

MV electrical network management

Easergy T200 P

Remote control unit for overhead switch



Catalogue

2007

The Guiding System, the new way to create your electrical installations

A comprehensive offer of products with consistent design

The Guiding System is first and foremost a Merlin Gerin product offer covering all electrical distribution needs. However, what makes all the difference is that these products have been designed to operate together: mechanical and electrical compatibility, interoperability, modularity, communication. Thus the electrical installation is both optimised and more efficient: better continuity of supply, enhanced safety for people and equipment, guaranteed upgradeability, effective monitoring and control.

Tools to simplify design and implementation

With the Guiding System, you have a comprehensive range of tools - the Guiding Tools - that will help you increase your product knowledge and product utilisation. Of course this is in compliance with current standards and procedures. These tools include technical booklets and guides, design aid software, training courses, etc. and are regularly updated.

The Guiding System, combined with the know-how and creativity, allows optimised, reliable, open-ended and standard compliant installations

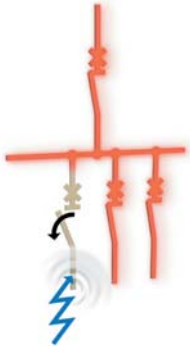
For a genuine partnership with you

Because each electrical installation is unique, there is no standard solution. With the Guiding System, the variety of combinations allows for genuine customisation solutions. You can create and implement electrical installations to meet your creative requirements and design knowledge. You and Merlin Gerin's Guiding System form a genuine partnership.

For more details on the Guiding System, consult www.merlin-gerin.com

A consistent design of offers from Medium Voltage to Ultra terminal

All Merlin Gerin offers are designed according to electrical, mechanical and communication consistency rules. The products express this consistency by their overall design and shared ergonomics.



Discrimination guarantees co-ordination between the operating characteristics of serial-connected circuit-breakers. Should a fault occurs downstream, only the circuit-breaker placed immediately upstream from the fault will trip.

Electrical consistency:

Each product complies with or enhances system performance at co-ordination level: breaking capacity, I_{sc} , temperature rise, etc. for more safety, continuity of supply (discrimination) or economic optimisation (cascading).

The leading edge technologies employed in Merlin Gerin's Guiding System ensure high performance levels in discrimination and cascading of protection devices, electrodynamic withstand of switches and current distributors, heat loss of devices, distribution blocks and enclosures.

Likewise, inter-product ElectroMagnetic Compatibility (EMC) is guaranteed.



Prefabricated and tested solutions, upstream and downstream from the device complying with the IEC 60439-1 switchboard standard.

Mechanical consistency:

Each product adopts dimensional standards simplifying and optimising its use within the system.

It shares the same accessories and auxiliaries and complies with global ergonomic choices (utilisation mode, operating mode, setting and configuration devices, tools, etc.) making its installation and operation within the system a simpler process.

Transparent Ready

Thanks to the use of standard Web technologies, you can offer your customers intelligent Merlin Gerin switchboards allowing easy access to information: follow-up of currents, voltages, powers, consumption history, etc.

Communication consistency:

Each product complies with global choices in terms of communication protocols (Modbus, Ethernet, etc.) for simplified integration in the management, supervision and monitoring systems.

**Guiding Tools
for more efficient design
and implementation
of your installations.**

SM6

Medium voltage switchboard system from 1 to 36 kV



Sepam

Protection relays



Masterpact

Protection switchgear from 100 to 6300 A



Trihal

MV/LV dry cast resin transformer from 160 to 5000 kVA

Evolis

MV vacuum switchgear and components from 1 to 24 kV.

The Technical guide

These technical guides help you comply with installation standards and rules i.e.: The electrical installation guide, the protection guide, the switchboard implementation guide, the technical booklets and the co-ordination tables all form genuine reference tools for the design of high-performance electrical installations. For example, the LV protection co-ordination guide - discrimination and cascading - optimises choice of protection and connection devices while also increasing markedly continuity of supply in the installations.



CAD software and tools

The CAD software and tools enhance productivity and safety. They help you create your installations by simplifying product choice through easy browsing in the Guiding System offers. Last but not least, they optimise use of our products while also complying with standards and proper procedures.



Compact

Protection switchgear system from 100 to 630 A



Multi 9

Modular protection switchgear system up to 125 A



Prisma Plus

Functional system for electrical distribution switchboards up to 3200 A



Pragma

Enclosures for distribution switchboards up to 160 A

Canalis

Prefabricated Busbar Trunking from 25 to 4000 A

PowerLogic

Power management

Training

Training allows you to acquire the Merlin Gerin expertise (installation design, work with power on, etc.) for increased efficiency and a guarantee of improved customer service.

The training catalogue includes beginner's courses in electrical distribution, knowledge of MV and LV switchgear, operation and maintenance of installations, design of LV installations to give but a few examples.



merlin-gerin.com

This international site allows you to access all the Merlin Gerin products in just 2 clicks via comprehensive range data-sheets, with direct links to:

- complete library: technical documents, catalogs, FAQs, brochures...
- selection guides from the e-catalog
- product discovery sites and their Flash animations.

You will also find illustrated overviews, news to which you can subscribe, the list of country contacts...



Guiding

TOOLS

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PEE0261



Throughout the world, poor quality supply of electrical power is no longer acceptable to consumers. In many countries, regulatory standards have been defined in order to **ensure a minimum standard of electrical service quality**.

The most common indicators employed are:

- **SAIDI**: Standard Average Interruption Duration Index - e.g.: 96 minutes/year
- **SAIFI**: Standard Average Interruption Frequency Index - e.g.: 1.2 interruptions/year.

In order to respond as effectively as possible to the globally recognised indicators for measuring their power quality, power distribution companies are looking for new products and solutions, focused principally on reducing the following:

- The number of interruptions to the supply
- The duration of power outages
- The areas affected by faults.

The above targets can be achieved by carrying out several actions, including:

- Establishing preventive maintenance on the networks
- Reducing the length of supply lines to limit the impact of a fault
- **Equipping the network with suitable equipment for better local and remote operation.**

For power distributors, an increase in service quality must be linked with improved performance and competitiveness as well as management of investments. This can be achieved by:

- Reducing operating costs, particularly during incidents on the MV network
- Reducing non-distributed power costs
- Maximising cost and time efficiency on investments and benefiting from immediate returns
- Selecting easy-to-implement, high-performance equipment to reduce equipment immobilisation and installation time
- Reducing direct and indirect maintenance costs of MV lines and equipment.

What are the benefits of managing MV networks?

- Network management results in a very high level of service
- It also has a positive impact on both investments and operation
- Network control fits into a comprehensive policy over several years.

Reducing power outage durations

- Optimised local and remote intervention based on reliable information from the fault current detectors
- Restoration of power to healthy parts of the network during an incident using control units:
 - by the operator from the remote control centre: 50% of the network resupplied in a few minutes
 - by integrated automation systems: faulty sections isolated in the reclosing cycle.

Improving distributed power quality

- Precise information about transient and permanent faults enables corrective and preventive maintenance measures to be taken to reduce the recurrence of faults.
- Monitoring of distributed power quality using relevant, recorded and transmitted measurements:
 - measurement of load currents and indication of variations in real time
 - measurement of voltages with indication and memorisation of voltage dips and loss
 - power factor measurement.






Reducing operating costs

- The accuracy of fault information significantly reduces the time required to locate faults:
 - on-site intervention time is significantly reduced when using devices which can communicate
 - precise information about faults simplifies fault detection tasks and operations.
- Preventive maintenance on the MV network reduces the number of interventions necessary outside normal working hours.

Rapid return on investments

- Comprehensive solutions which are quick and easy to implement.
- Product range compatibility and ease of upgrade in order to optimise investment and profit from immediate returns.
- Investment in the control station can be steep and time-consuming to implement. Remote network control can be set up in phases by installing simple systems which provide a rapid return on capital and can be implemented in a few months. This can be used to evaluate the improvement in service quality:
 - basic SCADA system with network view, detailed view, alarms and archives to enable control in real time and entry of data for maintenance purposes. After the various network instrumentation phases, the basic SCADA system can be replaced by a DMS type SCADA system.
 - adaptation of stations to remote control: motorisation of MV cells, communicating control unit or detector, transmission equipment.

Easergy: a range of solutions for MV network management

Easergy range dedicated supervisor	Remote network control		Remote network monitoring	
L500	T200 P	T200 I	Flite 116-SA/G200	Flair 200C
				
Easergy range dedicated remote control system	Overhead switch control unit	Control unit for MV and MV/LV substations	Communicating fault current detector for overhead lines	Communicating fault current detector for an MV substation
Capacity: 500 Easergy type devices	Control of 1 or 2 switches	Control of 1 to 16 switches	Single-phase ammetric detector	Three-phase, single-channel ammetric detector
Main functions				
<ul style="list-style-type: none"> Network view with substation alarm Detailed substation view Alarm logs, archives Direct access to substation view via a list Automatic sorting of alarms and archives by substation Online help 	<ul style="list-style-type: none"> Pole-mounted Switch monitoring and control Fault current detector Automation systems: sectionaliser, power supply source changeover switch Measurements: I, U, P, Q, S, energy and power factor cos φ 	<ul style="list-style-type: none"> Wall-mounted Measurements: I, U 	<ul style="list-style-type: none"> Flite 116: <ul style="list-style-type: none"> Line installation Phase-to-phase and phase-to-earth fault current detection I and U presence measurements with G200 Communication management Powered by lithium battery G200: <ul style="list-style-type: none"> Pole-mounted Flite 116 concentrator Processing and archiving Free I/O: 3 digital outputs and 6 digital inputs 220 Vac, solar or 12 Vdc supply 	<ul style="list-style-type: none"> Wall-mounted Phase-to-phase and phase-to-earth fault current detection U, I, P, Q, S, energy and power factor measurements cos φ Management of 3 digital outputs and 6 digital inputs 220 Vac supply backed-up by Ni-CD battery
Communication				
<ul style="list-style-type: none"> Integrated communication front-end Permanent and non-permanent communications management: <ul style="list-style-type: none"> telephone/GSM radio direct public and dedicated private line Periodic call management 	<ul style="list-style-type: none"> 1 to 2 serial communication ports 1 Ethernet port Communication port operation management Transmission interface: PSTN, radio, GSM, GPRS, Ethernet, dedicated line, RS232, RS485 	<ul style="list-style-type: none"> 915 MHz short range radio communication 1 SCADA communication port Transmission interface: radio, GSM, GPRS, CDMA 	<ul style="list-style-type: none"> 1 communication port GSM, GPRS or RS232 interface 	
Communication protocol				
<ul style="list-style-type: none"> Modbus 	<ul style="list-style-type: none"> IEC 870-5-101 and IEC 870-5-104 Serial DNP3 and TCP/IP Serial Modbus and TCP/IP HNZ, WISP+ and various proprietary protocols 	<ul style="list-style-type: none"> IEC 870-5-101 Serial DNP3 and TCP/IP Modbus 	<ul style="list-style-type: none"> IEC 870-5-101 DNP3 Modbus 	
Data configuration				
<ul style="list-style-type: none"> Professional communications and database editor Data creation via dialogue boxes 	<ul style="list-style-type: none"> Embedded web server Local and remote configuration 	<ul style="list-style-type: none"> Local and remote configuration with Easergy W500 	<ul style="list-style-type: none"> Local or remote configuration by PC 	
Accessories				
<ul style="list-style-type: none"> Radio, PSTN, DL and fibre optic modems 	<ul style="list-style-type: none"> Simulation tools and tests Open phase and zero sequence sensors 	<ul style="list-style-type: none"> Installation tool 	<ul style="list-style-type: none"> Open phase and zero sequence sensors 	

Local fault indication

Flite 110-SA

Flite 210, 230

Flite 312, 315, 332, 335, 382

Flair 21D, 22D, 23D

Flair 219, 279

Flair 310, 370



Fault current detectors for an overhead network

Single-phase ammetric detector

Three-phase ammetric detectors

Three-phase directional detectors

Fault current detectors for MV substations

DIN format three-phase ammetric detectors

Three-phase ammetric detectors

Three-phase directional detectors

Main functions

<ul style="list-style-type: none"> ■ Line installation ■ Phase-to-phase and phase-to-earth fault current detection ■ Indication of transient and permanent faults ■ Powered by lithium battery 	<ul style="list-style-type: none"> ■ Pole-mounted ■ Phase-to-phase and phase-to-earth fault current detection ■ Indication of transient and permanent faults ■ Powered by lithium battery 	<ul style="list-style-type: none"> ■ Pole-mounted ■ Phase-to-phase and phase-to-earth fault current detection ■ Transient and/or permanent fault indicator ■ Fault counter ■ Powered by lithium battery, solar panels or 12 Vdc depending on model 	<ul style="list-style-type: none"> ■ Incorporated in the switchgear ■ Phase-to-phase and phase-to-earth fault current detection ■ Measurements: <ul style="list-style-type: none"> □ ammeter □ maximeter ■ Self-powered by current sensors 	<ul style="list-style-type: none"> ■ Wall-mounted ■ Phase-to-phase and phase-to-earth fault current detection ■ Power supply: <ul style="list-style-type: none"> □ Flair 279: 220 Vac (battery-backed) □ Flair 219: battery 	<ul style="list-style-type: none"> ■ Wall-mounted ■ Phase-to-phase and phase-to-earth fault current detection ■ Indication of transient and permanent faults ■ Power supply: <ul style="list-style-type: none"> 230 Vac backed up by battery or external depending on model
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Communication

<ul style="list-style-type: none"> ■ Option: 1 signalling contact for RTU 	<ul style="list-style-type: none"> ■ Signalling contacts for RTU 	<ul style="list-style-type: none"> ■ Optional on the Flair 21: 1 signalling contact for RTU 	<ul style="list-style-type: none"> ■ Signalling contact for RTU 	<ul style="list-style-type: none"> ■ Signalling contact for RTU
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Data configuration

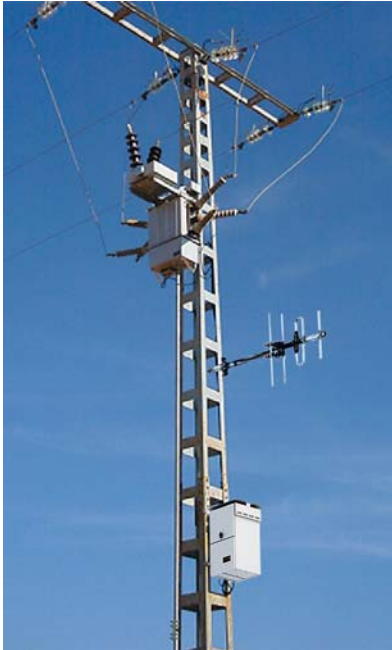
<ul style="list-style-type: none"> ■ By micro-switches 	<ul style="list-style-type: none"> ■ By micro-switches 	<ul style="list-style-type: none"> ■ Configurable via display unit 	<ul style="list-style-type: none"> ■ By micro-switches or button and display unit 	<ul style="list-style-type: none"> ■ By micro-switches 	<ul style="list-style-type: none"> ■ Configurable via display unit
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Accessories

<ul style="list-style-type: none"> ■ Installation tool 	<ul style="list-style-type: none"> ■ Open phase and zero sequence sensors ■ Unit for wall-mounting 	<ul style="list-style-type: none"> ■ Open phase and zero sequence sensors 	<ul style="list-style-type: none"> ■ Open phase and zero sequence sensors
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Easergy T200 P: solutions to optimise your overhead network.

PE56262



Easergy T200 P is a control unit designed for installation on MV overhead line poles to control overhead switches remotely.

A high level of integrated functions

Easergy T200 P has been specially designed to meet the needs of customers in managing overhead networks, offering compact and open-ended solutions:

- Management of 1 to 2 switches of any type
- Back-up power supply for motorisation, transmission equipment and the control unit
- High-performance fault current detector
- Measurements for better control of the network load
- Network reconfiguration automation systems
- Communication with the control centre
- Monitoring, for local or remote operation.

Compatible with any SCADA system

A continuously updated range of protocols includes the main standards IEC 870-5-101, IEC 870-5-104, DNP3, Modbus and other proprietary protocols. With our numerous installations around the world, we have considerable experience in the interoperability of our protocols.

Open to all communication media

- Optimum transmission network management via two serial communication ports and an Ethernet port
- Wide range of integrated modems, including radio, PSTN, GSM, GPRS and DL
- Management of external modems via Ethernet or RS232 connections.

Reliable and rugged

In view of difficult environmental conditions and the operational availability required, Easergy T200 P has undergone strict reliability and qualification testing in accordance with IEC international standards.

The reliability of the T200 range is proven by its use across five continents in very varied environments under conditions more severe than those demanded by the standards:

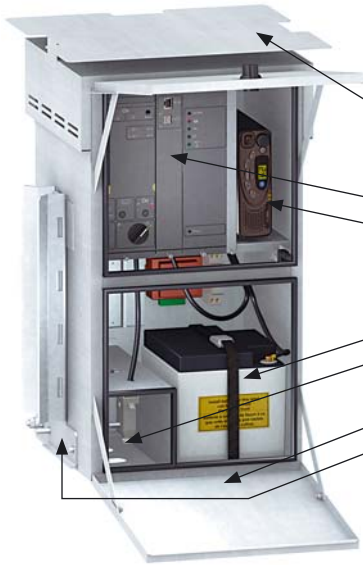
- High temperature: Algeria, Saudi Arabia, Indonesia
- Low temperature: Russia
- Humidity: UK, China, Guyana, Bolivia, Indonesia, Gabon
- Salt mist: Colombia, Portugal, Algeria.

Assured continuity of service

Overall improvements in power provision rely on ensuring the constant availability of equipment responsible for reconfiguring networks during an incident.

- Easergy T200 P performs numerous auto-tests, particularly on the power supplies and battery.
- Its power supply workshop is sized to power a conventional radio in order to transmit an alarm if the battery fails.
- The alarms transmitted to the control centre during a fault enable immediate corrective maintenance.
- The auto-tests ensure the availability of equipment without the need for preventive maintenance.

PEE6279



Compact enclosure

The equipment is housed in a stainless steel enclosure, ensuring:

- Withstand to mechanical and environmental stress
- Ease of installation and connection
- Low maintenance.

The enclosure is fitted with a padlock-opening locking system.

Main components:

- 1 - Sun protection canopy for optimum temperature performance
- 2 - Rack containing the electronic modules with local indications
- 3 - Slot for transmission equipment (radio, etc.)
- 4 - Battery for back-up power supply
- 5 - "Connection" section including removable sockets for connection to motorisations and toroid sensors with anti-vandal system
- 6 - Double door acting both as rain protection and as a tray for on-site operations
- 7 - Bracket for mounting on any type of pole.

Ease of installation

- Can be installed without the need for a lifting tool by means of a two-step mounting procedure using the fixing bracket
- Fixing bracket designed for mounting on any type of pole by strapping
- Enclosure is compact and light (without the battery) to mount by placing on the bracket then locking in position
- Lower door designed to support the battery and the installation tools.

Ease of connection

- All the internal connections are made by connectors: no screwdriver required
- Connection to the switch via tamper-proof removable connectors
- Connection of transmission equipment aeriels (radio, GSM, GPRS) by connector.

Fast and reliable installation

- Equipment supplied preconfigured
- Configuration by PC equipped with Internet Explorer connected to the USB or Ethernet port
- Configuration in a few minutes by downloading from the database prepared in the office
- Numerous test and simulation tools available as accessories.

Remote operation and maintenance by embedded Web server

- Option to access remote data in parallel with the control system with the GSM, GPRS, Ethernet and PSTN transmission networks
- Requires a PC equipped with a web browser and access to the communication network
- Option to change the configuration, update software versions, load archive files, display statuses and control the switch.

PE68271



High-availability back-up power supply

- The power supply workshop supplies the back-up operating voltages for the:
 - MV switch motorisation
 - transmission equipment, such as radio
 - control unit.
- A battery ensures the operation of the whole substation in the event of loss of the mains supply. The power supply workshop ensures its charge and monitoring (regulated and temperature-compensated charger).

Power supply self-monitoring

- Loss of AC supply: immediate and delayed alarm
- 48 Vdc motorisation fault: voltage fault, blown fuse
- 12 Vdc transmission fault: voltage fault, blown fuse
- 12 Vdc internal fault.

Battery self-monitoring

Battery availability check

The power supply module tests the battery status every 12 hours. When two tests are negative, an alarm is generated and transmitted to the control centre.

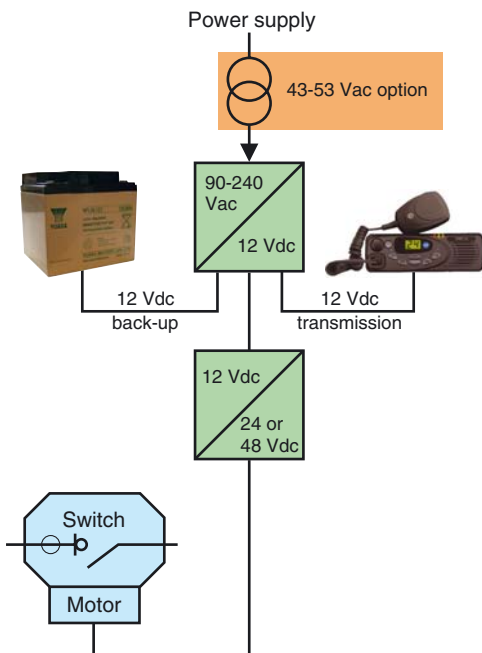
Prevention against serious discharge

Serious battery discharge is irreversible. T200 P protects the circuits and causes the battery circuit to cut out when it detects:

- A basic charger voltage fault
- Consumption in excess of 1.3 A for over 3 minutes on the transmission output
- **Alarm transmission to the SCADA system**

- the power supply workshop is designed to power a conventional analogue radio with a disconnected (faulty) battery
- it is therefore possible to warn the control centre during a battery fault (end of life, etc.) and to begin corrective maintenance.

DE6648EN



Power supply characteristics

AC power supply

- Supply voltage: 90 to 240 Vac, 50 Hz (43 and 57 Vac available as an option)
- Input protected by 2 A HPC fuse (type G)
- Connection to fuse terminal block inside the enclosure.

Motor mechanism power supply

- Supply voltage: 48 or 24 Vdc \pm 10%
- Current: 16 A for 50 ms and 6 A for 15 s
- Protection by delayed 5 A fuse.

Telecommunication equipment power supply

- Supply voltage: between 10.8 V and 14.8 V
- Available current: 1 A continuous; 7 A peak
- Protection by delayed 4 A fuse.

Battery

- Temperature-compensated charger
- Charging time: 24 hours
- Type: sealed lead 12 V, 24 Ah
- Lifetime at 20°C (as specified by the manufacturer): 10 years.

Battery autonomy

- Duration: 16 hours at 20°C under the following conditions:
 - 10 switch opening/closing cycles from start of battery life
 - Analog Radio Communication: 7 A consumption when transmitting, with an exchange cycle every minute lasting one second.

Direct connection by connectors

Information can be acquired and orders passed on via a direct connection between the control unit and the switch. The connections are made using tamper-proof removable connectors which enable:

- Fast and secure installation
- Simple start-up, with the control system, by fitting a simulator in place of the switchgear
- Reliable operation and maintenance due to servicing operations which do not require a screwdriver.

Switchgear control-command

Management of different types of predefined switches:

- PM6 type switches
- Other switches: single or dual control
- Available voltages: 48 Vdc, 24 Vdc or external supply
- Opening or closing orders by 0V or +V polarity or by current loop.

Local operator panel

Display of information by coloured LEDs

- Equipment fault
- Switch position: open, closed, inconsistent, locked
- Fault current detection
- Automation system on/off
- Ua and Ub voltage presence
- Automation system locked
- **Local** or **remote** operating mode
- Additional indication status.

Selection of remote or local operating mode

A rotary switch is used to select the operating mode:

- **Local**: the command from the operator panel is confirmed. Any order from the remote control centre is locked.
- **Remote**: local commands are not permitted. Orders from the remote control centre are validated.

Switch control

The switch must be in the "local" position. The control and validation buttons must then be pressed at the same time.

Automation system activation

The automation system is activated and deactivated by pressing the control and validation buttons at the same time.

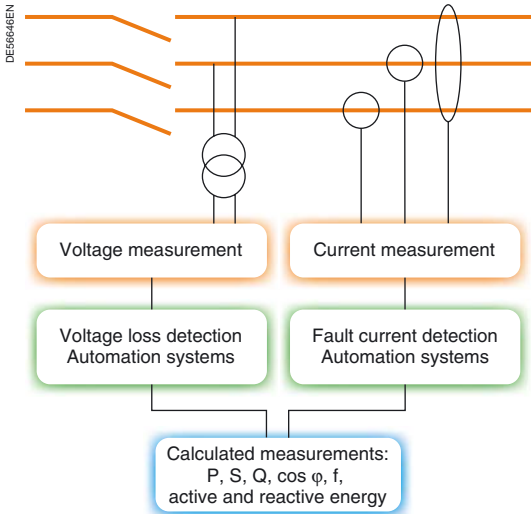
Detector reset and indication test:

- The "reset" button resets the fault detector
- The "test" button checks all indications.

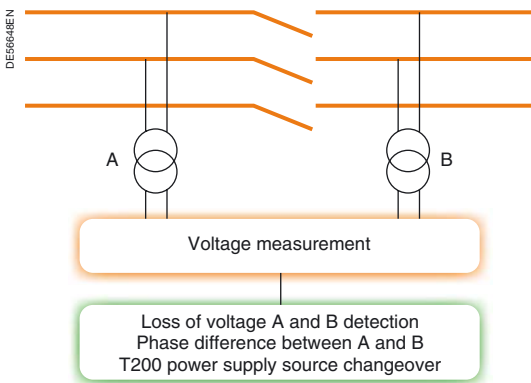
Additional information

- Door open indication
- Optional internal light
- T200 P has free digital inputs and outputs for additional processing:
 - 8 digital inputs
 - 3 digital outputs.





Measurements and functions with PM6 type switch



Middle point switch management with two voltage transformers

Available measurements

Depending on the options selected and the available measurements at the time of acquisition, T200 uses the following measurements:

- Current and voltage measurements
- Measurements of the phase difference between the upstream/downstream voltages for management of the opening points
- Calculated measurements: powers, power factors, frequencies, energies.

Fault current detection

Phase-to-phase and phase-to-earth fault current detector:

- Permanent: faults confirmed by the sensing time and loss of voltage
- Transient: memorisation of rapid faults (phase faults) and exceeding of zero sequence thresholds not confirmed by loss of voltage.

“Inrush” filtering function to prevent unintended detections when (re)powering up due to the load inrush current.

Fault memorisation

Memorised faults can be cleared:

- By remote control
- By a time delay configurable for each channel
- By alternative U return configurable for each channel
- By manual action on the operator panel.

Fault indication

- Locally via the red LED opposite the rack
- Remotely outside the station with a flashing external light (optional battery-operated indicator unit)
- Remote in the SCADA system.

MV voltage monitoring

■ The presence or loss of MV voltage can be indicated:

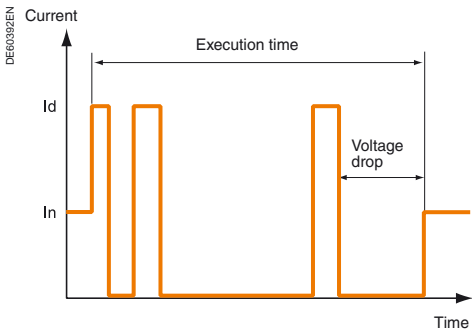
- By “AC OFF” indication (loss of voltage supply) from the power supply module for detections over 300 ms
- From the MV voltage measurement function for short duration detections or for configurable voltage loss and presence thresholds.
- Measurement of the phase difference when measuring voltage on each side of the switch.

PE6302EN

Measurement and FPI configuration N°1		
MV Network characteristics		
Network Frequency 50 Hz		
Voltage Configuration		
Voltage transformer	20000	Input 1
Voltage sensor configuration	V1	
Nominal Voltage	20000	V
Threshold	90	%
AC supply ON	75	%
AC supply OFF	30	%
Residual Voltage	100	ms
Acknowledge time	100	ms
AC supply ON	100	ms
AC supply OFF	100	ms
Current Configuration		
Current transformer ratio	2000	Input 1
Current transformer configuration	I1 I3 I0	
Fault Passage Detection configuration		
Threshold	500	A
I0	20	A
Fault duration	200	ms
I0	200	ms
Inrush	<input type="checkbox"/>	
Reset on Voltage recovery	<input checked="" type="checkbox"/>	
Automatic FPI reset	2	h

Characteristics

Application	
Network	4 to 36 kV
Frequency	50 or 60 Hz
Neutral	Resistive, direct or insulated
Current measurement and fault detection	
Types of current sensors	Assembly A: 3 phase current sensors Assembly B: 2 phase sensors and 1 zero sequence sensor (PM6)
Assemblies A and B phase fault	Configurable from 10 to 800 A in 1 A steps
Zero sequence fault	Assembly A Configurable from 5 to 160 A in 1 A steps Assembly B Configurable from 2 to 160 A in 1 A steps
Sensing time: ST	Phase fault 40 to 800 ms in 20 ms steps Zero sequence fault 40 to 800 ms in 20 ms steps
Reset	Automatic voltage return Configurable Yes/No After delay Configurable from 1 h to 12 h in 1 h steps Remote Yes Local Yes
Indication	Remote Phase fault, zero sequence fault Local Summary by LED on rack front panel, details via PC
Voltage measurement and monitoring	
Type of measurement	Single-phase from the power supply source (PM6) Three-phase from a transformer
Type of voltage transformer accepted	Primary: 100 to 36 000 V Secondary: 100, 110, 115, 120, 100/√3, 110/√3, 115/√3, 120/√3, 200, 220, 230, 240, 200/√3, 220/√3, 230/√3, 240/√3
Scaling	50 V to 36.000 V configurable
Detection threshold	Presence threshold 70 to 120% Loss threshold 5 to 95%
Voltage present validation time delay	100 to 180.000 ms in 10 ms steps.
Voltage loss validation time delay	100 to 180.000 ms 100 ms in 10 ms steps.
Phase difference measurement	Expressed in degrees; accuracy ± 3°
Retrieved measurements	
Current	3 I phases, I medium, I0
Voltage	According to acquisition: 1U-1V; 2U-2V; 3U-3V; 6U-6V
Power	Active P, Reactive Q and apparent S
Energy	Active and reactive energy
Other	Power factor, frequency
Memorisation and processing of measurements	
Periodic recording	On sample or averaged value (configurable) Period: 10 s, 30 s, 1 min, 15 min, 30 min or 1 h
High and low thresholds	Configurable from 0 to 800 A
Dead band (variation of I)	Configurable from 1 to 100% of the value read
Min. and Max.	Configurable for 1, 7 or 14 days
Accuracy of measurements (excluding sensors)	
Current and voltage measurements	Class 0.5 to 20°C
Fault current detector	3%
Power and energy	Class 1 to 20°C
Digitization	12 bits



Sectionaliser automation system	
Number of faults for opening	1 to 4 kV
Automation cycle time	20 to 240 s configurable in 5 s steps

Sectionaliser automation system

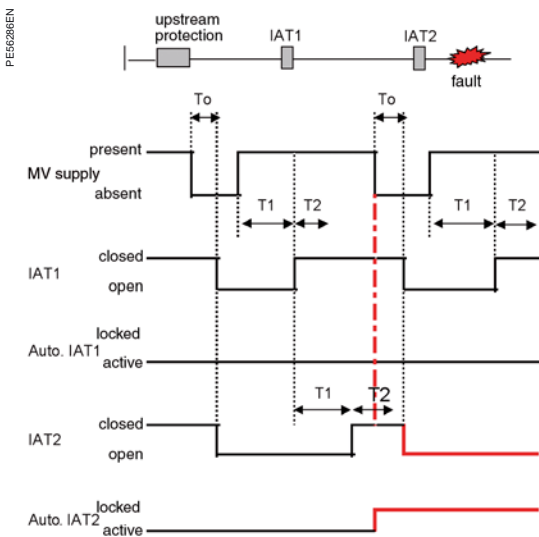
The sectionaliser automation system converts the switch into a disconnecter switch. In coordination with the recloser of the substation feeder, the automation system opens the switch after detecting a number of predefined fault currents (1 to 4) during the voltage dips in the reactivation cycle.

The following options are required for this function:

- Voltage measurement and monitoring for detections under 300 ms
- Fault current change detection.

Operation

- The line is powered and the switch is closed
- The automation system sends an opening order if:
 - the switch is closed
 - the number of permanent fault currents has been reached
 - the fault has disappeared
 - the MV voltage is not present.
- The automation system is reset at the end of the execution time delay launched after appearance of the first fault.
- The automation system can be:
 - deactivated by the configurator
 - switched on/off remotely and locally via the operator panel.



Voltage Time automation system	
To: voltage loss period	0 to 327 s in 1 s steps
Closing period	0 to 327 s in 1 s steps
Monitoring period	0 to 327 s in 1 s steps

Voltage Time automation system

The Voltage Time (VT) automation system is used with some switches which do not have current sensors and which do not allow the network to be reconfigured using the sectionaliser automation system.

The principle is to open all the switches when voltage is lost and to progressively restore power to the network by successively closing the switches. If closing a switch trips the line, it is locked in an open position and the cycle restarts to restore power to the upstream healthy part.

Upstream protection should also be equipped with a Voltage Time automation system.

The following options are required for this function:

- Voltage measurement and monitoring
- Voltage Time automation system.

Operation

- The line is powered and the switch is closed
- Loss of voltage: the switch opens after delay T_0
- Return of voltage: the switch closes after delay T_1 and voltage holding is monitored after delay T_2
- Loss of voltage during delay T_2 : the switch opens and the automation system locks.
- The automation function is reinitialised after locking:
 - using the "Reset automation system" pushbutton on the local operator panel
 - using the "Unlock automation system" command from the control centre.

The VT function can be switched on or off from the local operator panel or by remote control. It is still possible to control switches manually in "Local" mode.

Time-setting and time-stamping

A T200 can be time-stamped in one of the following ways:

- Locally using the laptop
- By the remote control system
- Via the Ethernet network
- By an internal GPS (available as an option)

Time-stamping is performed with millisecond precision, with:

- time zone management
- summer/winter time management.

Time-stamping precision:

- Resolution: 1 ms
- Discrimination between 2 events: 10 ms.

PE66293



Control centre

Archiving events and measurements

All data (variables) from the T200 or from the local Modbus network can be recorded. The recording and transmission mode for each variable can be configured.

This data is recorded in four logs for transmission to the SCADA system or for viewing locally:

Events log: information transmitted to the SCADA system

Variables configured as "events" are recorded in this log.

They are transmitted to the control centre according to the protocol exchange conditions.

Alarm log: spontaneous transmission

■ "Alarm" configured variables spontaneously trigger a call from the control centre.

■ These variables are also recorded in the "events" log.

System log: this can be consulted locally and is intended for maintenance and operation procedures, such as memorising transmission events, transmission errors and system configuration modification.

Measurements log:

Measurements configured as "records" are stored in this log.

Measurements configured as "events" and "alarms" are also recorded in the relevant logs.

The archive logs can be consulted locally and remotely via the Easergy T200 P web server configurator and can be downloaded in Excel format.

Criteria for recording variables

	Alarm log	Events log	Measurements log	Criteria
Indication				
TSD	■	■		<input type="checkbox"/> On change of state <input type="checkbox"/> On loss of closing
TSS	■	■		<input type="checkbox"/> On activity <input type="checkbox"/> On inactivity <input type="checkbox"/> Time-delayed <input type="checkbox"/> Alarm level: 1 to 3 e.g., SCADA, GSM, or SCADA and SCADA transmission
Measurements				
Periodic or average	■	■	■	Period: 10 s, 30 s, 1 min, 15 min, 30 min or 1 h
On thresholds	■	■	■	High and low
Dead band	■	■	■	Value as %
Min. and Max.			■	1, 7 or 14 days

Note: criteria can be combined.

Counters

A counter can be declared for each remote indication (TS) and remote measurement variable internal to the T200 or coming from a device connected to the local network. Counters can therefore be declared in order to establish:

- The number of operations of a switch
- The number of fault current passes
- etc.

There are 5 types of counter

- Counters for digital data TSS
 - pulse counter: counts the number of high or low state transitions (configurable) by a TSS. The theoretical scan interval for this counter is 10 ms
 - time counter: counts the time spent in the high or low state by a TSS
 - integrator counter: counts the number of high or low state transitions by a TSS in each integration period.
- Counters for analogue data
 - integrator: totals the associated TM every second
 - average: calculates the average for a TM over the last integration period.

The counter reading can be:

- Sent to the control centre if the protocol permits it
- Viewed on the display page of the operating software
- Modified from the control centre or the control page of the operating software.

PE66293

Measurement configuration

General Parameters

Variable name: Current P1 Correction factor: Direct/10

Logical Address: TM2 Class: Measurements 1 Access: DISPLAY

Internal Address: 0,0 External Address:

Unit: A Scale: Max value: 800 Min value: 0

Value format: Absolute + Sign

Periodic treatment: Log Event Dial-Up

Period: 15 min Type: Average Period: 15 min

Threshold treatment: Log Event Dial-Up

High threshold: Value: 500.1

Low threshold: Value: 0

Dead band: Log Event Dial-Up

Value in %: 10

Min and Max log: Maximum Active Minimum Active

Period value: 1 Day

Event storage capacity

Events	10 000
Alarms	2 000
System	6 000
Measurements	30 000

For all logs, when the storage capacity is reached, the most recent event clears the oldest from the list.

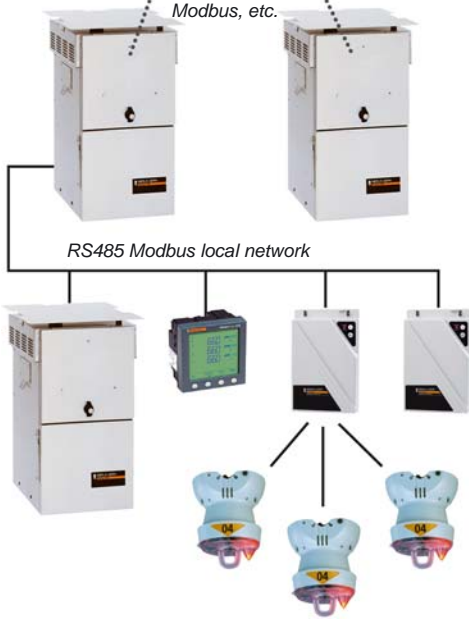
PE69281



SCADA

Communication networks: radio, PSTN, GSM/GPRS, Ethernet, etc.

Protocols: IEC, DNP3, Modbus, etc.



RS485 Modbus local network

Communication protocols

The communication module manages a “serial type” protocol and IP protocols at the same time.

Example: IEC 870-5-101 and IEC 870-5-104.

It is therefore possible to mix standard and IP transmission media.

Communication protocols can be downloaded, which simplifies procedures for updating versions. Two versions are embedded, which protects downloading and switching.

The range of communication protocols is continually updated and includes:

- IEC 870-5-101 and IEC 870-5-104
- Level 3 Serial DNP3 and TCP/IP
- Serial Modbus and TCP/IP with non-permanent communication management
- WISP+, HNZ
- Several proprietary protocols (please contact us).

Multi-channel SCADA communication

Three available communication ports

Easergy T200 P can manage up to three communication ports and ensure multi-site redundant communications.

- **Ports 1 and 2:** support all the transmission interfaces available in the product range.
- **Ethernet port 3:** this port is available for communication with the control centre using an IP protocol and Ethernet transmission interfaces. It can also be used for configuration and local operation.

Management of the various transmission modes

The ports can be configured to be used with single, dual or redundant channels:

Normal



One SCADA communication channel



Dual



Two SCADA communication channels

- Used with two SCADA sites for example.
- They work in exactly the same way:
 - the transmission is made simultaneously on both channels
 - reception is recognised on the first valid frame received.

Normal/standby



Two SCADA communication channels

- Used with different transmission media.
- Two operating modes:
 - **symmetrical:** T200 P changes to the other channel when there is a fault on the active channel
 - **automatic return:** dissymmetrical with or without automatic return: one channel is declared as the main channel and the other is the standby channel. After changeover, the return to the main channel is:
 - manual (local or remote reset) with the “no return” option
 - automatic once the cause of the changeover has disappeared with the “with return” option.

PE69281EN

Monitoring	Control	Diagnostic	Maintenance	Parametring
Communication general parameters				
Communication parameters on physical ports				
Protocol: IEC 60870-5-101				
Port 1 Mode:	Unbalanced	Link:	Normal	Media: Direct RS232 (internal interface)
Protocol: IP				
Port 2		Link:	Normal	Media: GPRS (internal modem)
Communication parameters on TCP/IP ports				
Protocol: IEC 60870-5-104				
Link: Normal				
Save				

Transmission interface range

■ **Integrated modems**

Modems and interface	Technical characteristics	Main functions
RS232 serial interface	Non-isolated Max. transmission speed : 38,400 bits/s	Direct connection and management of external transmission equipment ■ Direct: radio modem ■ Hayes: telephone, GSM Signal management: ■ Rx, Tx, DP, CPD, PDP, DPE, PAE, IA
Telephone modem (PSTN)	V.32 bis standard 300 to 14,400 bits/s Isolation: 8 kV	Message repetition (3) Main call no. Standby call no.
FSK radio modem	FSK V23 modulation 200 or 600-1200 bd Receive level: - 30 to + 10 dBm on 600 Ohms Transmission level: - 10 dBm or 0 dBm Reception access impedance: 600 Ohms or high impedance	Signal management: Rx, Tx, squelch, DP, DPE Parity, frame errors
FFSK radio modem	FFSK modulation 1200 - 2400 bd Receive level: - 30 to + 10 dBm on 600 Ohms Transmission level: - 10 dBm or 0 dBm Reception access impedance: 600 Ohms or high impedance	Test mode: carrier generation Signal management: Rx, Tx, squelch, Em cmd Parity, frame errors
Multidrop private dedicated line modem (DL)	FSK V.23 modulation: 600 - 1200 bd V.24 interface 2-wire half-duplex or 4-wire full-duplex transmission Line impedance: 600 ohms or high impedance (10 kohm) Carrier loss detection: 10 ms Carrier presence detection: 15 ms Isolation: 8 kV	Management: Parity, frame errors
GSM/GPRS modem	Dual-band modem 900 - 1800 MHz or 850 - 1900 MHz Triple-band collinear aerial with 6 db gain and 5 m cable - Indoor/outdoor installation	Transmission data: Message repetition (3) Main call no. Standby call no. SMS transmission
Ethernet port	10 base T/100 base T - TX (RJ45) 10/100 Mbits	Management of IP protocols and configurators

■ **External modems and transmission equipment**

T200 manages any type of modem or transmission equipment via the RS232 or Ethernet connection.

Local communication network

An optional master port is used to communicate with the various substation equipment (slaves).

- Protocol: Modbus master
- Port: RS232/485
- Equipment examples:
 - Sepam or other digital protection relay
 - PLCs
 - remote I/O for acquiring additional information
 - T200 slave in the same substation or nearby substation
 - metering unit
 - Easergy G200 and Flair 200C.

Local network

Protocol	Modbus master
Number of slaves	31 in RS485 connection
Maximum number of TAG	Digital inputs: 300 Digital outputs: 100 Analogue inputs: 200 Analogue outputs: 100

- Local and remote configuration
- Software download
- Configuration download
- Offline configuration

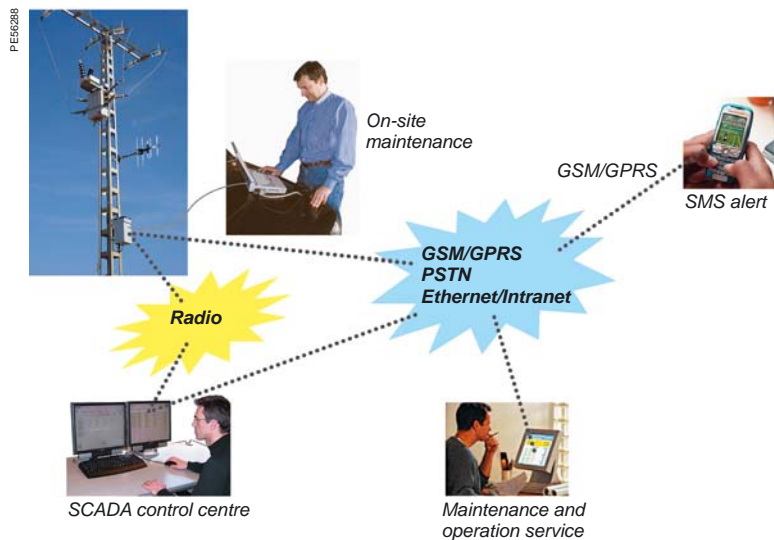
Embedded web data server

- Configuration, operation and diagnosis are carried out by connecting a laptop equipped with a web browser.
- The menu on the home page enables the user to select the menu display language.
- Access is secured by entering a login name and password.
- The web data server's HTML-format pages are used to:
 - display page: view states and measurements
 - control page: issue open/close orders and counter preset commands
 - diagnostic page: read and save archives
 - maintenance page: substation parameters, software version update, configuration download, network analyser
 - parameters page: Communication configuration, protocol, switch control, measurement and detection.

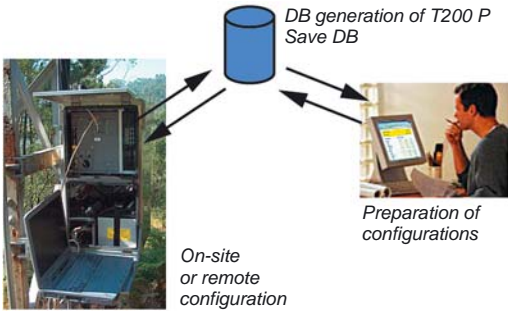


Remote and local connection

- Local access is achieved by connecting the PC to the USB or Ethernet port.
- Access to remote data parallel to the control system is possible via the GSM, GPRS, Ethernet or PSTN transmission networks regardless of the communication protocol.
- With local connection, pages are refreshed automatically either cyclically or on a change of state. The embedded web server is used for local supervision of the substation.



PE60289



Data configuration

Easergy T200 P is supplied with a factory-tested preconfigured database.

Configuration by web server

- Customisation of standard configurations and preparation of offline configurations
- preparation of the standard database
- preparation of site configurations.
- Configuration by downloading files
- loading the predefined configuration
- saving the definitive configuration after commissioning.

■ The configurable parameters are:

- switch management: command type, measurement sensors, fault current detectors, voltage presence, automation systems
- communication: protocol type, port operating mode, modem type, protocol parameters, exchange table
- variables: labels, address, associated information (remote controls), access type (user session, administrator, etc.), definition of states and recording criteria
- classes: customisation of display and command pages (variables are grouped and presented in classes).

PE60289EN

Label	Status
Switch state 1	Closed
Interruptor	Unlocked
Input voltage	On
I0 fault	Normal
Imax fault	Normal
TM63	0
Number of operations	117
Measurements 1	
Current P1	0.0 A
Current P2	---
Current P3	318.4 A
I0 current	168.1 A
Mean phase current	282.8 A
Power factor	0.348
Frequency	49.99 Hz
U12 Voltage	33936.4 V

Configuration by the SCADA system

Some parameters are designed to be modified by the SCADA system via the communication protocol. These are mainly parameters connected to network operation:

- Fault current detection thresholds and voltage monitoring
- Measurement recording value for min., max. and dead band thresholds.

Operation and control

Alongside operation and control of the network from the SCADA system, it is also possible to operate the equipment locally or remotely using three pages:

- Display of states and measurements
- Issuing commands: switches, counters (initialisation), automation system on/off, fault detector reset and other digital outputs. The issuing of commands is made secure by a selection and confirmation process.
- Consultation of transmitted and archived data
- on-screen consultation of archive logs
- extraction of logs on a PC as an SCV file for analysis.

The views are refreshed periodically or automatically on a change of state.

PE60289EN

Label	Counter/Reset Value	Current state	Control order
Switch state 1		117	Get Reset Value
Number of operations	100	---	OK
Pre-set number of operations		---	OK
Switch state		Closed	Opened
Measurements 1			
Active energy counter	0 kWh	36308 kWh	Get Reset Value
Pre-set active energy		---	OK
Reactive energy counter	0 kVArh	1188 kVArh	Get Reset Value
Pre-set reactive energy		---	OK
Digital inputs/outputs			
Digital output 1		Closed	Opened
Digital output 2		Closed	Opened
Digital output 3		Closed	Opened

Maintenance

Update of software versions or change of protocol

A new version of the communication card software or protocol can also be downloaded from a PC. Two software versions are saved. It is possible to switch between the two versions.

System events log file analysis

- Memorisation of transmission events (to determine the origin of a recurrent communication fault)
- Indication of transmission errors (CRC error, collisions, PSTN line disturbance, redundant changeover, etc.)
- Indication of system events (T200 start-up, T200 reset, configuration modification, etc.).

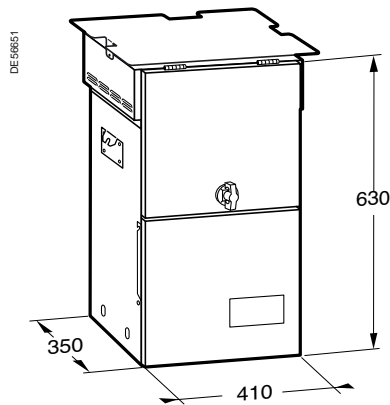
Communication analyser

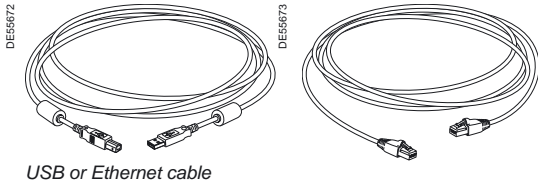
This analyser observes the frames exchanged on ports 1 and 2 with the control centre.

General characteristics and dimensions

Capacity			
	Controllable switch		1 channel (2 channels optional)
	Additional inputs		Open door, 8 free digital inputs; dry loop supply
	Additional outputs		3 dry contact outputs; 1 A to 230 Vac relay outputs
Electrical and mechanical characteristics			
Dielectric	AC voltage input	IEC 60 255-4	Insulation (50 Hz/1 min): 10 kV Surge (1.2/50 μs): 20 kV
	Toroid input	IEC 60 255-4	Insulation (50 Hz/1 min): 2 kV Surge (1.2/50 μs): 5 kV
Electromagnetic	Fast transient bursts	IEC 61 000-4-4	Level 4: 4 kV (sector and sensors) 2 kV (other circuits)
	Electrostatic discharge	IEC 61 000-4-2	Level 3: 6 kV on contact, 8 kV in the air
	Electric fields	IEC 61 000-4-3	80 MHz to 1 GHz - 30 V/m
	Radio frequency in MC	IEC 61 000-4-6	0.15 MHz to 80 MHz - 10 V rms
	Dampened oscillating waves	IEC 61 000-4-12	2.5 kV common mode, 1 kV differential mode
	Impulse magnetic field	IEC 61 000-4-9	1000 A/m peak
	Surges	IEC 61 000-4-5	Coupling between 1 kV line wires, between wire and 2 kV earth
Climatic	50 Hz magnetic field	IEC 61 000-4-8	30 A/m permanent and 300 A/m 1 to 3 s
	Operating temperature		-25°C to +55°C
	Relative humidity		Less than 95% at 40 °C
	Salt mist	IEC 60 068-2-2	344 h
	Storage temperature		-40°C to +70°C
Mechanical	Enclosure material		Inox 316 L
	Vibrations	IEC 60 068-2-5	10 to 500 Hz; 1 g or 0.075 min peak-to-peak
	Dimensions (T200 P 2-channel)	W x L x D	630 mm x 410 mm x 350 mm
	Weight		40 kg
	Protection	IEC 60 529	IP55

Dimensions





USB or Ethernet cable

PC connection cables

The cables to connect a PC to the Easergy T200 P USB or Ethernet configuration ports are standard. Three versions are available in the range.

Product references

- **T200-USB**: 3 metre USB-A and USB-B type USB cable
- **T200-ETH3**: 3 metre crossed Ethernet cable for direct PC-T200 connection
- **T200-ETH10**: 10 metre crossed Ethernet cable for direct PC-T200 connection



Switch and auxiliary simulator

Implementation and operation tools

Switch and auxiliary simulator (Reference: T200-ST)

The switch and auxiliary simulator is compatible with all types of power supply and control logic and can perform all input and output tests for the T200. It is supplied with connection cables fitted with connectors which come in place of the switch. The simulator can be fitted without altering the wiring. It is used to:

- Simulate control of two switches: open/close order and change of position
- Display output states
- Simulate digital inputs.

Test case for testing states, voltage and current injection

(Reference: T200-TESTCASE)

The T200-TESTCASE test case is used to carry out all operational tests on site. It operates independently using power supplied by the T200. It includes connection cables and does not require any modifications to the T200 wiring. In addition to the T200-ST functions, it is also used to:

- Simulate a phase-to-phase or zero sequence fault current
- Simulate a fault cycle (automation system test).

The injection values can be configured in order to carry out all the operational tests without modifying the T200 database:

- Fault current detector: phase-to-phase and zero sequence
- Voltage loss and presence detection
- Automation systems.

This case includes:

- The T200-ST simulator
- A programmable voltage and current simulator
- Connection cables.



Test case

Transmission equipment

Radio equipment

In order to simplify on-site implementation, the radio transmitter-receiver station can be supplied as a factory-programmed and tested, pre-assembled option.

The equipment includes:

- Aerial connector mounted on a partition in the connection section, complete with mounting accessories (surge suppressor and connection cables)
- Radio, type used: TAIT serial 81xx or Motorola
- Rack connection cables and aerial connector
- Reference included in the Easergy T200 P parts list.

Radio aerial and connection cable

- Directional and omnidirectional aerials available on request
- Aerial cable with type N connector at each end available on request.



GSM aerial

Easergy L500 is a basic SCADA system which operates under Windows® and has been designed to control Easergy products in just a few clicks.

Its range of functions and its value for money make it an outstanding tool for the following applications:

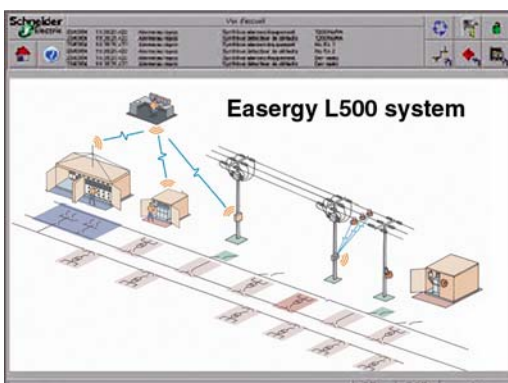
- Remote control of small networks
- System dedicated to network control in addition to the DMS type system
- Temporary system pending implementation of a DMS
- Installed base maintenance
- Experimentation.

Easergy L500 offers:

- An immediate return on investment: the network is operational immediately after investment in the first substations.
- Confirmation of your blueprint by the installation of a remote control system.
- Balanced and gradual training of the personnel in charge of operating the networks.

With the compatibility of the Easergy T200 range with any type of DMS SCADA proven by our installations, we offer a global solution for the early phases of your project which capitalises on the investment made in substations.

PE56310



Easergy L500 includes all the functions needed to operate the MV network in real time

A communication front-end managing up to 8 communication ports a various transmission modes:

- Continuous transmission (cyclical interrogation of equipment). The interrogation cycle can be configured.
 - private dedicated line: permanent link
 - fibre optic
 - RS232, RS485 links.
- Non-continuous transmission (exchange on alarm initiated by remote or equipment or supervisor)
 - digital or analogue UHF and VHF radios
 - telephone and GSM.

One control station with 1 to 3 screens

Password-protected access. A number of profiles (display, control, configuration) can be configured. The various views and data types can be displayed via icons and lists in the toolbar.

■ **General view with network representation** (mimic-based or geographical)

The remotely controlled substations are animated on an alarm summary.

■ **Substation view**

Single-line representation of the substation with:

- switch position, earthing switch, fault current detector, measurements, trend curves
- issuing of open and close orders secured by selection/confirmation
- communication status: call, date of last connection
- detailed views can be accessed from the network view (click on substation) or the substation list.
- Alarm log refreshed in real time, with the 6 most recent alarms displayed in the toolbar which is present in all views. Alarms can be sorted by substation and by filter. They are colour-coded according to their status
- **Archive log** can be viewed by substation and by filter
- **System view** with status of communication equipment.

A professional configurator for creating remotely controlled substations and transmissions in just a few mouse clicks

- Applications can be permanently enhanced using this editor
- Representations of network and substation views can be enhanced using the graphics editor on the supervisor.

Additional system functions

- System synchronisation via GPS clock in the PC
- Time setting of remote equipment via protocol
- Call management: automatic general control, general control on operator request, periodic call, single call on request
- External visual and audible alarm
- Event log printing.

The Easergy L500 offer includes a wide range of communication accessories

- FSK or FFSK radio modem
- PSTN and GSM modems
- FSK dedicated line modem
- Fibre optic interface.

L500 capacity

- 500 T200 P 2-channel type devices
- 8 communication ports
- Licence according to size of application: 256 variables, 500 variables, 1000 variables, unlimited.

General view: network representation on a geographical map

General equipment call
 Access to system view
 Connect/disconnect with password
 Archives: global or by substation
 Alarm list: global or by substation
 Access to substation view by list
 Network view

System disconnect
 Help files and user manuals
 5 most recent alarms with states

T200 P
 MV/LV substation with T200 I
 Flair 200C

12/1/006 15:57:50 admin

Substation view

Communication management bar

4-channel T200 I, radio communication

Flair 200C, GSM communication

12/01/006 15:59:30 admin

12/01/006 15:40:45 admin

Tick one box only between each of the horizontal lines.
 Orange box corresponds to none priced functions.

T200 P model Quantity

1 - For switch **PM6 and others (P2)**

Variants and options

2 - Number of channels 1 channel (1) 2 channels (2)

3 - Measurements No measurement (ZZ-)
 I measurements (the measurement of I includes fault detection) (AZ-)
 I and U measurements (BZ-)
 I, U measurements, power, energy, etc. (CZ-)
 I, 2 U measurements, power and power supply changeover (DZ-)

4 - Power supply U motorization = 48 Vdc (A)
 U motorization = 24 Vdc (B)
 U motorization = 48 Vdc and U power supply 43-57 Vac (F)

5 - Battery Standard version: 12 V-24 Ah battery (C)
 Option: 12 V-38 Ah battery (B)

6 - Software options Standard (includes sectionalizer automation system) (A)
 Automation system Voltage Time (B)
 Specific customer version (C)

7 - Protocols Modbus and Modbus TCP (M2)
 IEC 870-5-101 and IEC 870-5-104 (I2)
 DNP3 and DNP3 TCP (D2)
 Others available on request (xx)

8 - Modem port 1 (Ethernet and USB included as standard) Non-isolated RS232 (Z)
 GSM and GPRS 900 - 1800 MHz (G)
 GSM and GPRS 850 - 1900 MHz (H)
 PSTN (F)
 V23 FSK radio modem: 600-1200 Baud (B)
 FFSK radio modem: 1200-2400 Baud (C)
 DL multidrop (private line): 600-1200 Baud with 8 kV isolation (D)

9 - Modem port 2 (Ethernet and USB included as standard) None (Z)
 Non-isolated RS232 (Z)
 GSM and GPRS 900 - 1800 MHz (G)
 GSM and GPRS 850 - 1900 MHz (H)
 PSTN (F)
 V23 FSK radio modem: 600-1200 Baud (B)
 FFSK radio modem: 1200-2400 Baud (C)
 DL multidrop (private line): 600-1200 Baud with 8 kV isolation (D)

10 - Local network None (Z)
 RS485 master Modbus 2 kV isolated (R)

11 - GPS synchronisation None (Z)
 GPS synchronisation (G)

12 - Transmission equipment port 1 None (Z)
 Radio integration kit (connector, cable, etc.) (K)
 RS232/485 converter with 2 kV isolation (I)
 Others available on request: radio receiving set, fibre optic modem, etc. (x)

13 - Transmission equipment port 2 None (Z)
 Radio integration kit (connector, cable, etc.) (K)
 RS232/485 converter with 2 kV isolation (I)
 Others available on request: radio receiving set, fibre optic modem, etc. (x)

14 - Other options None (Z)
 According to customer, please consult us (x)

To create the reference for your T200 P, use the model below to fill in the codes located to the left of the boxes you have just ticked.

Variants and options no.:

1 2 3 4 5 6 7 8 9 10 11 12 13 14
P2

Only one of the boxes (ticked or filled) by the needed value) have to be considered between each horizontal line.
 Orange box corresponds to none priced functions.

T200 P accessories

Configurator cables

USB length 3 m	T200-USB-3	<input type="text"/>
USB length 5 m	T200-USB-5	<input type="text"/>
Ethernet length 3 m	T200-ETH-3	<input type="text"/>
Ethernet length 10 m	T200-ETH-10	<input type="text"/>

Simulators

Universal simulator with auxiliary	T200-ST	<input type="text"/>
Test case	T200-TESTCASE	<input type="text"/>

L500 accessories

Scada licence

256 variables - x communication ports	L500-F-256-x	<input type="text"/>
1000 variables - x communication ports	L500-F-1000-x	<input type="text"/>
5000 variables - x communication ports	L500-F-5000-x	<input type="text"/>
Unlimited number of variables - x communication ports	L500-F-nl-x	<input type="text"/>

*x = number of communication ports from 1 to 8
 Application development: please consult us.*

Accessories

Visual and audible alarms	L500-ext-alarms	<input type="text"/>
FSK radio modem	G500M-M-B	<input type="text"/>
FSK radio modem	G500M-M-C	<input type="text"/>
PSTN modem	Olitec-PSTN-USB	<input type="text"/>
FSK DL modem (private line)	MDU910LL	<input type="text"/>
GSM modem with aerial	GSM KIT	<input type="text"/>

Miscellaneous

Specify miscellaneous equipment to be supplied

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