TMU 220

Transformer Monitoring Unit

About TMU 220

The **TMU 220** is an advanced solution for the aggregation and correlation of information from different sources, specially designed to be part of a power transformer asset management system.

With a wide variety of physical input types as well as several Client/Master communication protocols, the **TMU 220** can gather information from all types of sensors. From simple temperature probes, level and pressure sensors to more complex ones like partial discharge readers and DGA (Dissolved Gas Analysis) devices.

The **TMU 220** comes with integrated interpretation algorithms, built-in alarms, control capabilities and statistics and recording functions. For added functionality and flexibility the **TMU 220** also provides open IEC 61131-3 programming, user defined alarms and programable function keys.

Despite the added value of advanced functionality and flexibility, **TMU 220** is a cost-effective aggregator, carefully designed for integration with multiple sensor vendors, easy installation and straightforward configuration and management.

Key Features

- Determine overload capacity and expected remaining lifetime
- Hot spot and winding temperatures calculation
- Flexible DGA interpretation depending on available measurements
- Supervision of key components such as bushings, partial discharges, cooling system and OLTC with configurable alarms
- Statistics on all values (temperatures, gas, load)
- Trend, event, and disturbance recording
- Integrated webserver
- Multiple communication protocols including IEC 61850 Server and GOOSE
- State-of-the-art configuration and management software

Costumer Benefits

- Reliability and security
- Improved QoS
- Easy configuration, commissioning, installation and maintenance
- Easy system integration through multiple communication protocols and WAN interfaces
- High-accuracy measurement, recording and monitoring
- Extended benefits through FDIR, advanced distributed automation and asset management systems
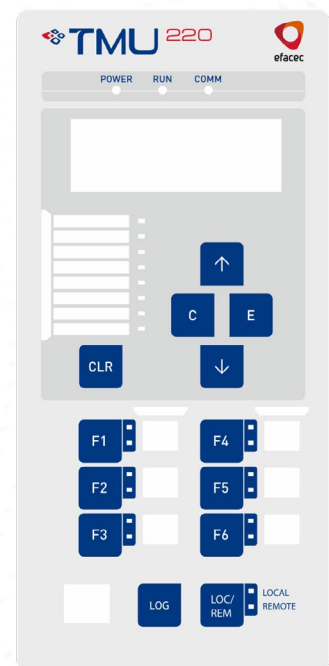
IEC 61131-3 flexible programming

IEC 61850 open design

efacec Empowering the future

Functions

Power Transformer Monitoring Algorithms

Besides aggregating data from different sensors and correlating them, the **TMU 220** aggregator also has built in interpretation algorithms that calculate meaningful information about the transformer health.

Recording

The **TMU 220** includes a general purpose event recorder that can store up to 25 000 events of any data source.

Disturbance records are stored in native COMTRADE format including both analogue and digital information for up to 100 records. Fault reporting function stores a summary of each power system incident, aggregating relevant data for post-mortem analysis.

In addition to event and fault/disturbance recorders, a general purpose trend recorder is available to generate load diagrams or other statistical/trend data. All data is kept is non-volatile memory.

Measurement and Monitoring

The **TMU 220** provides up to 6 voltage inputs and 6 current inputs, enabling continuous monitoring of both sides of the transformer. Three-phase measurements (voltage, current, power, energy, etc.) are some of the built-in monitoring functions.

Functions

Control and Supervision		IEC 61850
Power Transformer Supervision	• (1)	SPTR, YPTR
Transformer Oil Supervision	• (1)	SIML
Bushings Supervision	• (4)	
Tap Changer Control /Supervision	• (1)	YLTC
Cooling System Control /Supervision	• (6)	CCGR
Transformer Protection Supervision	• (1)	SPTR
Partial Discharges	• (3)	SPDC
Distributed Automation	•	GGIO (or user defined)
Programmable Automation (IEC 61131-3)	•	GAPC (or user defined)
Monitoring, Measurement and Metering		
Three-Phase Measurements	○ (2)	MMXU/MSQJ
Single-Phase Measurements	○ (2)	MMXN
Statistics	•	MMXU (or user defined)
Recording and Reporting		
Disturbance Recorder	•	RDRE
Chronological Event Log /SOE	•	
Load Diagram /Trend Recorder	•	
Histogram	•	
Self-Tests and Watchdog	•	

• Base feature | ○ Optional feature | (n) Maximum number of instances

Hardware

The **TMU 220** is a 1/2 rack 19'' IED with detachable HMI, up to 16 AC inputs, 24 DC inputs, 24 RTD inputs, 104 digital inputs and 32 digital outputs, supporting sensors from multiple manufacturers.


TMU 220 1/2 rack hardware interfaces
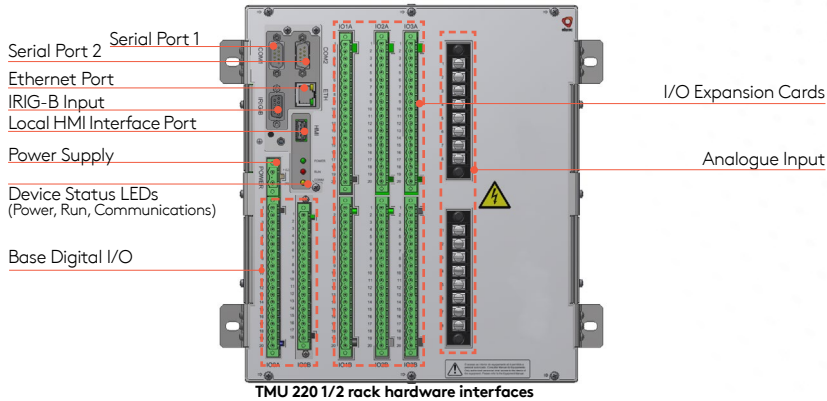
The **TMU 220** was designed according to European and US international standards, and tested by independent labs. This product is also CE Marked according to the applicable European Directives, namely the Low-Voltage (LVD) Directive 2006/95/EC, as well as the EMC Directive 2004/108/EC.

Interfaces

Built-in and Web-based User Interface

The local user interface is detachable, providing multiple enclosure integration options, and includes a 20x4 alphanumeric LCD and keypad for IED information access, change of settings, and operation status indication. Fully programmable alarm LEDs and function keys provide additional shortcuts to status indications and user operations.

TMU 220 user interface detachable panel
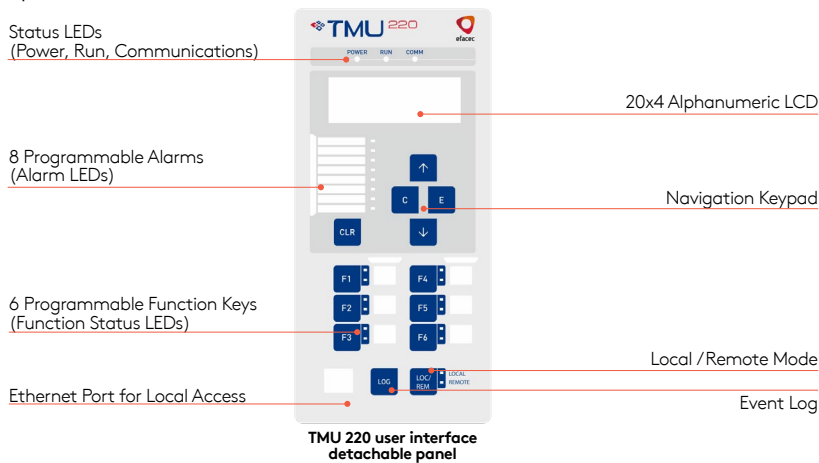
Complementary to the local interface the **TMU 220** provides IP connectivity options for the engineering toolset as well as an embedded webserver where all local operations are available as well as access to status, SOE and disturbance records. This allows straightforward device operation and management either locally or remotely (depending on WAN connectivity options).

Communication Interfaces and Protocols

The **TMU 220** supports multiple communication options, enabling the integration with intelligent sensors and with a central asset management system. All communication interfaces include extensive self-monitoring, including online data and statistics. Cyber security features such as software and firmware protection, authentication and encrypted communication between IED and external access (systems, tools, web browsers) for selected protocols are included.

Input/Outputs

Base I/O	
8 DI + 8 DO	●
Expansion	
AC Analogue Inputs Slots (up to 2 cards)	
8 CT	□
4 CT + 4 VT	□
Expansion Board Slots (up to 3 cards)	
16 DI Expansion Card	
32 DI Expansion Card	
8 DI + 8 DO Expansion Card	□
8 DC Analogue Inputs Card	
2 DC Analogue Outputs + 8 RTD Inputs Expansion Card	

- Base feature
□ Optional mutual-exclusive feature

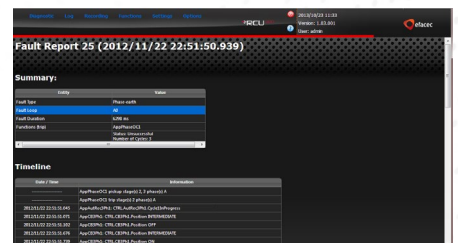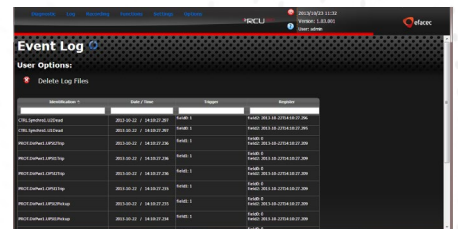## Power Supply

24/48 V d.c. (19 V to 60 V)	○
48/60/110/125/220 V d.c. (38 V to 350 V) 115/230 V a.c. (80 V to 265 V)	○

○ Optional feature

Web interface

Communication Interfaces

| Communications*	
Serial Port (COM1): RS232/RS485 (Copper)	■
Serial Port (COM2): RS232/RS485 (Copper / Glass Fiber / Plastic Fiber)	□
Single 10/100BASE-TX	
Single 100BASE-FX (MT-RJ – Multi-mode)	
Dual 100BASE-FX (MT-RJ – Multi-mode)	■
Dual 100BASE-FX (LC Duplex – Single-mode)	
RTC Synchronization	
By Communication Protocol	●
SNTP Client	●
IRIG-B Input	●

- Base feature
□ Optional mutual-exclusive feature
■ Core mutual-exclusive feature
* Other communication hardware options available, please contact

Unified Engineering and Handling

The **TMU 220** aggregator shares a common user interface, installation and maintenance procedures with other Efacec IED families, and is delivered with pre-defined configuration templates for typical applications.

The user is still able to fully adapt **TMU 220** aggregators to any specific application with the use of the **Automation Studio** toolset, including the creation, type testing and deployment of user-defined configuration templates.
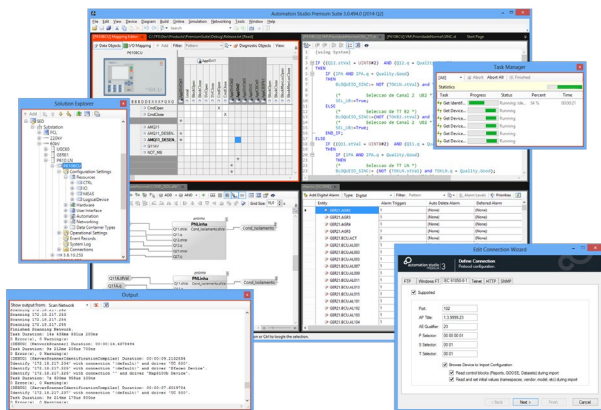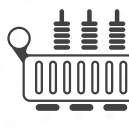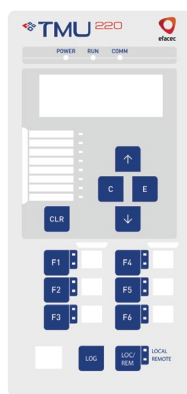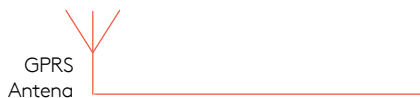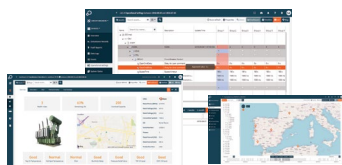

Efacec Automation Studio

User Automation with IEC 61131-3

User-defined algorithms or control schemes can be designed through straightforward IEC 61131-3 programming together with full flexibility for user-defined IEC 61850 object models.

With a state-of-the-art engineering environment, the **TMU 220** provides all the required flexibility and openness to support any specific application.

Communication Protocols

Servers/Slaves *

IEC 61850 Server and GOOSE	o
IEC 60870-5-101/104	o
DNP 3.0 (Serial & TCP)	o
MODBUS (Serial & TCP)	o

Clients/Masters *

MODBUS (Serial & TCP)	o

o Optional feature
* Other protocols available on request, please contact

IEC 61131-3 function block diagram

Applications

GPRS Antena

Fiber optic temperature sensors

Top oil temperature sensor

DGA analyser

Buchholz relay

Pressure relief device

Level sensor

Bushing monitor

Partial discharge analyser

CT and VT

Cooling system

OLTC

Empowering the future

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