

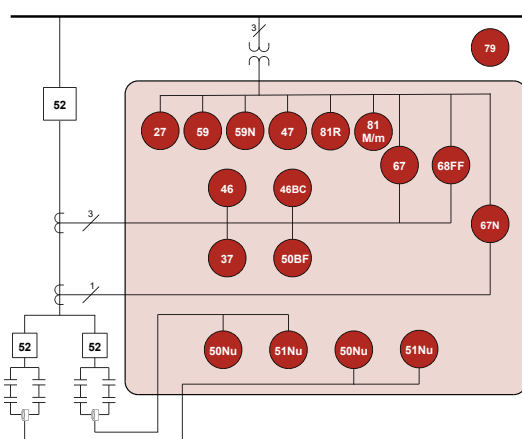
## Capacitor bank protection and control

**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 or two 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.

### Applications

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



#### Protection functions

50ND1/51NU1 Neutral 1 unbalance overcurrent  
50ND2/51NU2 Neutral 2 unbalance overcurrent  
3x50/51 (67), 50N/51N (67N)  
46TOC (67Q), 46IOC(67Q)  
46BC Open phase / Broken conductor  
37 Undercurrent  
27, 57, 59N, 47  
81M/m, 81 ROCOF  
49T Thermal overload protection RTD (with RTD module)  
50 BF Breaker Failure  
68 Fuse Failure  
79 Recloser  
Capacitor bank automatic connection/disconnection

#### Data acquisition

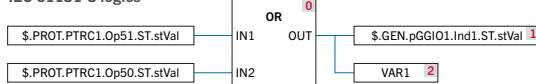
SOE (1000), faults (20)  
Oscillography (12 analog and 100 digital channels)  
Medidas: I, V, P, U, Q, f, T

#### Local HMI

4,9" display  
Graphical displays  
I/O/L/R pushbuttons  
19 LEDs  
Keyboard



#### IEC 61131-3 logics



#### Synchronization

IEEE 1588 v2  
IRIG-B  
SNTP

#### Communications

Protocols: IEC 61850, IEC 60870-5-103/104, DNP3, Modbus, PROCOM  
Redundancy: PRP, HSR, D-link failure, switch mode  
Web services: HTTP/HTTPS, FTP/sFTP, SSH

## INSULATION AND ELECTROMAGNETIC TESTS

Electromagnetic compatibility requirements	IEC 60255-26
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
Immunity to conducted, common mode disturbances	IEC 61000-4-16
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
Withstand to radiated electromagnetic interference from transceivers	IEEE 37.90.2

## CLIMATIC TESTS

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 TESTS

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

## MAIN FEATURES

High precision in direct measurements (class 0.2 in currents and voltages)

Wide range current inputs allowing the same device to be connected to 1 A and 5 A CT secondary

Through the front USB you can access the equipment to retrieve reports and equipment CID, load an external CID, load the firewall configuration or update the equipment firmware

Synchronization from communications protocols, SNTP, IEEE 1588 v2 (PTP), demodulated IRIG-B input or PPS input, pacFactory or display

Web server for monitoring and setting without needing additional software

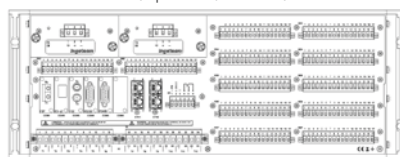
Cybersecurity features: sFTP, HTTPs, firewall, audit log, password accessing, RBAC, LDAP, session management...

Acquisition of Sampled Values as per IEC 61869-9 (NCIT) and IEC 61850-9-2LE (SAMU) standards (optional)

## HARDWARE OPTIONS

### Mounting options

- 19" 4U rack (up to 6 I/O slots)



- 1/2 x 19" 5U rack (up to 2 I/O slots)



### Optional

- High break contact outputs
- High speed outputs

### Optional IP54 front protection

### Boards options

- CPU: 6 DI + 4 DO
- 11 DI + 9 DO
- 32 DI
- 16 DI + 8 DO
- 16 DI + 16 DO
- 16 DI + 8 AI (mA)
- 8 DI + 8 DO
- 11 RTD + 4 AO
- 100 Ω platinum, 100 Ω nickel, 120 Ω nickel, 10 Ω copper

### Communication ports

Front:

- RJ45
- USB

Rear:

- Up to 2 Ethernet (FO or RJ45)
- Up to 6 serial (FO, RS232, RS485)

### Power supply

- 24, 48, 125 and 220 Vdc
- Power: 40 W
- Optionally redundant power supply

## SOFTWARE

All the devices in the INGEpac™ product range can be accessed using powerful software tools developed by Ingeteam which run on Windows®

Application specifically designed for simple and user-friendly access to the equipment

**INGESYS eFS**

