Three-phase multi-function electronic meter

PRISMETER 2&5

Class 0,2 S or 0,5 S

- PRISME Concept
- 2- or 4-Quadrant
- Load Profile
- Power Quality monitoring
- Harmonic Analysis
- DLMS Protocol

CE

The **PRISMETER** is designed to cope with tariff metering for industrial customers, sub-stations and power generation plants.
A **multi-energy** meter, it is used for the measurement of active, reactive and apparent energy on three-phase networks.
A **multi-function** meter, it measures both the parameters linked to the metering of electrical energy and those linked to the power quality.

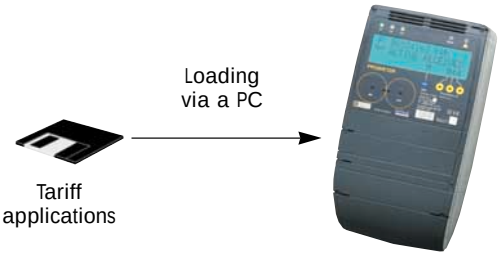
THE PRISME CONCEPT

The **PRISMETER** benefits from the **PRISME** concept. This concept strongly differentiates between the hardware base of the meter and its functions, which are defined by tariff applications. Therefore, it is fully **programmable** and **multi-function**.

THE HARDWARE BASE

The PRISME base is composed of measurement, calculation and processing electronics. Two tariff applications can be loaded in the base (for example: the first application can be dedicated to energy measurement and the other to power quality monitoring). The integrated PRISME supervisor manages the exchanges between the base and the tariff applications. Applications are executed simultaneously and determine the functions of the meter.

The PRISME equipment base handles data required by the applications and ensures its availability :
- measurement of elements that are essential for metering and for the quality of the electrical energy supply,
- management of the date and time (Real Time Clock for tariff control, date and time stamping of power demand),
- regular back-up of data,
- selftest of the operation of the electronic systems, test mode for local verification by the operator, etc.



THE DLMS PROTOCOL

DLMS (Device Language Message Specification) is a communications protocol that enables data to be exchanged between communicating systems. This exchange of data takes place independently of both the communications support used and the functions fulfilled by the communicating systems.
As a result, DMLS is the ideal protocol for a multi-function, open-ended meter.

THE FUNCTIONS CARRIED OUT BY THE PRISME BASE

Metrological measurements
- active energy delivered and consumed per phase,
- reactive inductive three-phase energy,
- reactive capacitive three-phase energy,
- work supplied by the apparent power in three-phase.

Power quality measurements
- amplitude, duration and dates of appearance of voltage faults, per phase,
- harmonic analysis (U & I) up to 25th (optional),
- unbalanced voltage.

Back-up
Back-ups of contractual parameters and metering data are carried out at regular intervals that can be parameterised by the tariff applications. When power is cut off at the meter, the back-up process is automatically triggered. This information is then saved in a non-volatile memory. A Lithium battery provides the time/date function back-up. The battery compartment is accessible from the front of the meter, which makes it easy to replace (life span: 10 years).

TARIFF APPLICATIONS

The standard tariff applications are designed to meet a wide range of functions thus enabling revenue billing, load control, and power quality monitoring.

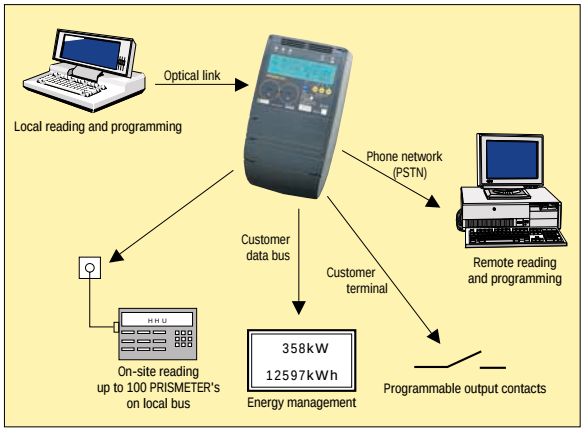
Metrological functions
- breakdown of energy (import and export) into the various tariff settings,
- calculation of average power (programmable interval times of 1 to 60 minutes),
- storage of energy in TOU registers for current billing period and the n previous periods (n programmable),
- storage of load curves (kW, kvar, kVA),
- storage of Maximum Demand Interval for current billing period and previous periods,
- calculation of Transformer and Line compensation,
- calculation of power and overruns of energy compared to subscribed power levels,
- assignment of customer output contacts,
- management of external synchro,
- energies at the end of programmable periods (day, week, month).

Power Quality functions
- detection of voltage sags, swells, interruptions, outages according to thresholds programmed by the energy distributor,
- recording of fault characteristics (time, date, duration, magnitude, phase, type),
- calculation and storage in memory of slow variations,
- harmonic analysis (optional).

THE COMMUNICATION INTERFACES

Local reading and programming
Accessible from the front of the meter, the optical port allows direct communication with a PC for fast programming and reading at a baud rate of 19200.

Remote reading and programming
The meter has a built-in V22 bis (2400 bps) modem. The transmission protocol is TRIMARAN+. The utility can thus carry out remote reading and programming functions at a distance from the meter. The customer can carry out remote reading of invoicing data stored in memory by the meter at any time.



Local bus
This bus is a two wire cable communications network that links the different meters spread over a building (up to one hundred PRISMETER's can be connected).
It enables a dialogue to be set up between a Hand Held Unit (HHU) or a PC and the meters anywhere on the network.
The transmission logic used is that of the EURIDIS+ protocol.

The customer data bus
The bus provides a connection to an energy manager or to a PC. It transmits customer real time information to carry out energy monitoring and load control.
The information is delivered on a cyclical basis : current tariff period, consumption index, power demand, etc.

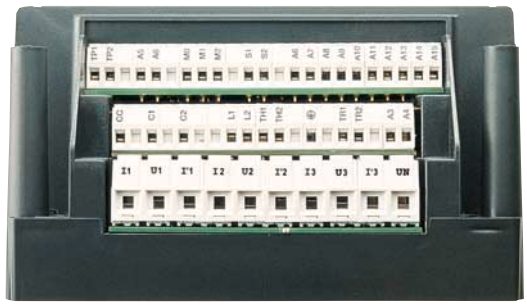
INPUT / OUTPUT

Terminal connector bars
The PRISMETER has three terminal connector bars.

«Customer» connector bar
Dedicated to the consumer, for energy management, it provides:
- 2 «active energy» metrological pulse output (P+ ; P-),
- 2 «reactive energy» metrological pulse output (Q+ ; Q-),
- end of Interval contact output,
- 4 or 9 programmable contacts,
- 1 «customer data bus» output.

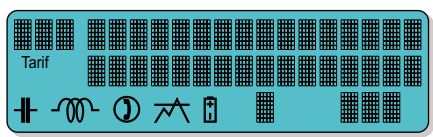
«Distributor» connector bar
Dedicated to the energy distributor, it comprises :
- a remote communications bus output for local programming and reading (via a HHU),
- connection to the public switching telephone network (PSTN), or through a PABX if needed,
- 1 time synchronisation input,
- 2 inputs for tariff applications,
- 2 external pulse energy inputs.

«Power» connector bar
It connects meter (current and voltage) measurement circuits to the three-phase network.



DISPLAY

Indicator lights and pictograms
Three green LED's indicate mains supply present on each of the phases. These indicators flash when the active energy on the corresponding phase is being metered. A red LED indicates an error condition detected by the instrument. The pulse rate of two yellow LED's is proportional to the measured energy (active and reactive) thus enabling meter testing.
Pictograms on the display unit indicate the events processed :
- consumption of inductive reactive energy,
- consumption of capacitive reactive energy,
- remote reading in progress,
- excess power demand.



The display unit
A large, alphanumerical display unit allows the user to view the parameters stored in memory (up to 1000 parameters). The applications loaded determine the contents and designation of the registers displayed. Three push-buttons are used to scroll through the parameters. A fourth button is used for switching between tariff applications.
Back-lighting of the display unit is available as an option.

TECHNICAL SPECIFICATIONS

- **Network** : 4-wire and 3-wire, three-phase
- **Accuracy classification**
  - Active energy : 0,5 S or 0,2 S (IEC 687)
  - Reactive energy : 2 (IEC 1268)
- **Integration period**
  Can be parameterised by the application :
  1 to 60 min in 1-minute increment
- **Measurement**
  - Nominal voltage (V_n) : 57,7/100 V or 230/400 V (max. 2 V_n)
  - Nominal current : 1 A or 5 A
  - Starting current : 20 mA
  - Frequency : 40...65 Hz
- **Power supply**
  The meter can power itself from the voltage circuit
  - Consumption : < 15 VA at 57,7 V
    : ≤ 20 VA at 230 V

  or from an auxiliary power supply
  (48...127 V_{DC}/57,7...100 V_{AC} or 230 V_{AC})
- **Output contacts**
  - Bi-stable relays : 10 A / 230 V_{AC}
  - Monostable relays : 10 A / 230 V_{AC}
  - Pulse outputs : 48 V_{DC} / 27 mA max. (NPN collector open)
  - Active energy pulses : C = 0,1 Wh (230 V) / 0,025 Wh (57,7 V)
  - Reactive energy pulses : C = 0,1 Varh (230 V) / 0,025 Varh (57,7 V)
- **Inputs** : E1, E2 : 440 V max. — E3 : dry contact
- **Local communication bus**
  maximum length 500m — up to 100 PRISMETER'S
- **Modem**
  - Conforms to the CCITT V22 bis recommendation (2400 bps)
  - Possible adaptations : ISDN, GSM
- **Operating environment** : -20°C...+60°C / HR ≤ 90%
- **Storage environment** : -25°C...+70°C / HR ≤ 100%
- **Weight** : 2,750 kg
- **Case** : UL 5V polycarbonate
- **Watertightness** : IP 51

Conformity to french and international standards

IEC 687 :	Static active energy meters for a.c. current
IEC 1268 :	Static reactive energy meters for a.c. current
IEC 950 :	Safety of information processing equipment
IEC 1000-4-2 :	Tests of immunity to electrostatic discharge *Level : 15 kV with terminal cover*
IEC 1000-4-3 :	Tests of immunity to radiated electromagnetic fields *Level : 40 V/m from 80 to 1000 Hz*
IEC 1000-4-5 :	Tests of immunity to overloads *Shock wave U 1,2/50 µs, I 8/20 µs : 6 kV (U and I circuits)* *Shock wave U 10/700 µs : 4kV (modem ; remote communication)*
IEC 1000-4-6 :	Tests of immunity to conducted disturbance
IEC 1000-4-8 :	Tests of immunity to electromagnetic fields *Permanent field 400 A per min* *Short duration field : 1000 A/m duration 1 sec*
IEC 1000-4-12 :	Tests of immunity to damped oscillating waves *Common mode : 2,5 kV* *Differential mode : 1 kV*
IEC 1107 :	Optical link - Exchange of data
EN 55022 :	Immunity to induced radio wave disturbance
HN 44S80 :	General specifications for the supply of electric energy meters (EDF specification)

Dimensions and mounting