



Femto D4 DC

Counter/analyzer of DC Energy



Atto DC

Transducer of DC Energy

Femto D4 DC is a DC Energy Counter / Analyzer with back lighted LCD graphic display, while **Atto DC** is a DC Energy Transducer. Both are equipped with a microprocessor with outstanding flexibility and accuracy designed to meet the most demanding applications of electrical parameters analyses and energy supply monitoring in the photovoltaic system, wireless telephonic system, battery system, etc. Voltage, current, power and energy, max and min voltage and current measures. Input of 60mV or 100mV for shunt.

The instrument can be integrated with other Electrex products to manage energy monitoring systems, other parameters (solar radiation, temperature, humidity, etc.), alarms and even with remote access (GSM / Internet). In this way you can keep under review the state of operation, promptly and automatically check any kind of malfunction (e.g. a string of the photovoltaic plant that stops producing photovoltaic energy), any theft or tampering (e.g. solar panels) or access to restricted areas.

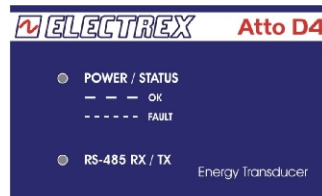
Measurement system

All the readings are obtained with a continuous sampling of the voltage and current in order to ensure the maximum metering accuracy.

A sophisticated digital measurement method with a compensation system of the internal amplifiers' offsets ensure the maximum metering accuracy and stability irrespective of the signal level and the environmental working conditions.

Simple to use

Femto D4 DC is equipped with a graphic dot matrix LCD display with a led backlight and adjustable contrast that allows the simultaneous reading of 2 parameters and their symbols with high visibility digits. 3 keys make the instrument use simple and rational, while page displayed at switch on is at user choice.



Through a simple keyboard set up is possible to set all the operative parameters like integration time (1-60 min), digital outputs and alarms (threshold, delay and hysteresis), digital input, RS485 address. The set-up is password protected.

Atto DC is equipped with two Led indicators located on the front panel that provide an indication of instrument's state and RS485 port operation.

Digital input

Femto D4 DC is equipped with an optically insulated digital input complete with programmable filter for input glitches. The digital input is set to operate for external pulse count of, for example, water meters, gas meters (insulation to meet the ATEX requirements), quantity count, etc. Other user selectable operative modes are ON/OFF state input (example for reading the ON/OFF state of machines and switches) and tariff change input (example for day-night tariff changeover). The digital input requires an external 10-30Vdc power supply.

Digital outputs

Femto D4 DC is equipped with two optically insulated transistor outputs rated 27 Vdc 27 mA per DIN 43864 standards. The two outputs are factory set to the transmission of pulses proportional to the imported and exported energy (pulse weight and length are user programmable). The outputs may be alternatively configured as outputs of the internal alarms (see Alarms) or as remote output devices controlled via serial line and Modbus commands.

Measures

Parameters	Type	Range
Voltage	U	h
	U MAX (1)	h
	U MIN (1)	h
Current	I	h
	I MAX (1)	h
	I AVG (2)	h
	I MD (2)	h
Active Power	P	h
	P AVG (3)	h
	P MD (3)	h
Temperature	T (°C and °F) (4)	h
Time life	h (1/100 h)	h
Active energy	E _a IMP (5)	h
	E _a EXP (5)	h
Pulse counter	CNT (6)	h

- (1) Value at a time of 500ms.
- (2) Average value (rolling average) over the integration time (1.. 60 min. programmable).
- (3) Import /Export average value (rolling average) over the integration time (1.. 60 min. programmable).
- (4) Microprocessor internal temperature
- (5) Import/Export energies displayed as 9 digits in floating-point readings; internal energy metering performed with 0,1 Wh minimum resolution and 99.999.999,9999 kWh maximum energy count before rollover.
- (6) Total and partial (for instrument with digital input)

Serial communication

Femto D4 DC is equipped, as standard feature on all types, with an optoinsulated and over-voltage protected RS485 serial communication port. The protocol is a full compliant Modbus-RTU suitable for communication with PLCs and with SCADA programs. The instrument data are read as numerical registers composed by mantissa and exponent in the IEEE format. A transmission speed of up to 38.400 bps, with maximum 125 registers (equivalent to 62 parameters) per query with no waiting time between queries, ensure an unrivalled communication speed and dialogue efficiency.

Types on request

Several hardware configurations are available on request. They include different power supply and Input/Output configurations.

Alarms

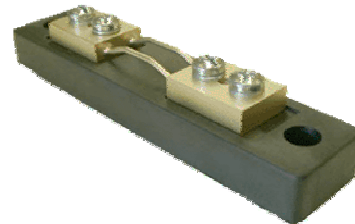
Femto D4 DC is complete with 2 programmable alarms offering the maximum configuration flexibility for adapting to the most diverse requirements. Each alarm can be selected to link to any one of the parameters available, for example, either as a minimum and/or as a maximum. Linking of both alarms to the same parameter is also possible for operating as dual threshold alarm. The alarms configuration includes the option of precise setting of a delay time (1-99 sec), an hysteresis cycle (in % of threshold value) and the polarity of the output contacts (NO, NC). The alarms state information is always available on serial communication as Modbus "coils". Due to the numerous combinations available, only a part of them are programmable by keyboard while are entirely programmable via serial port with the Energy Brain software or via serial port by means of Modbus *Holding registers*.

Voltage Divider

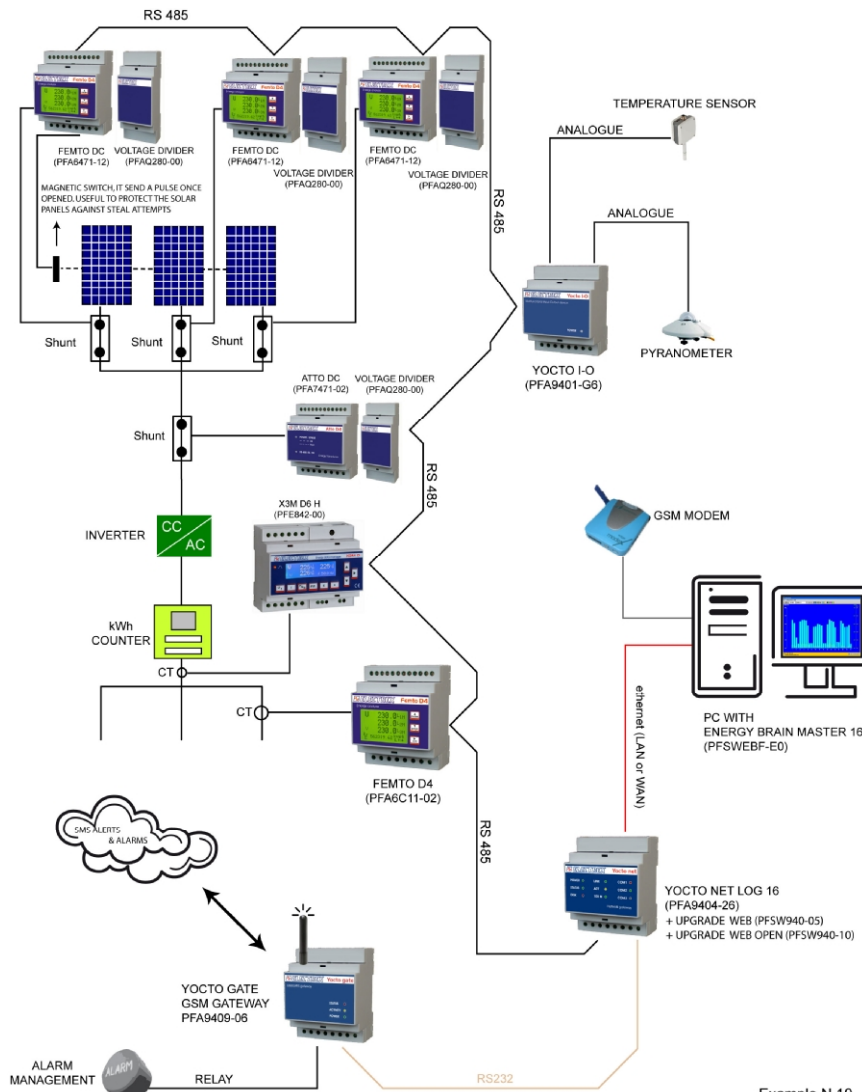
Femto D4 DC and **Atto DC** directly measure up to 300V. For voltage up to 900V is mandatory use a voltage divider with ratio 3/1 (e.g. input of 900V correspond to an output of 300V). The voltage divider size is of 2 DIN modules.

Shunt

Femto D4 DC can be used with DC shunt in class 0.5% with voltage drop 60mV or 100mV. Versions are available with flow from 10A and 25A based plastic support and 50A and 100A without support base. Other versions, from 1A to 15.000A, are available on request. All models are in accordance with the standards DIN43703.



Shunt 10A 60mV based plastic support.

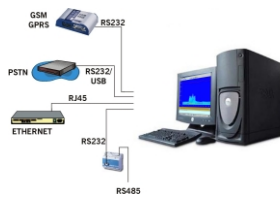


Example N.10

Example of a monitoring system of a photovoltaic system with remote management measures and alarms

Energy Brain Software

Energy Brain is the software package designed for the realization of all types of local and/or wide area networks of instruments. It is suitable for application with all the Electrex instruments equipped with communication port and it supplies all the functions needed for an accurate monitoring and targeting of industrial energy consumption.



Configuration

- The available choices enable the maximum flexibility in adapting the software to the type of network (several types of simultaneously connected networks too) and to the operator needs.

Several Energy Brain versions are available according to the functions and the number of channels required.

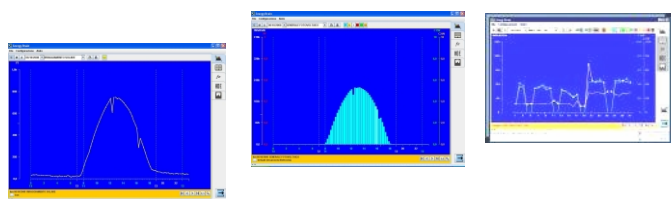
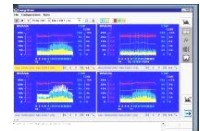
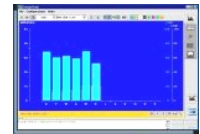
On line readings display

- On line display of the readings supplied by the field instruments.



Load and energy profiles/graph survey

- Solar radiation graphs
- Demand profiles (DD, MM, YY graphs)
- Energy profiles (MM, YY graphs)
- MD and TOU tariff profiles (MM, YY graphs)
- Up to 4 graphs displayed simultaneously
- Zoom and parameter selection tools
- Graphical and numerical print-out
- Data export



Technical Specifications

Measures

Voltage:	..... U
Max:	..... U _{MAX}
Min:	..... U _{MIN}
Current:	..... I
Max:	..... I _{MAX}
Media (AVG):	..... I _{AVG}
di Punta (MD):	..... I _{MD}
Active Power, IMPORT:	..... P _{IMP}
EXPORT:	..... P _{EXP}
Average (AVG) IMPORT:	..... P _{AVG IMP}
EXPORT:	..... P _{AVG EXP}
Peak (MD) IMPORT:	..... P _{MD IMP}
EXPORT:	..... P _{MD EXP}
Active Energy; IMPORT:	..... E _{a IMP}
EXPORT:	..... E _{a EXP}
Time life TOTAL and PARTIAL:	..... Hours, 1/100 hour
Microprocessor internal temperature:	..... °C, °F
Pulse counter (for each input):	..... C _{NTT} , C _{NT Part} .

Functional Characteristics

Measurement system:

- Energy counter on 2 quadrant (programmable)
- 12 bit A/D converter (2 channels)
- Continuous sampling of voltage and current
- Automatic offset compensation
- AVG values, peak, max and min stored in a non-volatile memory

Communication port RS-485:

- Galvanically insulated
- Baud rate from 2400 to 38400 bps
- Over voltage protected
- Protocol Modbus-RTU, full compliant

2 digital output (if available):

- Galvanically insulated
- DIN 43864 (27Vdc, 27mA)
- Programmable functionality: pulse output, alarm contact, remote control.

1 digital input (if available):

- Galvanically insulated
- Programmable functionality: external pulse count, ON/OFF state detection, tariff changeover (max 2 tariffs).
- Programmable 10/100 Hz filter for input glitches suppression.

Front Panel Femto D4 DC

Display:.... graphic LCD with adjustable contrast 100x64 dots
Visible area.....43x25 mm
Backlight:..... yellow/green Led
Display update interval:..... 1s
Keyboard: 3 keys

Electrical Characteristics

Voltage input:
Direct input: 300 Vdc (max 360)
With voltage divider:..... 900 Vdc

Current Input

With external shunt:
Primary:programmable (max. 10 kA)
Secondary:.....60 - 100 mV

Digital Inputs (depending on type):

Power supply (external):..... 10 to 30 Vdc
Absorbed current: 2 to 10mA
Max counting frequency: 10 or 100Hz (programmable)

Digital Outputs (depending on type):

Type:..... open collector (NPN) per DIN 43864
Max voltage:..... 27 Vdc
Max current:..... 27mA

Power supply (separate from voltage inputs):

standard type:..... 230/240Vac +/- 10% 50/60Hz
Femto D4 DC 15÷36Vac 50/60Hz, 18÷60Vdc
on request: 115/120Vac +/- 10% 50/60Hz
..... 400Vac +/- 10% 50/60Hz
Self consumption: < 3VA

Galvanic insulation:

Power supply (separate):..... 4 kV
RS485 serial port: 1,5 kV
Digital Input & Outputs: 1,5 kV
Analogue 4-20mA Outputs:..... 1,5 kV

Working Conditions

Working temperature: -10°C/+50°C, 14,00°F/+122,00°F
Storage temperature:..... -15°C/+60°C, 5,00°F/+140,00°F
Max relative humidity:..... 95% without condensation

Mechanical Characteristics

Case: self extinguish plastic V0 class
Protection degree: IP40 on frontal panel
..... IP20 on terminal side
Size: 70 x 90 x 58 mm (4 DIN modules)
Mount:..... DIN rail

Product code

Type	Code
FEMTO D4 DC RS485 230-240V 1DI 2DO	PFA6471-12
FEMTO D4 DC RS485 18÷60VDC 1DI 2DO	PFA6471-18
ATTO D4 DC RS485 230-240V	PFA7471-02
SHUNT 10A 60mV WITH SOCKET.....	PFARQ70010
SHUNT 25A 60mV WITH SOCKET.....	PFARQ70025
SHUNT 50A 60mV	PFAR070050
SHUNT 100A 60mV	PFAR070100
SHUNT – other version on request	
VOLTAGE DIVIDER D2 DC 900V/300V	PFAQ280-00

Subject to modification without prior notice

Data-sheet Femto DC 2008 12 18-ENG

Distributor