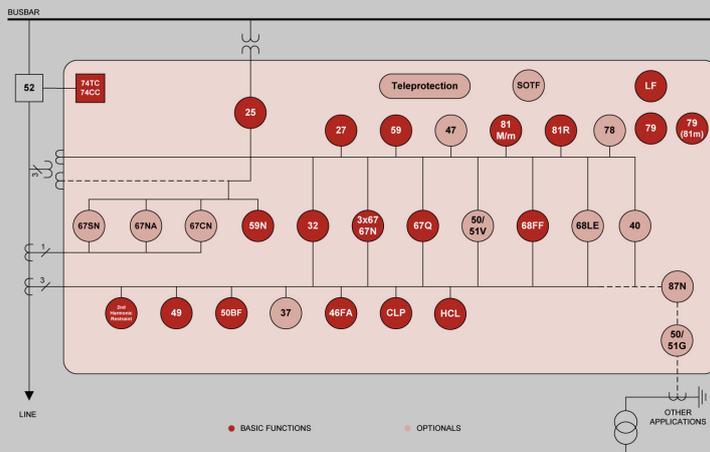




The INGEpac EF MD family is composed of multifunctional protection and control devices for high and medium voltage positions. Its design is compliant with all the requirements of standards in the electrical sector, including IEC 61850. Besides having powerful logging features, it provides comprehensive, detailed information, making it possible to monitor and analyse events, these being fundamental elements in an electrical grid's continuous improvement process.



Software

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

INGESAS EFS

Protection Functions

SOTF Switch onto fault
 27 Undervoltage
 59 Overvoltage
 59N Neutral overvoltage
 47 V2 overvoltage protection
 Frequency (81M/m)
 Frequency rated of change (81R)
 3x50/51 (67)
 50N/51N (67N)
 50NS/51NS. (67NS) Sensitive neutral overcurrent
 50G/51G. Earthing overcurrent.
 67IS Isolated neutral directional
 67IS Compensated neutral directional
 46TOC (67Q), 46IOC(67Q)
 46BC Open phase
 50CSC Second harmonic restraint
 37 Undercurrent

49 Thermal image
 32 Power units
 78 Vector shift r
 Field loss
 HCL
 Cold load pickup
 50V/51V supervision
 87N Restricted earth
Teleprotection
 Teleprotection (67/67Q)
Monitoring Units
 68LE Load encroachment
 68FF Fuse failure
Fault locator
Breaker Monitoring
 k12 breaker monitoring per pole
 Closing and trip circuit monitoring
 Excessive number of trips
 Dead line / open pole detector

Breaker status logic
 Pole discordance
50BF Basic breaker failure
Automatic Operations
 Synchronism
 Recloser
 Frequency recloser
Data Acquisition Functions
 Phase and neutral current metering
 Phase and synchronism voltage metering
 Active and reactive power
 Active and reactive energy
 Chronological historical event, incident and fault recording
 Switch monitoring
 Oscillography
 Metering logs

Insulation and Electromagnetics

· 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	IEC 61000-4-4
· 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	IEC 60529

Mechanical

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

Main features

- Single protection and control platform
- IEC 61850 native platform
- Extensive dynamic range in current inputs, enabling connection to 1A and 5A current transformers.
- Graphic and textual programming for logic based on IEC61131-3.
- Complementary functions for responding to primary element failures (breaker failure and winding supervision).
- Measurement log for current (demand), voltage and powers, allowing you to obtain load curves.
- 6 setting groups, making it possible to instantaneously re-program the equipment when the grid's conditions are re-configured.
- Equipment synchronisation from a global reference through the communications protocol or the demodulated IRIG-B input protocol.
- Measurement: Current, voltage, power, power factor, frequency, negative sequence current, demand maximeter, THD, fundamental values and RMS.
- Bi-directional active and reactive energy counters.
- Operation counters: trips, operation openings, energy cut off by the switch and automatic reclosure.
- Local interface with graphic display, LEDs and programmable buttons.
- 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 outputs for control/tripping and signalling.
- Ethernet RJ45 and USB ports on the front.
- IEC 61850 communications and serial protocols.
- Web Server
- Applicable in redundant grids

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
- Ethernet ports in glass optic fibre or RJ45
- Protocols: IEC 61850, PROCOME, DNP3.0
- HSR, PRP and link failover redundancy
- Different models for auxiliary voltages most commonly found in electrical installations.
- Basic protection and control equipment or extended protection and control equipment
- IP54 lid
- 9 programmable graphics pages in the local interface.
- Teleprotection
- RIO module sensing (remote input/output)
- Redundant power supply source.

Applications

- Distribution line control and protection for earthed, compensated and isolated neutral grids.
- Backup protection for transmission lines with the option of teleprotection schemes for 67 and 46Q functions.
- Busbar backup protection
- Subfrequency load shedding
- Backup protection for transformers, generators, motors.

