



## Stand-Alone Merging Unit

INGEPAC EF PB is the family of devices that Ingeteam has designed as a SAMU (Stand-Alone Merging Unit); the device acquires conventional transformer currents and voltages (CT and VT), and **converts them into digital values**, transmitting them to an Ethernet network, also called **process bus**.

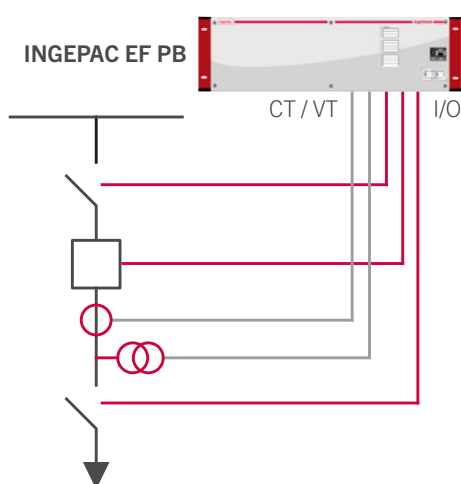
The data is published as **Multicast Sampled Values (MSV)**, complying with the **IEC 61850-9-2** or **IEC 61869** standard.

Merging units do not only **notably reduce expenses** derived from conventional cabling (installation, maintenance, etc.), but also allow **accessing to captured information** from any IED connected to the network, quickly, efficiently and reliably.

Additionally, INGEpac EF PB allows you to include **I/O modules** that allow **GOOSE transmission/reception** in accordance with the **IEC 61850-8-1** standard.

### Applications

- Conversion to conventional voltage or current transformer sampled values
- Remote inputs/outputs



#### Protection functions

Multicast Sampled Values emitter IEC 61850-9-2LE or IEC 61869  
Communications supervision, device power supply, temperature, etc.  
Binary inputs and outputs

#### Data acquisition functions

SOE (1000)  
Oscillography (12 analog and 100 digital channels)  
Measurements: I, V, P, U, Q, f, T  
Sags and swells, THD, harmonics (15) (only INGEpac EF PBQ models)

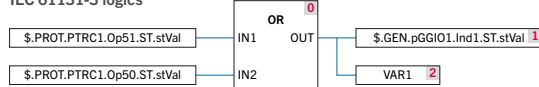
#### Communications

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

#### Synchronization

IEEE 1588 v2  
PPS  
IRIG-B  
SNTP

#### IEC 61131-3 logics



## 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

Reduction in installation costs, related to the reduction in cabling

Fewer windings needed for CTs and VTs given that the sampled values are captured by one or more IEDs

Improves substation maintenance, facilitating relay replacements without the need to change panel cabling given that it is minimal

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

Web server for monitoring and setting without needing additional software

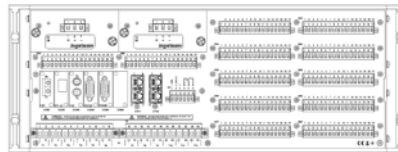
Communication status monitoring

Cybersecurity features: sFTP, HTTPs, firewall, audit log, password accessing, RBAC, LDAP (Lightweight Directory Access Protocol), session management, etc.

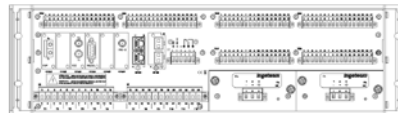
## HARDWARE OPTIONS

### Mounting options

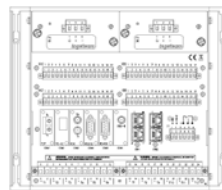
- 19" 4U rack (up to 6 I/O slots)



- 19" 3U rack with 2 I/O slots



- ½ x 19" 5U rack (up to 2 I/O slots)



### Optional

- High break contact outputs
- High speed outputs

### 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

### 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

### Optional IP54 front protection

### Front panel or surface mounting

## 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**



CYBERSECURITY