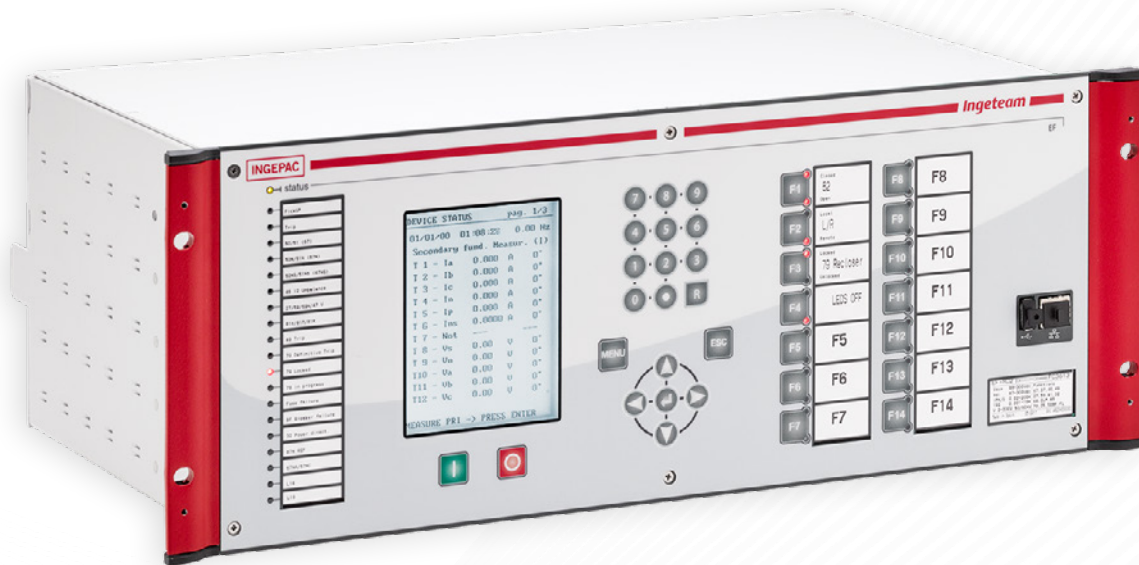




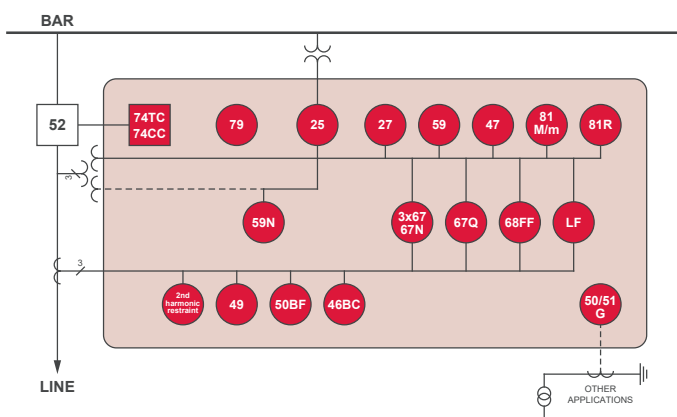
Breaker management

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**.

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.

Applications

- Bay controller: Local and remote operation, monitoring and metering
- Breaker failure protection in transmission and subtransmission lines
- Backup protection for line differential and distance units



Protection functions

Breaker failure with single-pole / three-pole trip
 Low current breaker failure
 3x50/51 (67), 50N/51N (67N)
 50G/51G
 46TOC (67Q), 46IOC(67Q)
 46BC Broken conductor
 50 CSC Second harmonic restraint
 27, 59, 59N, 47
 81M/m, 81 ROCOF
 25 Synchrocheck
 79 Single-pole/three-pole recloser
 Fault Locator
 Breaker monitoring

Data acquisition

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

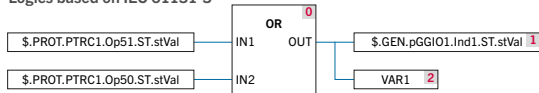
Synchronization

IEEE 1588 v2
 IIRIG-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

Logics based on IEC 61131-3



Local HMI

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



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

Breaker failure protection for single-pole and three-pole breakers, for operating with own protection and external trip

Automatic reclose with different timings for single-pole or three-pole trips

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

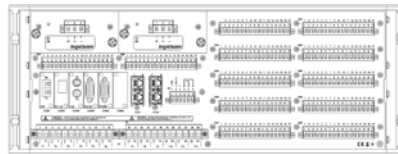
Web server for monitoring and setting without needing additional software

Cybersecurity features: sFTP, HTTPs, firewall, audit log, password accessing, etc.

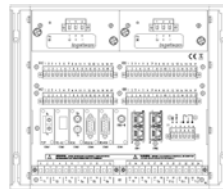
HARDWARE OPTIONS

Mounting options

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



- ½ 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