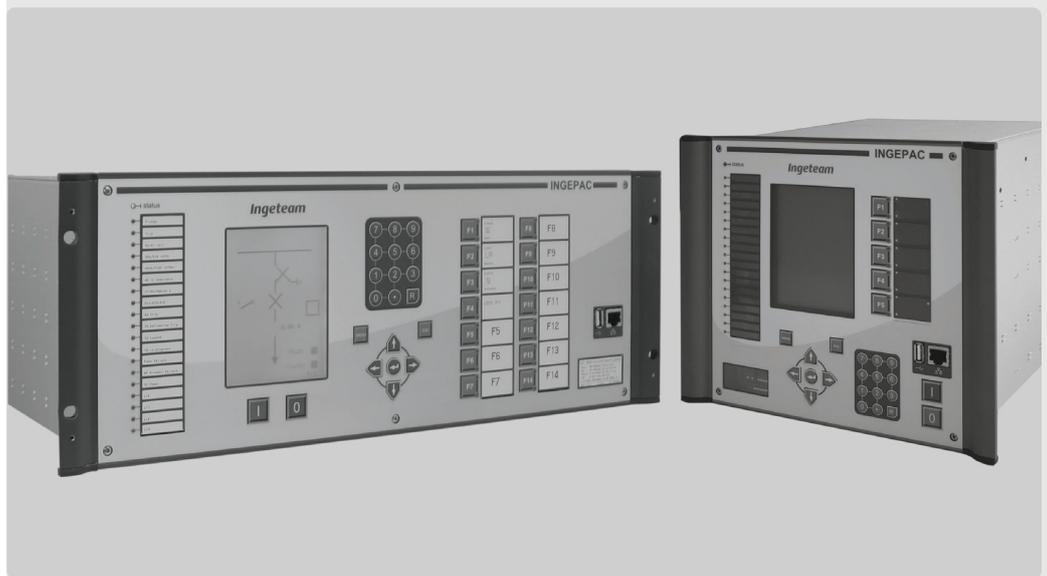


# INGEPAC

# EF ZT

## Distance protection and control relay



INGEPAC® EF/ZT equipment is the perfect solution for main protection and control in single and double overhead transmission and undertransmission lines, and single, double busbar and breaker and half configurations

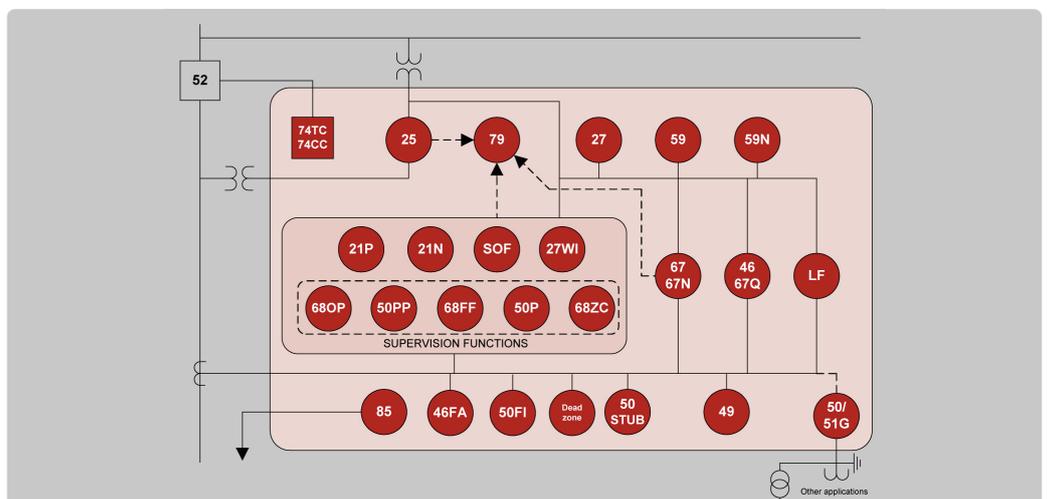
Its design is compliant with all the requirements of standards in the electrical sector, including IEC 61850. Besides having powerful logging features, it provides comprehensive, detailed information, making it possible to monitor and analyse events, these being fundamental elements in an electrical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

### Software

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

**INGESAS EFS**

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



#### Distance Functions

- Quadrilateral (5 areas).
- MHO (5 areas).
- 21 High speed
- Zone 1 extension
- Double line adaptation
- Serial compensation line adaptation

#### General Protection Functions

- SOTF Switch onto fault
- 27 Undervoltage
- 59 Overvoltage
- 59N Neutral overvoltage
- 47 V2 overvoltage protection
- Frequency (81M/m)
- Frequency rate of change (81R)
- 3x50/51 (67)
- 50N/51N (67N)

- 50G/51G. Earthing overcurrent.
- 46TOC (67Q), 46IOC(67Q)
- 46BC Open phase
- 50CSC Second harmonic breaking
- 37 Undercurrent
- 49 Thermal image
- 32 Power units
- Stub bus

- Teleprotection**
- Teleprotection (21)
- Teleprotection (67/67Q)

- Monitoring Units**
- 68ZC Load encroachment
- 68FF Fuse failure

- Power swing
- Fault locator**
- Fault locator

#### Breaker Monitoring

- kl2 breaker monitoring per pole
- Closing and trip circuit monitoring
- Excessive number of trips
- Dead line / open pole detector
- Breaker status logic
- Pole discordance

#### Breaker failure (50BF)

- Breaker failure with single-pole / three-pole trip

#### Automatic Operations

- Synchronism
- Recloser

#### Data Acquisition Functions

[www.ingeteam.com](http://www.ingeteam.com)  
[ingepac.info@ingeteam.com](mailto:ingepac.info@ingeteam.com)

# Ingeteam

## Insulation and Electromagnetic Tests

· Dielectric strength	IEC 60255-5
· Insulation resistance	IEC 60255-5
· Impulse voltage	IEC 60255-5
· 1 MHz damped wave immunity test	IEC 60255-22-1
· Immunity to industrial frequencies	IEC 60255-22-7
· Leakage current	IEC 60255-27
· Electrostatic discharge immunity test	IEC 61000-4-2
· Immunity to radiofrequency radiated fields	IEC 61000-4-3
· Fast transient burst immunity	IEC61000-4-4
· Surge pulses immunity test	IEC 61000-4-5
· Immunity to radiofrequency induced signals	IEC 61000-4-6
· Harmonics	IEC 61000-4-7
· Immunity to 50Hz magnetic fields	IEC 61000-4-8
· Immunity to pulsing magnetic fields	IEC61000-4-9
· Immunity to damped oscillatory magnetic fields	IEC 61000-4-10
· Immunity to interruptions and dips in DC power supply	IEC 61000-4-11
· Ripple immunity in DC power supply	IEC 61000-4-17
· Damped oscillatory waves immunity	IEC61000-4-18
· Immunity to interruptions, dips and variations in DC power supply	IEC 61000-4-29
· Radioelectrical emissions	EN 61000-6-4
· Earth continuity	IEC 61131-2

## Climatic

· Cold low temperature test	IEC 60068-2-1
· Dry heat test	IEC 60068-2-2
· Thermal shock	IEC 60068-2-14
· Humid heat, cyclical test	IEC 60068-2-30
· Humid heat continuous test	IEC 60068-2-78
· External protection level	IEC60529

## Mechanical

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

## Main features

- Different hardware configuration variants allowing you to define suitable equipment for the application.
- 5 separate areas of action with mho and/or quadrilateral characteristics in each of them. Direction can be selected for each area: forward, reverse or non-directional
- Analysis per phase combination (AN,BN,CN,AB,BC,CA), characteristics (Quadrangular and Mho) and area of action.
- Single-phase or three-phase triggers and applicable with or without teleprotection schemes.
- Backup units; overcurrent, overvoltage, undervoltage, frequency, etc.
- Distance units supervision; power oscillation, load area, fuse failure, etc.
- Adaptation to lines with capacitive voltage transformers (CVT).
- Fault localiser for reducing down times.
- Automatic operations: recloser, synchronism.
- Single protection and control, multi-protocol, native IEC 61850 platform
- Graphic and textual programming for operation logic based on IEC61131-3.
- Chronological logging of events, failure reports, load curves and oscillographs 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 LEDs each, 19 programmable LEDs and 1 fixed two-colour hardware status LED, numerical keypad, menu keys, and 9 programmable graphics pages.
- Up to 6 serial and 2 Ethernet rear ports
- Ethernet RJ45 and USB ports on the front
- Equipment synchronisation through NTP server, demodulated IRIG-B or from global references via communications protocols.
- Web server for monitoring and adjustments without needing in-house tools.

## Options

- Two housing types: 1/2 x 19", 5U rack and 19", 4U 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 and 8 digital outputs
- Selectable rear port connectivity:
  - Up to 6 serial communications
  - Up to 2 Ethernet communications
- Serial ports in glass optic fibre, plastic optic fibre, RS232 or RS485
- Protocols: IEC 61850, PROCOME, DNP3.0
- Ethernet ports in glass optic fibre or RJ45
- HSR,PRP or link failover redundancy
- Different models for auxiliary voltages most commonly found in electrical installations.
- RIO module capturing (remote inputs and outputs).
- Redundant power supply source.
- Up to 2 teleprotection ports that comply with C37.94 or G.703 standards.

## Applications

- Primary or secondary protection for cables, overhead or mixed lines in transmission and undertransmission grids.
- Redundant or double protection schemes as main unit.
- Backup with another distance protection, line differential protection or overcurrent directional protection.
- Grid Automation

