

INGEPAC

EF BF

Breaker management



INGEPAC™ EF BF is the suitable solution for **breaker failure protection**, for one or three poles breakers, and also includes **auto-recloser** and **synchronism check**.

INGEPAC™ EF BF supports **dual CT inputs** to monitor both breakers individually, making it the best solution suitable for controlling **multibreaker schemes**, such as breaker and a half or ring applications.

Its design is compliant with all the requirements of the standards in the electrical sector, including **IEC 61850**. Besides having **powerful logging features**, it provides comprehensive, detailed information, making it possible to **monitor and analyse events**, these being fundamental elements in an electrical grid's improvement process.

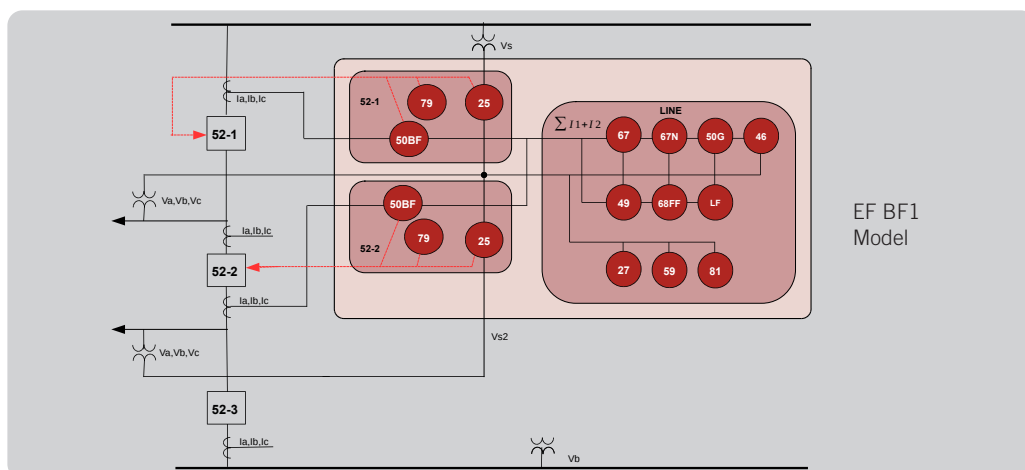


Software

All the equipment in the INGEpac™ family can be accessed using powerful software tools developed by Ingeteam and which run on Windows®.

The application software is specifically designed for simple and user-friendly access to the equipment.

INGESYS EFS



EF BF1 Model

General protection functions

- 27 Undervoltage
- 59 Overvoltage
- 59N Neutral overvoltage
- 47 V2 overvoltage
- Frequency (81M/m)
- Frequency rate of change (81R)
- 3x50/51 (67)
- 50N/51N (67N)
- 50G/51G Earthing overcurrent
- 46TOC (67Q), 46IOC (67Q)
- 46BC Broken conductor
- Second harmonic restraint

- 49 Thermal image
- 68FF Fuse failure

Breaker failure (50BF)

- Breaker failure with single-pole / three-pole trip
- Low current breaker failure

Fault locator

- Automatic operations**
- Synchrocheck
- Single-pole/three-pole recloser

Breaker monitoring

- k12 per pole
- Closing and trip circuit monitoring
- Excessive number of trips
- Dead line / open pole detector
- Breaker status logic
- Pole discrepancy

Data acquisition functions

- Phase and neutral current metering
- Active and reactive power

- Voltage measurements on the line side and busbar side (3/1)
- Incoming and outgoing active and reactive energy
- Chronological historical events and fault recording
- Oscillography
- Measurement historical report
- Breaker monitoring

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Ingeteam

Insulation and electromagnetic tests

· Dielectric withstand	IEC 60255-27
· Insulation resistance measurement	IEC 60255-27
· Voltage impulse	IEC 60255-27
· Electrostatic discharge immunity	IEC 61000-4-2
· Radiated radiofrequency electromagnetic field immunity	IEC 61000-4-3
· Electrical fast transient / burst immunity	IEC 61000-4-4
· Surge immunity	IEC 61000-4-5
· Immunity to conducted disturbances, induced by radiofrequency fields	IEC 61000-4-6
· Power frequency magnetic field immunity	IEC 61000-4-8
· Impulse magnetic field immunity	IEC 61000-4-9
· Damped oscillatory magnetic field immunity	IEC 61000-4-10
· Ripple on DC input power port	IEC 61000-4-17
· Damped oscillatory wave immunity	IEC 61000-4-18
· Voltage dips, short interruptions and voltage variations immunity	IEC 61000-4-29
· Power frequency immunity	IEC 60255-22-7
· Withstand to radiated electromagnetic interference from transceivers	IEEE 37.90.2
· Measurements of radiated and conducted radiofrequency disturbances	EN 55022

Climatic

· Cold	IEC 60068-2-1
· Dry heat	IEC 60068-2-2
· Change of temperature	IEC 60068-2-14
· Damp heat cyclic	IEC 60068-2-30
· Damp heat steady	IEC 60068-2-78
· External protection level	IEC 60529

Mechanical

· Vibrations	IEC 60255-21-1
· Shock and bump	IEC 60255-21-2
· Seismic	IEC 60255-21-3

Main features

- Different hardware options allow to define the most suitable configuration for the application
- Breaker failure protection for single-pole and three-pole breakers, for operating with own protection and external trip, and for application in breaker-and-a-half and ring schemes
- Transmission schemes backup protection: directional overcurrent, overvoltage, undervoltage, frequency, etc.
- Fault locator
- Automatic reclose with different timings for single-pole or three-pole trips and for application in breaker-and-a-half and ring schemes
- Synchronism checking functions for one or two breakers, depending on model
- Single protection and control, multi-protocol, native IEC 61850 platform
- Graphical and textual logic programming based on IEC 61131-3
- Chronological logging of events, fault reports, load curves and oscillography facilitates the complete analysis of events
- Measurement: current, voltage, power, power factor, energy, frequency, negative sequence current, demand maximeter, THD, fundamental values and RMS
- Front panel for setting and display: 4.9" monochromatic graphic display, programmable function keys with 2 LED each, 19 programmable LED and 1 fixed two-colour hardware status LED, numerical keypad, menu keys and 9 programmable graphics pages
- USB and RJ45 Ethernet ports on the front
- Communication protocols: IEC 61850 Ed.1 and 2, DNP 3.0, IEC 60870-5-103, IEC 60870-5-104, PROCOMÉ
- Synchronisation from communications protocols, SNTP, IEEE 1588 (PTP), demodulated IRIG-B input or PPS input
- Web server for monitoring and setting without needing additional software
- Cybersecurity features: sFTP, HTTPs, firewall, audit log, password accessing

Options

- Two housing types: 5U 1/2 x 19" rack and 4U 19" rack, which can contain the following modules in different configurations:
 - 11 digital inputs and 9 digital outputs
 - 16 digital inputs and 16 digital outputs
 - 16 digital inputs and 8 digital outputs
 - 32 digital inputs
 - 16 digital inputs and 8 analog inputs
 - 16 digital inputs and 8 analog inputs (4 isolated)
 - 8 digital inputs, 4 digital outputs and 4 High Break Current outputs
 - 8 digital inputs, 4 digital outputs and 4 High Speed-High Break Current outputs
 - 8 digital inputs and 8 digital outputs
- Selectable rear port connectivity:
 - Up to 6 serial communications
 - Up to 2 Ethernet communications
- Serial ports in glass fibre optic, plastic optic fibre, RS232 or RS485
- Ethernet ports in glass fibre optic or RJ45
- HSR or PRP and D-Link redundancy
- Captures analog measurements using Sampled Values (SV) protocol, through IEC 61850-9-2 or IEC 61869-9 standards
- Different models for auxiliary voltages most commonly found in electrical installations
- Remote inputs capturing and outputs using RIO modules.
- Redundant power supply

Applications

- Bay controller: local and remote operation, monitoring and metering
- Breaker failure protection in transmission and subtransmission lines for single, double or breaker and a half bays
- Backup protection for line differential and distance units
- Automatic reclosing for one or two breakers
- Synchronism check for one or two breakers
- Frequency load shedding
- Breaker monitoring
- User logic