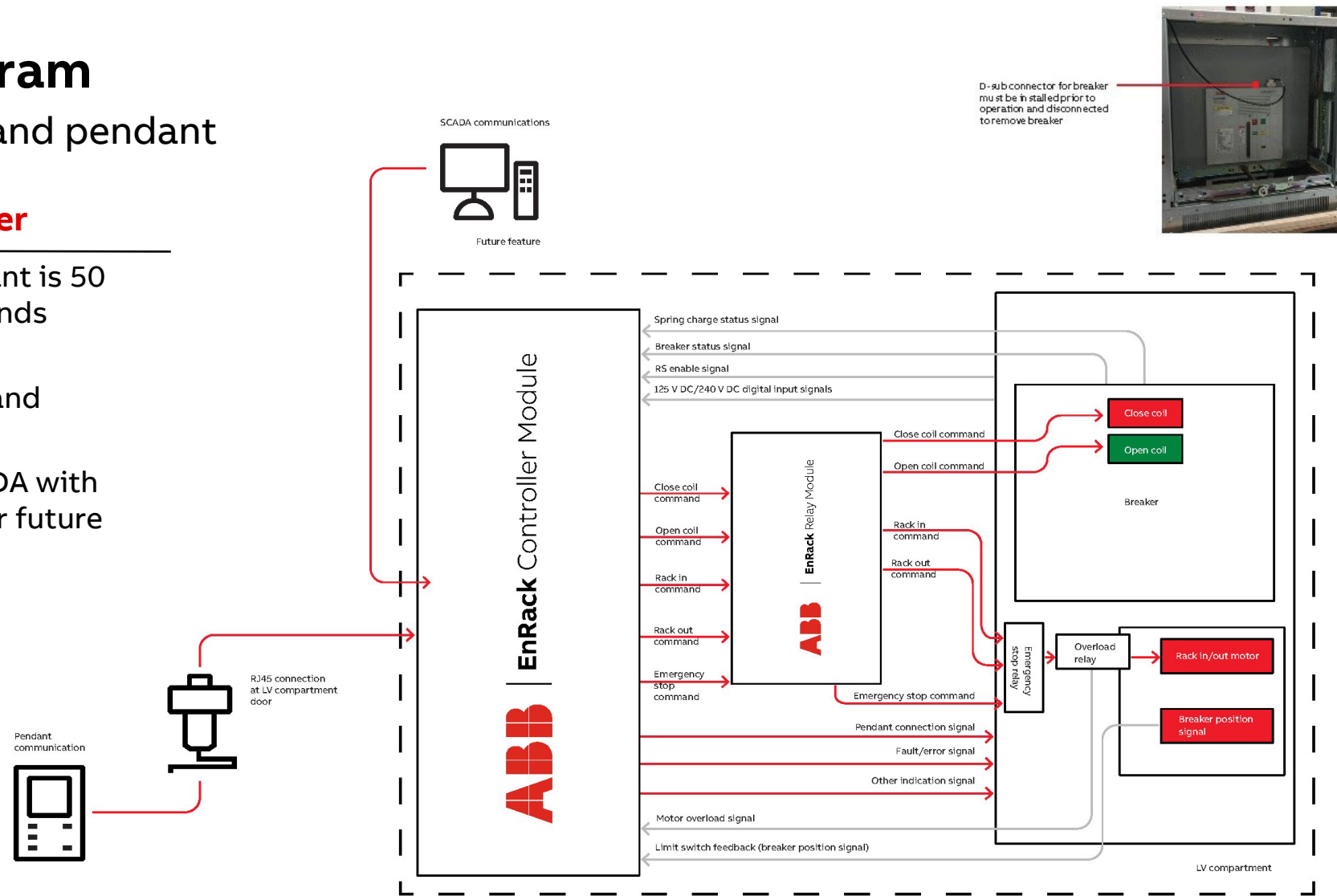
Ratings:	Controller module	Relay module	Pendant
Input power	24 Vdc, 0.35A	24 Vdc, 0.3A	24 Vdc, 0.1A
Digital inputs	260 Vdc, 15mA	24 Vdc, 0.05A	N/A
Digital outputs	260 Vdc, (max), 0.3A	260 Vdc, (max), 0.3A	N/A

# Connection block diagram

Control module, relay module and pendant

## How the components link together

- Cat 5E Ethernet cable between pendant is 50 ft and has RJ45 connectors on both ends (pendant and door)
- Cat 5E Ethernet cable between door and Controller module
- Addition of direct connection to SCADA with controller module will be made in near future



# EnRack – How to operate

## EnRack procedure

1. Ensure power supply to EnRack circuit is present
2. Insert one end of the 50 ft cable into the pendant and the other end into the LV door
3. Operator moves to stand-off position
4. Check pendant screen and note the breaker location and status
5. Ensure no error codes are displayed on the pendant screen
6. Press and hold permissive button while depressing the button for the action desired (i.e., rack in or rack out) Release both buttons after one (1) second
7. Monitor the progress on the screen
8. If further racking is needed, then repeat steps 5 - 7

## EnRack+ procedure

Follow steps 1-8 of basic EnRack procedure until breaker is in desired position, i.e., disconnect, test or connect

If close command is to be operated, ensure breaker is open and springs are charged on ADVAC breakers or capacitors are charged on AMVAC breakers (breaker ready indication on) and the breaker is in the test or connected position (will be indicated on display)

Press and hold permissive button while depressing the close button

If open command is to be operated, ensure breaker is closed and in the test or connect position (will be indicated on display)

Open and Close function is blocked when breaker is in the disconnect position

See User Manual 1VAL104601-TG for detailed procedures

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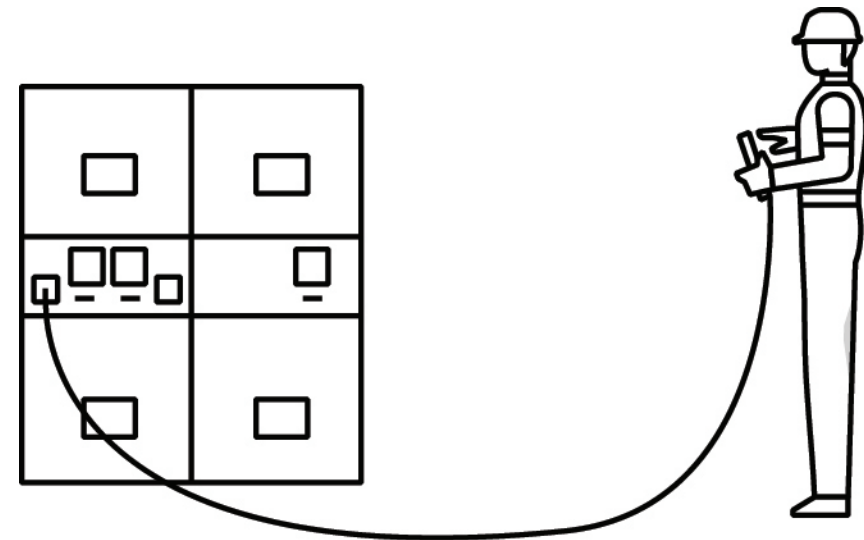
# Supporting documentation

Marketing collateral, technical guides, instruction manuals

## Documents

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- |   |               |
|---|---------------|
| – MV Switchgear Overview                            | 1VAL1001-RG   |
| – EnRack Flyer                                      | 1VAL104601-FL |
| – EnRack Service Manual (IOMM)                      | 1VAL104601-MB |
| – EnRack User Manual                                | 1VAL104601-TG |
| – External/Customer Presentation                    | 1VAL104601-PP |
| – Sample specification for Advance and Advance 27   | 1VAL107001-SS |
| – Sample specification for SafeGear and SafeGear HD | 1VAL108002-SS |



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# ANSI MV air insulated metal-clad switchgear

## Contact information

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