

# INGEPAC

# EF CD

## Control and Measurement Terminal



The INGEpac EF CD family is composed of control and measurement equipment for high and medium voltage positions.

Its design is compliant with all the requirements of standards in the electrical sector, including IEC 61850. It offers comprehensive local control for electrical positioning, measurement, bay level automatic operations and access to the position from the IEC 61850 network.

#### Current Measurement.

IA, IB, IC  
Average I  
IN  
IA, IB, IC (fundamental)  
IN (fundamental)  
THD I phase A, phase B, phase C  
Average THD I  
Neutral THD I  
I0, I1, I2

#### Voltage Metering

VA, VB, VC  
Average V  
VN  
VA, VB, VC (fundamental)  
VN (fundamental)  
VAB, VBC, VCA  
Average composed U  
THD V phase A, phase B, phase C  
Average THD V  
Neutral THD V  
V0, V1, V2  
Frequency

#### Power Measurement

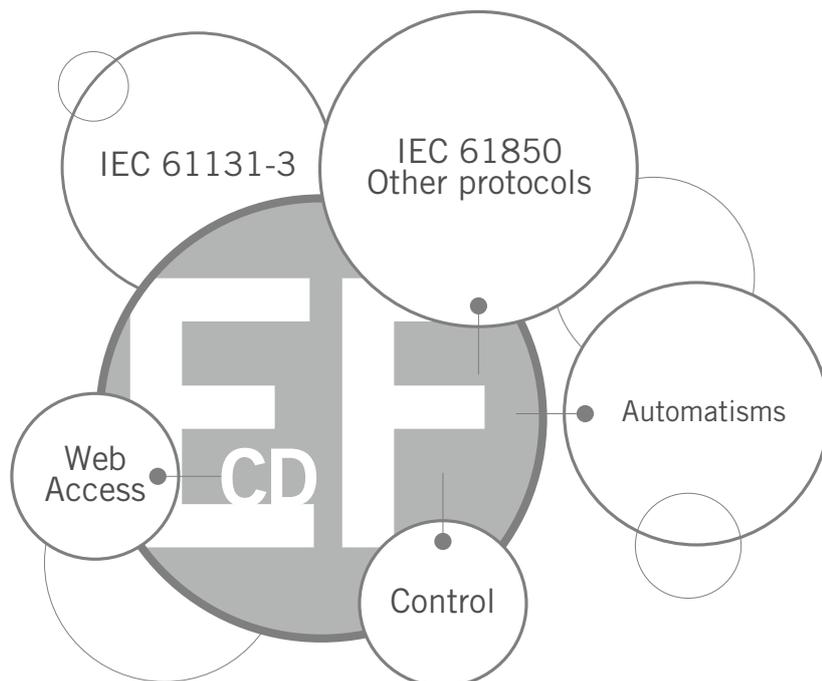
P(ActivePower)  
Q(ReactivePower)  
S(ApparentPower)  
P(Active P.) phase A, B and C  
Q(Reactive P.) phase A, B and C  
S(Apparent P.) phase A, B and C  
Cosine phi phase A rms  
Cosine phi phase B rms  
Cosine phi phase C rms  
Cosine phi rms average  
ActivePower (fund)  
ReactivePower (fund)  
ApparentPower (fund)

Active P phase A, B and C (fund)  
Q Reactive phase A, B and C (fund)  
S Apparentphase A, B and C (fund)  
Cosine phi phase A (fund)  
Cosine phi phase B (fund)  
Cosine phi phase C (fund)  
Cosine phi average phase (fund)

#### 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



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# Ingeteam

## Insulation and Electromagnetics

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

## Climatic

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

## Mechanical

· Vibrations test	<b>IEC 60255-21-1</b>
· Shock and bump test	<b>IEC 60255-21-2</b>
· Seismic tests	<b>IEC 60255-21-3</b>
· Shock and bump test	<b>IEC 60255-21-2</b>
· Seismic tests	<b>IEC 60255-21-3</b>

## Main features

- IEC 61850 native platform
- Extensive dynamic range in current inputs, enabling connection to 1A and 5A current transformers
- Application software specifically designed for simple and user-friendly access to the equipment.
- Graphical and textual logic programming based on IEC 61131-3.
- Different hardware configuration variants allowing you to define suitable equipment for the application.
- Measurement log for current (demand), voltage and powers, allowing you to obtain load curves.
- Equipment synchronisation from a global reference through the communications protocol or the demodulated IRIG-B input protocol.
- 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 inputs for control functions or automatic functions.
- Digital outputs for control/tripping and signalling.
- Ethernet RJ45 and USB ports on the front.
- Up to 6 serial and 2 Ethernet rear ports.
- 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.
- RIO module sensing (remote input/output)
- Synchronism verification
- Redundant power supply source

## Applications

- Grid Automation
- User-defined automatic operations (interlockings, automatic sequences, alarms, signal grouping, etc.).
- Local and/or remote signalling, control and measurement of the substation's electrical position for any voltage level.
- Signalling, control and measurement for the substation's ancillary services.
- Control and measurement for breaker and a half configurations.

