



Substation Automation Products

# Distributed busbar protection REB500

# Optimized protection for your switchyard

**REB500 IEDs provide reliable and proven busbar protection for different switchyard configurations. Additionally, by integrating a versatile selection of protection functions, REB500 IEDs protect the complete bay. This allows you to achieve optimized protection for your switchyard. Furthermore, REB500 is adaptable and scalable to your changing needs during the whole life cycle of your installation.**

The IEC 61850 enabled REB500 IED is designed to support different protection philosophies. You can create a distributed protection solution by assigning bay units into dedicated bay cubicles. In this distributed solution, the bay protection is assigned to separate bay units. Alternatively, you can integrate all necessary functionality into one cubicle.

The versatile hardware and distributed functionality of REB500 IEDs allows for application in all types of switchyard configurations such as single busbar, double and triple busbar including transfer bus, quadruple and 1½-breaker schemes.

## Stable and secure

REB500 detects all bus faults and feeder faults in solidly and low-impedance earthed power systems. It also detects all types of phase faults in isolated and compensated power systems.

REB500 busbar protection detects and operates selectively for all faults in the protected zone. At the same time it maintains complete stability for faults outside the protected zone.

The integrated overall check zone feature is independent of isolators' indications. This feature enables REB500 to remain stable in case the busbar replica is not valid.

REB500 is capable of protecting busbars in all circumstances. REB500 features a unique signal prolongation which enables continuous measurement and ensures correct operation of the busbar protection, even when the current transformers are heavily saturated during external faults. Two independent algorithms, stabilized differential current and directional current comparison, are utilized. This ensures correct operation of the busbar protection instead of blocking the protection function and leaving the busbar unprotected.

Additionally, REB500 maximizes the protected area within the substation in case the retrieved process data is not valid.

## Versatile protection application capabilities

In addition to low-impedance busbar differential protection, REB500 integrates a comprehensive back-up protection functionality as well as station protection as an option.



# Power system security ensured

Back-up protection includes both breaker failure and end-fault protection, which reduces the required wiring in the cubicle. Furthermore, less cabling is needed in the substation.

Station protection offers line distance protection and protection for 2- or 3-winding transformers integrated in bay units. Combined with busbar differential protection, a complete protection system can be built using one central unit and one or several bay units. The five zone line distance protection for phase-to-phase and phase-to-earth faults enables protection of different overhead line and cable applications using different system earthing principles.

## Distributed installation

REB500 busbar protection can be installed distributed, which means that the busbar protection functionality is divided into several IEDs placed in bay-specific cubicles. These cubicles can be located close to the primary process. The IEDs exchange information using a fiber-optic communication link. Due to the short distance between IEDs in bay-specific cubicles and the primary process, the length of cables can be significantly reduced. This in turn simplifies maintenance and testing.

## Easy access to substation information

REB500 IEDs gather vital process information and make it easily available for the user. For instance, disturbance information from each bay is available with a sampling rate of up to 2400 Hz. The information can be accessed via the local HMI of any of the REB500 IEDs in the protection system. Through REB500 IEDs, process data can be made available, for example, for substation automation systems over IEC 61850-8-1 to necessary actions.

Process data can also be accessed by connecting a PC to the IED using the HMI500 tool, or using a standard internet browser to read data available in the REB500 IED.

## Adaptable to changing needs

REB500 adapts to changing needs throughout the life cycle of the substation. The scheme of the protection system can easily be adapted according to changes in the substation by adjusting the parameters in the IEDs. As REB500 uses the low-impedance principle, no additional interposing CTs are required. Functionality of the IEDs can also be upgraded without the need to change hardware.

REB500 also offers flexible solutions at system extension. With its capacity of up to 60 feeders and up to 32 busbar zones, the REB500 busbar protection system can grow according to your needs. Using the bay models from the bay model catalogue of the HMI500 tool as a base simplifies extension of the system.

The HMI500 tool offers a comprehensive and easy-to-use graphical user interface for handling the distributed busbar protection REB500 throughout its life cycle. The Online Help function

adds to user comfort. The tool allows you to configure and set parameters for the complete station protection system.

The two variants of the tool have been optimized to provide the functionalities needed for different purposes. HMI500 Operation offers a wide range of functionalities, such as setting and retrieving parameters, event and disturbance handling, documentation of the configuration, and maintenance and testing of REB500. Password-based user management prevents access by unauthorized persons.

HMI500 Configurator offers functionality to fully configure the entire busbar protection application with REB500. The HMI500 Configurator tool utilizes a bay model catalogue. The catalogue consists of pre-configured bay models which allow you to maximize the working efficiency with the REB500 IED and the complete busbar protection system. The bay models are available for the most common busbar layouts such as single, double busbar with and without transfer bus as well as for triple busbar. The sophisticated compare configuration function provides detailed information about differences and changes made.

The HMI500 tool enables you to also create configurations based on the bay models. Furthermore shifting of bays or swapping the CT and breaker in couplers in existing configurations is supported.

## IEC 61850-enabled

REB500 supports ABB's Relion® protection and control product family by offering a reliable solution for distributed busbar protection with station protection capabilities. Being IEC 61850-enabled, REB500 communicates over IEC 61850-8-1 and seamlessly inter-operates with Relion IEDs in an IEC 61850-based system.

## Feature summary HMI500

Features	Operator	Configurator
Event monitoring	•	
Disturbance handling	•	
Read and write set file	•	
Online test	•	
Online monitoring	•	
Parameter setting	•	•
Signal matrix	•	•
Substation automation communication	•	•
Reports	•	•
Create application configuration		•
Import bay model		•
Adapt application configuration		•
Customize bay model		•

## REB500 configuration process



The workflow to create a typical configuration consists of four step.

## REB500 Technology summary:

### Main features

- Low-impedance busbar protection
- High functional reliability with
  - stabilized differential current
  - directional current comparison
- Low CT performance requirements
- High through-fault stability even in case of CT saturation
- Neutral current measurement for impedance-grounded networks
- No switching of CT circuits
- Flexible solutions at system extension
- Extensive self-supervision

### Installation

- Distributed protection solution with IEDs close to the feeders, with short connections to CTs, isolators, circuit breakers, etc.
- Centralized protection solution with IEDs in one cubicle
- Fiber-optic connections between central unit and bay unit IED
- Interference-proof data transfer with up to 1200 m length

### Scalability

- Up to 60 feeders (bay units)
- 32 busbar zones

### Most important back-up protection functions

- Breaker-failure protection
- End fault protection
- Definite time overcurrent protection
- Breaker-pole discrepancy
- Current release criteria
- Voltage release criteria
- Breaker-pole discrepancy
- Phase and ground overcurrent
- Directional sensitive earth fault

### Most important station protection functions

- Distance protection
- Power swing protection
- Teleprotection

- Transformer differential protection for 2- and 3 winding transformers
- Thermal overload
- Peak value Over/Undercurrent
- Peak value Over/Undervoltage
- Power protection
- Frequency protection

### Control

- Auto-recloser
- Synchrocheck

### Logic

- Binary logic and timer in the bay unit

### Monitoring

- Event recorder with a sampling rate of 1 ms
- Fault recorder with a sampling rate of 2400 Hz

### Measurements

- Output of relevant analogue measured (current, voltage, differential current)
- Currents in all bays, busbar through-going currents

### Communication

- LON
- IEC 60870-5-103
- IEC 61850-8-1

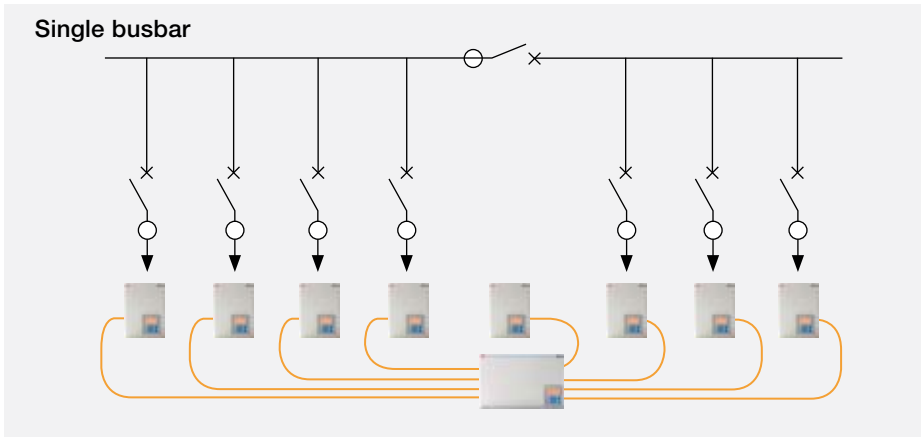
### Tool

- HMI500 Operator
- HMI500 Configurator

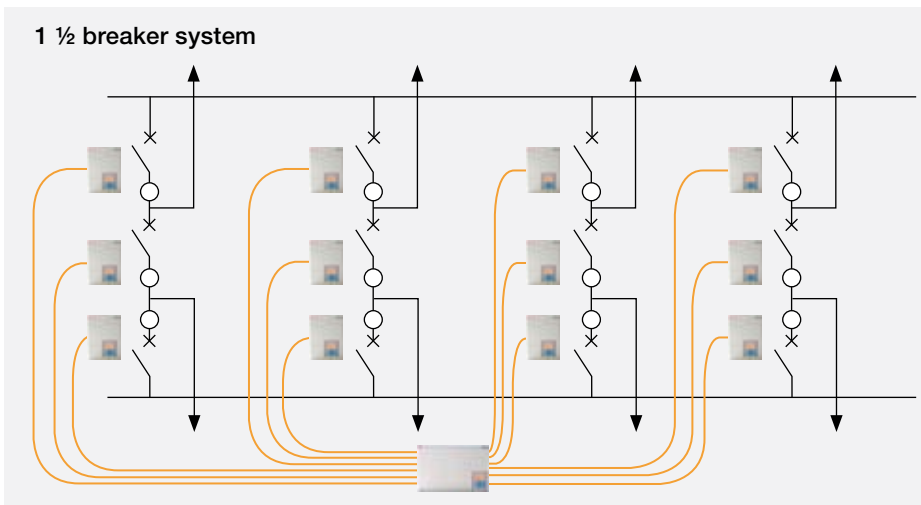
### Hardware

- 1 and 5 A rated currents transformers
- Supply voltages between 48 V DC and 250 V DC
- Nominal frequencies of 50, 60 and 16.7 Hz
- Redundant power supply

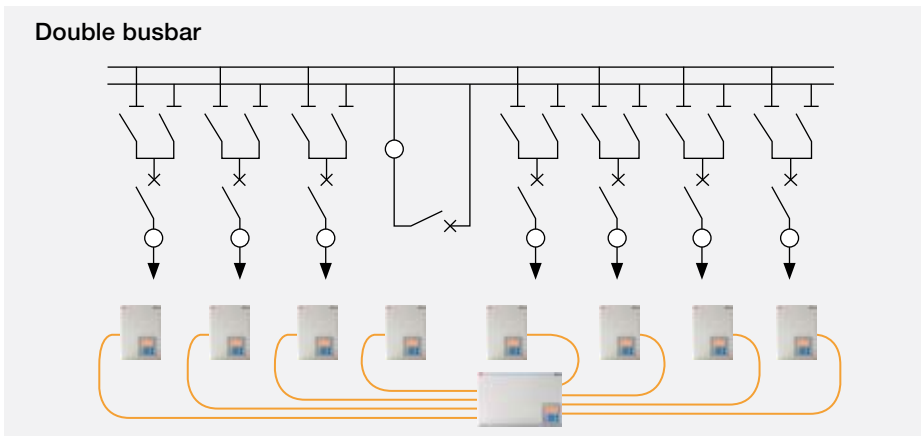
# Application examples



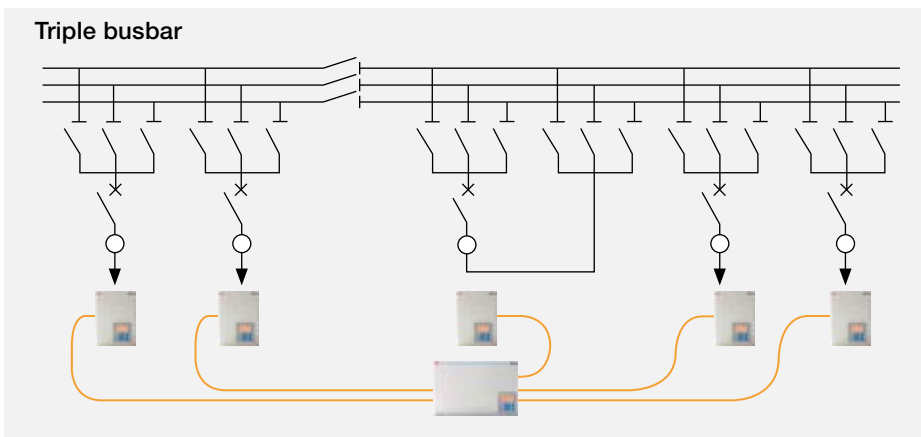
REB50 provides complete protection for single busbar arrangement.



REB50 provides complete protection for 1 ½ breaker system.



REB50 provides complete protection for double busbar arrangement.



REB50 provides complete protection for triple busbar arrangement.

# Contact us

## **ABB AB**

Substation Automation Products

SE-721 59 Västerås, Sweden

Tel. +46 21 32 50 00

Fax +46 21 14 69 18

[www.abb.com/substationautomation](http://www.abb.com/substationautomation)