

INGEPAC

EF CB

Capacitor bank protection and control



INGEPAC™ EF CB is a range of Intelligent Electronic Devices that provide all the protection and control functionalities required for Medium Voltage **shunt capacitor banks** of one, two or three steps.

Its design is compliant with all the requirements of standards in the electrical sector, including **IEC 61850**. INGEpac™ EF CB provides comprehensive and detailed information, by means of its **monitoring** and **events recording capabilities**, these being fundamental elements in an electrical grid's improvement process.

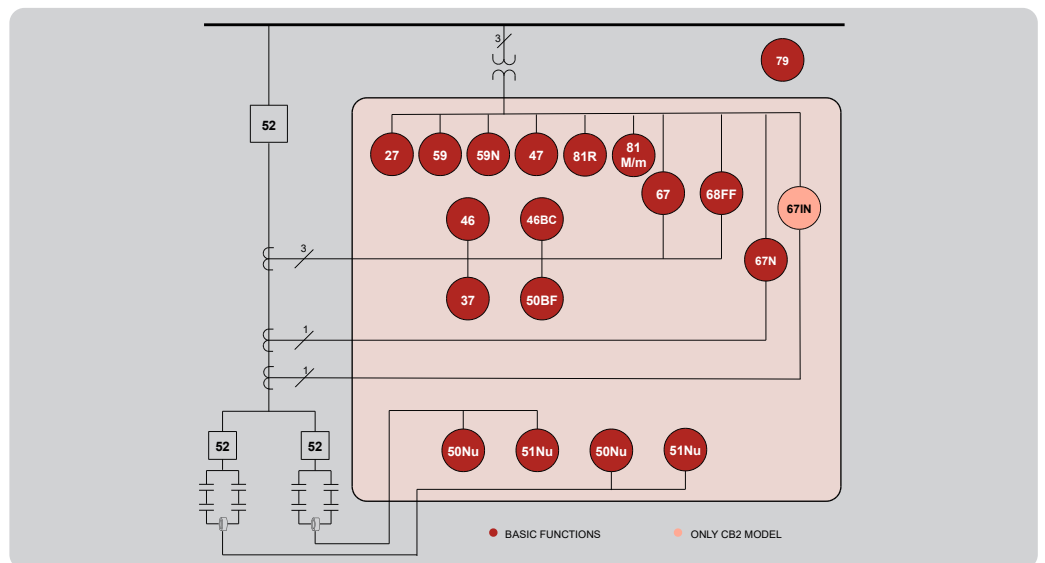


Software

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



Protection functions

50ND₁/51NU₁ Neutral 1 unbalance overcurrent
50ND₂/51NU₂ Neutral 2 unbalance overcurrent
50ND₃/51NU₃ Neutral 3 unbalance overcurrent (depending on the model)
3x50/51 (67)
50N/51N (67N)
46TOC (67Q), 46IOC (67Q)
46BC Open phase / Broken conductor

Monitoring units

37 Undercurrent
27
59
59N Zero sequence overvoltage
47 Negative sequence overvoltage
81M/m
81R ROCOF Rate Of Change Of Frequency
50BF Breaker failure

Automatic operations

67 Closing and trip circuit monitoring
68FF Excessive number of trips
79 Breaker status logic

Data acquisition functions

Phase and neutral current
Power factor

Phase-phase and phase-neutral voltage

Active and reactive power
Frequency
Maximeter
Active and reactive energy counters both directions
Chronological historical events and fault recording
Breaker monitoring
Oscillography
Measurements historical reports

Insulation and electromagnetic tests

· Dielectric withstand	IEC 60255-27
· Insulation resistance measurement	IEC 60255-27
· Impulse voltage	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

- Protection and control in one single device
- Wide range current inputs allowing the same device to be connected to 1 A and 5 A CT secondary
- Application software specifically designed for simple and user-friendly access to the equipment.
- Graphical and textual logic programming based on IEC 61131-3
- Chronological events record, fault reports, load curves and oscillography
- Historic measurements record, including currents (demand), voltage and power
- Six setting groups for instantaneously adapt the settings to changes in grid configuration without reset of the device
- Circuit breaker monitoring
- Metering: current, voltage, power, power factor, frequency, negative sequence current, demand maximeter, THD, fundamental values and RMS
- Active and reactive energy counters in both directions
- Trips, operation openings, energy cut off by the breaker and automatic reclosing operations totalizers
- Front panel with 4.9" monochromatic graphic display, programmable function keys with 2 LEDs each, 19 programmable LEDs and 1 fixed two-colour hardware status LED, numerical keypad and menu keys
- Digital inputs for control, automation and protection functions
- Digital outputs for control/tripping and signalling
- Ethernet communication RJ45 and USB ports on the front
- Automatic reclose
- Communication protocols: IEC 61850 Ed. 1 and 2, DNP 3.0, IEC 60870-5-103, IEC 60870-5-104, PROCOME
- Master Modbus-RTU communication
- 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 accesing

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 contact outputs
 - 8 digital inputs, 4 digital outputs and 4 high speed, high break contact outputs
 - 8 digital inputs and 8 digital outputs
- Selectable rear port connectivity: up to 6 serial communication ports, up to 2 Ethernet communication ports
- Serial ports in glass fibre optic, plastic fibre optic, RS232 or RS48
- Ethernet ports in glass optic fibre or RJ45
- HSR, 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
- Basic or extended control features
- IP54 front protection
- Nine programmable graphic pages in local display
- RIO module (remote input/output)
- Redundant power supply

Applications

- Grid automation
- Capacitor bank connection/disconnection automatic operation for correctly controlling the system's reactive power
- Capacitor bank protection and control
- Distribution feeder protection

