for a greener tomorrow

MITSUBISHI ELECTRIC
Changes for the Better

MEprotect – DIGITAL PROTECTION RELAY

Intelligent energy asset protection

- **Reliable, secure and comprehensive protection provided with minimal size and modular design**

RELIABLE PROTECTION FOR ALL INDUSTRIES

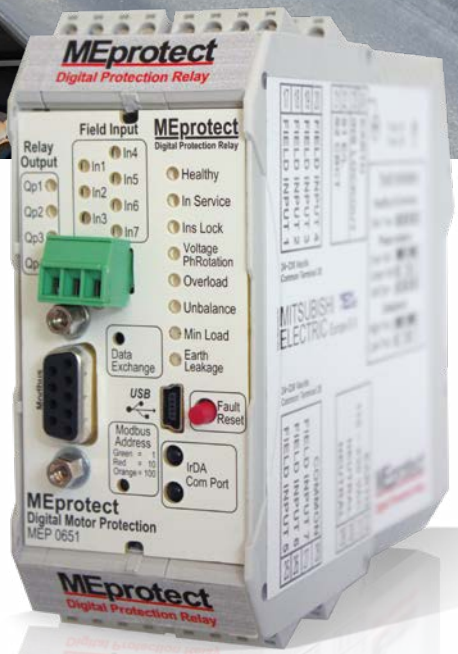
Mitsubishi Electric Europe's **MEprotect** digital protection relays provide reliable, secure and complete protection and control for electrical equipment such as motors, generators and transformers in all industrial applications.

UNIVERSAL APPLICABILITY

Reliable and robust, **MEprotect** relays can safeguard low and medium voltage equipment in all environments. Feature such as on-line monitoring, diagnostics and event logging help reduce asset downtime and maintenance costs.

MEprotect relays are suitable for use in:

- **Water, power and utilities**
- **Continuous processing**
- **Mining and cement**
- **Food and beverage**
- **Discrete manufacturing**
- **Plastics and rubber**
- **HVAC and refrigeration**
- **Ceramics and textiles**
- **Buildings and infrastructure**
- **Electrical distribution**



Modular and compact, **MEprotect** relays are ideal for use where space is tight.

KEY BENEFITS

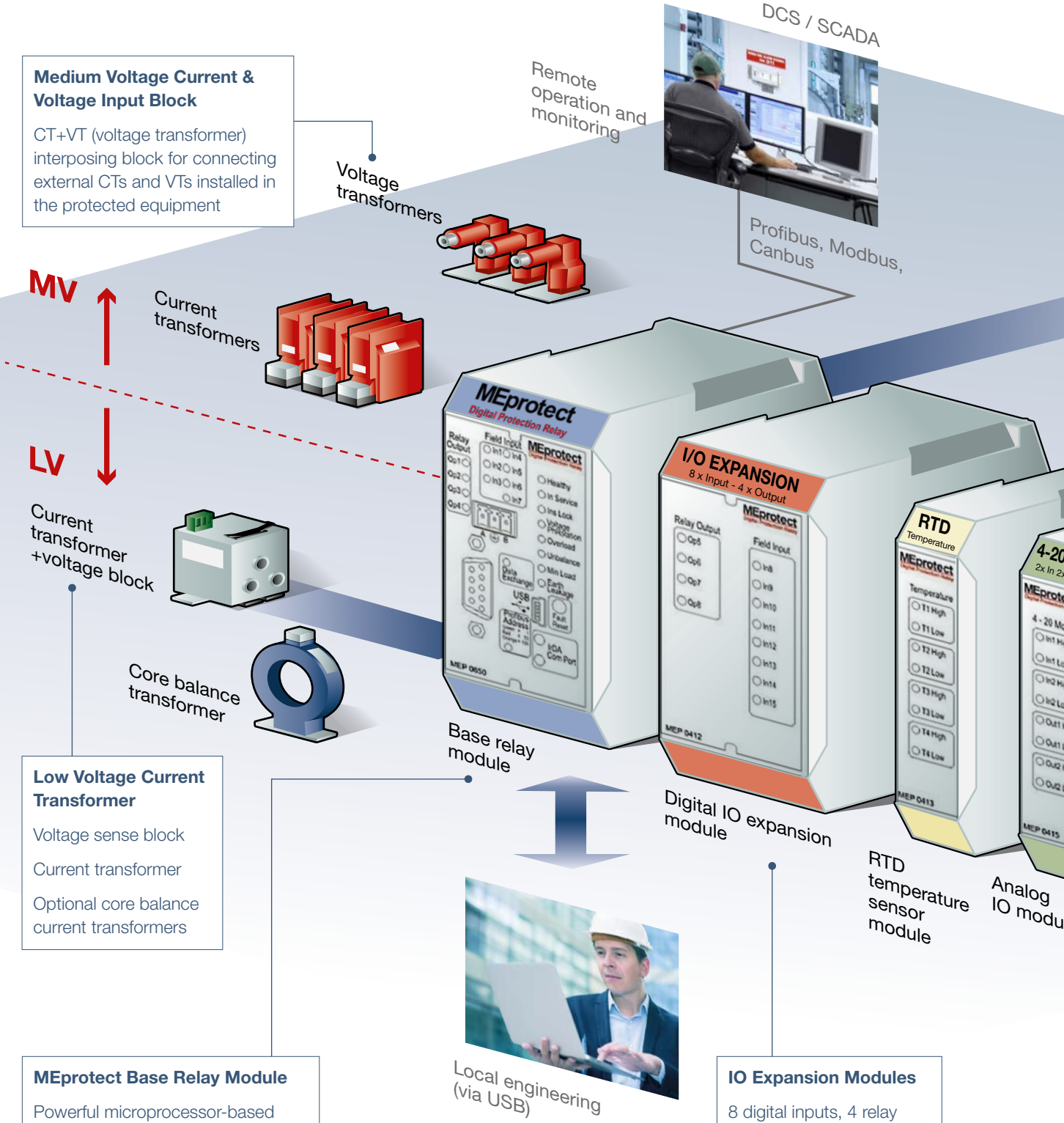
- **Comprehensive set of more than 50 protection functions in a single platform**
- **Equally at home in LV and MV applications**
- **Easy to set up and commission with built-in simulator**
- **One device combines protection with powerful local control**
- **Extensive analytics for equipment health in support of predictive asset maintenance**
- **Wide set of communication protocols including IEC61850 to easily integrate with plant or substation automation systems**

CONFIGURATIONS

MEprotect is available in 3 capability models (core, essence and pro) and can be supplied pre-configured for the following applications, reducing installation time and effort.

MOTOR RELAY AND MANAGER	Provides complete protection for any sized low- or medium-voltage motor. Includes diagnostics, monitoring and starting control.	***Requires MEprotect/ core or higher***
FEEDER DISTRIBUTION RELAY	Provides complete protection for medium-voltage feeder distribution lines	***Requires MEprotect/ essence or higher***
TRANSFORMER PROTECTION	Provides multi-facetted protection, control and backup protection of transformers	***Requires MEprotect/pro***
GENERATOR PROTECTION	Can protect any sized generator, standby generator or cogeneration unit.	***Requires MEprotect/pro***

KEY COMPONENTS



Medium Voltage Current & Voltage Input Block

CT+VT (voltage transformer) interposing block for connecting external CTs and VTs installed in the protected equipment

Low Voltage Current Transformer

Voltage sense block

Current transformer

Optional core balance current transformers

MEprotect Base Relay Module

Powerful microprocessor-based protection platform with on-board digital I/O, USB port, RS485 ports

IO Expansion Modules

8 digital inputs, 4 relay digital outputs

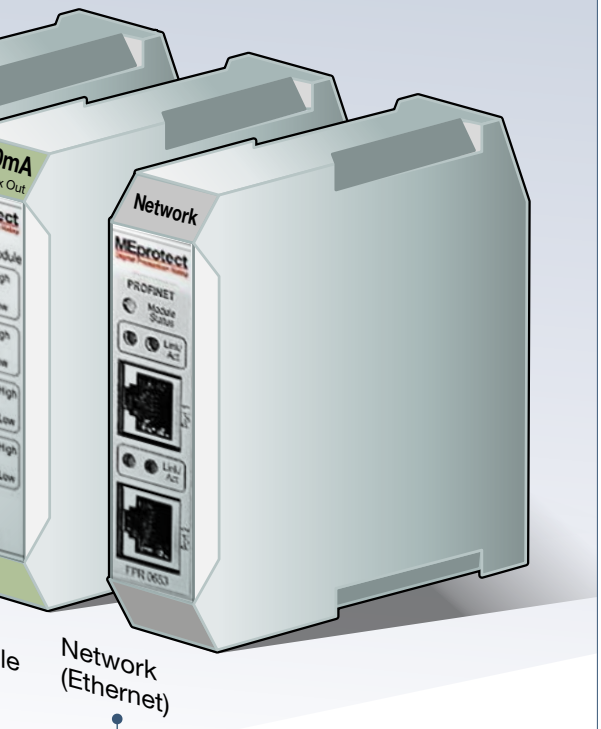
4 RTD inputs for temperature inputs

2 analog inputs and 2 analog outputs (4-20 mA)

Local operating HMI

Robust touchscreen, password-protected multi-level access, 7” or 10” screen. (**MEprotect** can also operate without HMI).

HMI - local operation and engineering



Network (Ethernet)

Network Expansion Module

Modbus TCP, Profinet, IEC61850+GOOSE, CC-Link IE Field

OPTIONAL ADD-ONS

External Memory Module

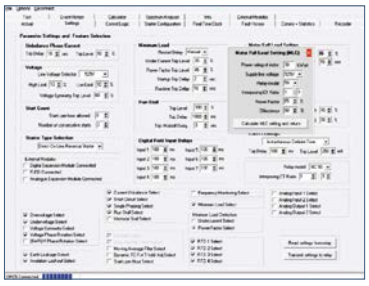
- Stores parameter and logic-function settings and protection configurations.
- Automatically updates when settings are changed or relays replaced.

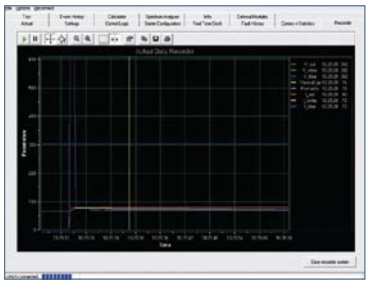
Insulation Lock-out Module

- Measures resistance of the cable and protected equipment, even while not in use
- Detects potential problems in standby equipment
- Prevents potentially disastrous energisation of equipment with short-circuit or earth faults

COMMON SOFTWARE TOOLS

All **MEprotect** relays use the same software interface, which enables easy setting and access to information.





MEprotect/emp is used for configuring and monitoring the protection relay to provide comprehensive engineering, parameterisation and monitoring tools, including:

- **Statistical data log:** stops and starts, energy use, running hours, availability, etc. Assists predictive maintenance
- **Fault log:** time stamped fault description, current maximum, voltage minimum, breaker clearance time, etc
- **Event log:** includes events, warnings and faults
- **Protection configuration:** parameterisation of all protection functions
- **Spectrum analyser:** power quality analysis for assessing line filtering needs
- **Logic engineering:** control functions based on protection trip/alarm states, timers, local and remote (network) IO including powerful function blocks
- **Real-time display:** shows voltage, current, power, temperatures, etc
- **Simulation:** comprehensive pre-commissioning testing, training and lifecycle modifications
- **Three-phase recorder:** protected equipment’s currents, voltages, thermal capacity and power factor

MEprotect HMI

The operator's HMI provides touchscreen access to the **MEprotect** relay at three password protected levels:

Unprotected Viewing of key operational and protection data

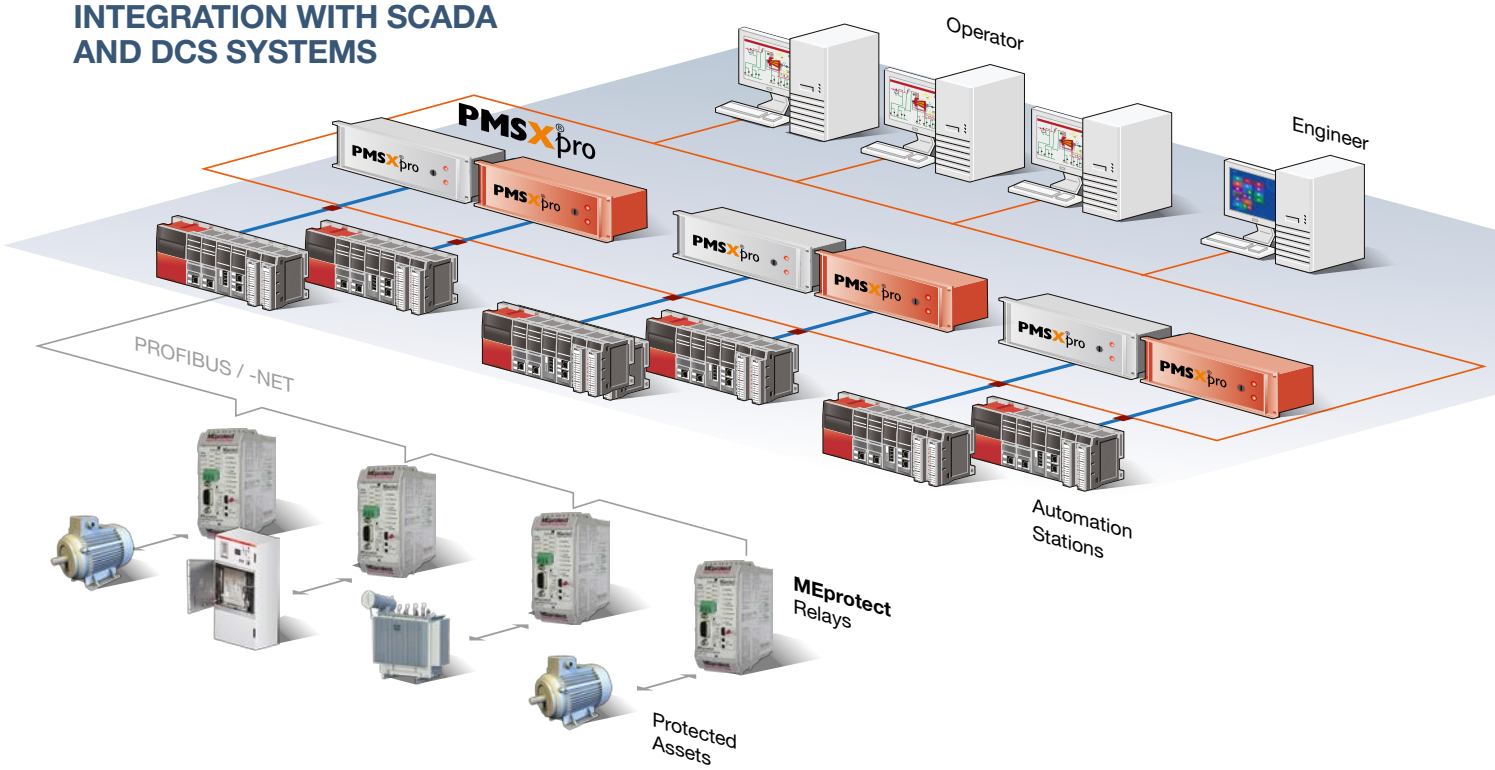
Level 0 Local operation of the equipment, displays key operational and protection data

Level 1 Allows adjustments to selected parameters by authorised technicians and senior operators

Level 2 Allows changes to the protection settings by senior technicians or engineers

The HMI provides independent logging and analysis of events. It is usually door or panel mounted, but can be located up to 1200m distant from the relay. Its intuitive navigation allows easy **MEprotect** configuration and parameter setting. Seven and 10 inch screens are available, the latter able to serve up to eight **MEprotect** relays.

INTEGRATION WITH SCADA AND DCS SYSTEMS



MEprotect can be used in MCCs, switchgear panels, or generator protection cabinets, with or without an HMI. Its fieldbus interfaces allow easy integration with PLCs, DCSs and SCADA systems.

The illustration shows integration of a **MEprotect**-based protection system with Mitsubishi Electric's PMSX®pro DCS using Profibus or Profinet. Similar integration can be easily achieved with MAPS SCADA.

Standardised functions in Mitsubishi Electric's DCS and SCADA allow plug-and-play monitoring and control of the protected equipment. Similarly, equipment can be switched on and off and monitored remotely.

In addition, these functions allow remote, centralised setting and resetting of **MEprotect** relays and downloading of operational data logs. This means **MEprotect** relays can be deployed in hazardous or geographically remote locations.

OPERATIONAL AND MONITORING FUNCTIONS

Table 1: Common functions provided by MEprotect

Operational Features (monitoring & metering)
Current (pos., neg. and zero seq.)
Current demand
Phase angles
Temperature (with RTD module)
Current unbalance
% THD current
Magnitude THD current
% THD voltage
Magnitude THD voltage
Sync values
Differential current
Voltage (L-L, L-N, pos., neg. and zero seq.)
Voltage unbalance
VA and VA demand
kW and kW demand
kWh (forward, reverse and net)
VARs and kVAr demand
kVArh (lead, lag and net)
Power factor
Frequency
Volts/Hz
2nd harmonic voltage (H2/fundamental)
3rd harmonic voltage
Harmonics spectrum analyser
Trip circuit monitoring
Breaker wear
CT supervision (CTS)
VT supervision (VTS)
Waveform recorder (6000 cycles typical)
Fault recorder (last 35 faults)
Sequence of events recorder (1400 events)
Trend recorder
Motor history
Motor start trending
Programmable logic equations
Min./max. recording
Conformal coated circuit boards
Local operating panel basic
Local operating panel advanced
Connection of externally provided VTs / CTs fitted (e.g. in MV panels)
Sensitive ground current (0.5A/0.1A)

Note: not all listed functions are available in each model – please refer to the **MEprotect** catalogue for details.

PROTECTION FUNCTIONS

Table 2: Protection functions available in MEprotect

Protection type	
12	overspeed
14	underspeed
24	volts per Hertz / overfluxing
25	synchronizing or synchronism-check
26	thermostat
27	undervoltage
27T	low voltage ride-through
27X	auxiliary undervoltage
32P	directional active overpower
32Q	directional reactive overpower
37	phase undercurrent or underpower
38	bearing protective (temperature / mechanical)
40	loss of field / excitation
46	phase negative sequence / unbalance
46G	generator negative sequence current protection
47	phase-sequence voltage or phase-balance overvoltage
49	machine or transformer thermal (I2T)
49T	machine thermal protection (RTD/PTCs)
50/27	inadvertent generator energization
50BF	breaker failure
50G	ground instantaneous overcurrent
50N	neutral instantaneous overcurrent
50P	phase instantaneous overcurrent
51G	timed ground overcurrent / overload
51LR	locked rotor during running
51LS	locked rotor on startup
51N	neutral timed overcurrent
51P	phase timed overcurrent
51V	delayed voltage-restrained phase overcurrent
55	power factor limiting
55A	apparent power factor limiting
59	Overvoltage
59G	ground overvoltage
59X	auxiliary overvoltage
62	time-delay stopping or opening
64	ground (earth) detector
64REF	restricted earth fault differential
66	notching or jogging / starts per hour
67N	directional earth fault
67P	phase directional overcurrent
74TC	trip circuit / control circuit supervision
78	phase-angle limit / vector surge / vector shift
79	auto-reclose /ac reclosing
81O	overfrequency
81R	rate of change of frequency (ROCOF)
81U	underfrequency
86	Lockout
87, 87T	differential protective
87B	busbar differential / zone protection
87G	restricted ground fault
87GDH	unrestrained restricted ground fault/ground differential
87H	unrestrained current differential
87M	motor differential protective
87R	dual-slope %'ge restrained current differential / inrush block
94	tripping or trip-free; circuit breaker / contactor control
CLPU	cold load pickup
LOP	loss of power
SOTF	switch on to fault

TECHNICAL SPECIFICATIONS

Parameter	Specifications
GENERAL	
Voltage (aux. power)	110 ~ 240Vac/dc
Power consumption	2.5 Watt (relay alone)
Operating conditions	20°C ~ +65°C, Relative humidity < 85%
Communication	Profibus DPV-1, Modbus RTU, CAN-Bus, Modbus TCP and Profinet (IEC61850 and CC-Link IEF Basic in upcoming releases)
Digital inputs	7 Opto-isolated, 24Vac/dc – 240Vac/dc
Digital outputs	4 Electromechanical relay (5 A, 240Vac)
Analog inputs/outputs	4-20mA
RTD, PTC inputs	PT100, PT1000, NTC, PTC sensors
Real Time Clock	24hr clock, 5-day battery back-up, time/date stamping
LED fault indication	Latch LED on trip, event and fault
Mounting	DIN rail or chassis
Compact and lightweight	150g-245g
EXPANSION MODULES	
Digital IO expansion module	8x inputs, 4x outputs (relay)
Temperature (RTD) module	4x PT100, PT1000, RTD, NTC or PTC
Analog I/O module	2x 4-20mA inputs, 2x 4-20mA outputs
Network module	2x Ethernet ports
CURRENT INPUTS	
Rated current	1A / 5A
Rated frequency	40Hz ~ 66Hz
Burden	0.1VA (at rated current)
Maximum rated	current 400A
VOLTAGE INPUTS	
Rated voltage	110Vac (via own CT / VT sensing blocks)
Rated frequency range	40Hz ~ 66Hz
Burden	0.1VA (at 190V: rated voltage * W3)
Maximum rated voltage	247Vac
Thermal rating continuous	rated voltage * W3

FEATURES: Real Time Clock, LED fault indication, DIN rail or chassis mounted, compact and lightweight, expansion modules.

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