ELECTREX
the energy saving technology

Engineered and manufactured in Italy
Made in Italy
Pensato, progettato e prodotto in Italia

Atto DC 3I
DC Transducer Energy Analyzer

EcoAlarm
Voltage Divider with Alarms

Atto DC 3I is a DC transducer – energy analyzer, equipped with an extremely versatile and accurate microprocessor. Designed to be to measure simultaneously three strings of a photovoltaic plant. Measures: voltage, current, powers and energies, max. and min. voltage, max. current. Three 60mV or 100mV inputs per shunt.

The Atto DC 3I can be easily integrated with other Electrex instruments and Electrex networks used in monitoring and managing energy, environmental parameters (luminosity, temperature, humidity, etc.) and alarms (also remotely through GSM / Internet).This makes possible to constantly monitor the status of the plant, quickly and automatically check any malfunction (e.g. a string of the photovoltaic plant stops producing energy).

While through the **Atto EcoAlarm,** a voltage divider equipped with an alarm system, we can be notified in case of theft or tampering of a solar panel.

True-RMS

The constant sampling of voltage and currents, and 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.

The 64 bit resolution allows an high detail of the energy value useful especially with small loads (e.g. devices in stand-by).

Versatile in application

Atto DC 3I and **Atto EcoAlarm** are equipped with two Led indicators located on the front panel providing an indication of instrument's state and RS485 port operation.

Digital Inputs

Atto DC 3I can be equipped with one or more optically insulated digital inputs, with programmable filter for input glitches. The inputs are usually used for counting pulses generated externally. If configured in a proper way the inputs can serve as remote state indicators (e.g. ON/OFF machinery states, breakers, etc.) or (through an external pulse) for selecting different tariffs T1 or T2, for example day/night. The models with self powered inputs do not require an external power supply 10-30 V DC.

Digital Outputs

Atto DC 3I can also be equipped with one or more optically insulated transistor outputs rated 27Vdc and 27mA per DIN 43864 standards. While in the self powered model it can have two opto-mos rated 250V 100mA AC/DC.

The outputs are configured, by default, for transmitting pulses proportionally to the Energy (pulse weight and length are user programmable) but can be used also as outputs for the internal alarms (see the Alarms paragraph below) or as remote controlled outputs through a serial line or Modbus commands.

Measures (3 strings simultaneously)

Parameter	*Type*		*Range*
Voltage	U	•	*10,0V...300V*
	U_{MAX} (1)	•	
	U_{MIN} (1)	•	
Currents		•	*Through Shunt 60 or 100mV*
	MAX (1)	•	
	AVG (2)		
	MD (2)	•	
Active Power	P	•	*± 0,00…1999 MW*
	P_{AVG} (3)	•	
	P_{MD} (3)	•	
Temperature	T (°C e F) (4)	•	
Life Time	h (1/100 h)	•	*0,01…99.999,99 h*
Energies	E_{TOT} (5)	•	*0,1 kWh…99.999,9 MWh*
	E_{PART} (5)		
Pulse Counter	CNT (6)	•	

(1) Value on 500mS.
(2) AVG Value over integration time (1.. 60 minutes programmable).
(3) AVG Value (rolling AVG) sin Export and Import over integration time (1.. 60 minutes programmable).
(4) Internal temperature of the microprocessor.
(5) Imported and Exported Energies are displayed as floating point, 9 digits numbers. The internal counters are logged with a resolution of 64 bit which allows a minimum definition of 0,1 Wh on Modbus and 0,1kWh on the display. Max counting: 99.999.999,9999 kWh.
(6) Total and partial (for instruments equipped with digital input)

Relay output

Atto DC 3I can be equipped also with a relay output rated max 230V 250mA (max 30V 2A) over resistive load. The relay is programmable as the output of the internal alarms(see the Alarms paragraph below) or as remote controlled outputs through a serial line or Modbus commands.

Serial communication

Atto DC 3I and **Atto EcoAlarm** are equipped with a RS485 port protected from over-voltages. The protocol used is the Modbus-RTU "*full compliant*" suitable for connections to PLC and SCADA. The data gathered from the instruments is red as a numeric register composed by a 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.

Atto DC 3I and EcoAlarm

DC Transducer Energy Analyzer and Voltage Divider with Alarms

Alarms

When present in the **Atto DC 3I** the outputs are programmable as alarms. Very flexible and customizable to different needs (e.g. for min and max values). The alarms can also refer to the same parameter for different thresholds. Their 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*". The alarms are entirely programmable via serial port with the Energy Brain software or via serial port by means of Modbus *Holding registers*.

Versions of Atto DC 3I

The **Atto DC 3I** can be produced, on request, with other hardware configurations and input and output combinations. Self powered inputs or transistor, opto-mos, relay outputs for example. The customization can be made also on the power supply.

Voltage Divider

Atto DC 3I measures directly the DC voltages up to 300 V. For higher voltages, up to 900 V, it is needed the voltage divider with a 3/1 ratio (e.g. 900 V input >> 300 V output). The voltage divider has a 2 DIN rail modules dimension.

EcoAlarm

The **Atto EcoAlarm** adds a protecting system against the theft and tampering of the solar panels to the voltage divider. The instrument has a 4 DIN rail modules dimension.

Shunt

Atto DC 3I measures the currents of 3 strings via 3 shunts, accuracy class 0.5%, 60mV or 100mV. The following versions are also available: 10A or 25A mounted on a plastic base, or 50A and 100A without the plastic base. While other shunt models of 1A or 15.000A are available on request.

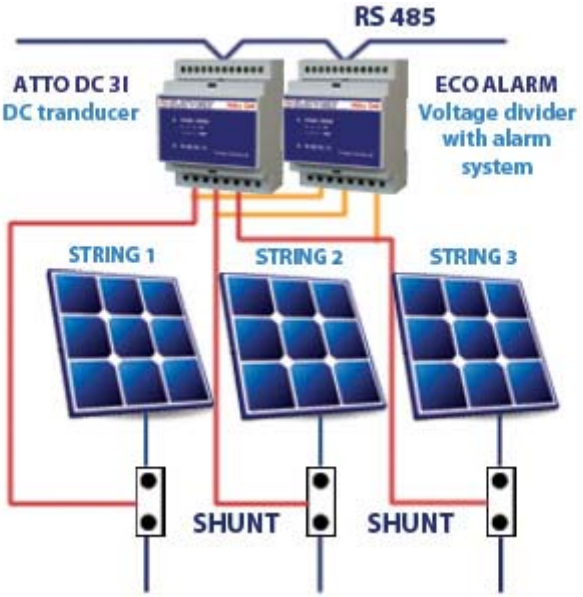
All the types are conform to the DIN43703 normative.

Atto DC 3I

Voltage Divider

Atto EcoAlarm

Shunt 10A 60mV mounted on a plastic board



Atto DC 3I and EcoAlarm

DC Transducer Energy Analyzer and Voltage Divider with Alarms

Technical specifications

Functional characteristics Atto DC 3I

Measurement system:

- *True-RMS measurement up to the 31st harmonic*
- *2 and 4 quadrant measurement (programmable)*
- *12bit A/D converter (6-channel)*
- *Automatic compensation of the offset*
- *AVG values, peaks, max. and min. values are logged on a non-volatile memory*

RS485 serial port:

- *Galvanic insulation*
- *2.400 to 38.400 bps programmable speed*
- *Built-in over-voltage protection*
- *Modbus-RTU protocol, full compliant*

Digital outputs (if present):

- *Galvanic insulation*
- *Conform to DIN 43864 (27Vdc, 27mA) normative*
- *Opto-mos rated 250V 100mA AC/DC*
- *Programmable functions: weighted pulses outputs, alarms notification, remote controlled outputs.*

Digital inputs (if present):

- *Galvanic insulation*
- *Programmable functions: pulse counting, state notifications, tariff selection (max 2 tariffs)*
- *Programmable filter for input glitches suppression (max. counting frequency 10 or 100Hz)*
- *Available also on the self-powered*

Electrical characteristics

Voltage inputs
Direct: ..... 300 Vdc (max 360)
With voltage divider or Atto EcoAlarm: ..... 900 Vdc

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

Digital inputs (depending on version)
Power supply (external): ..... da 10 a 30 Vdc
Absorbed current: .....da 2 a 10mA
Max. counting frequency::.....10 o 100Hz (programmable)

Transistor digital outputs (depending on version)
Type:.....open collector (NPN) – conform to DIN 43864
Max. applicable voltage: .....27 Vdc
Max. switchable current: 27mA

Opto-mos digital outputs (depending on version)
Max. applicable voltage: .....250 V ac/dc
Max. switchable current: 100mA ac/dc

Relay output (depending on version)
Max. voltage and current:.....230V – 250mA (30 V – 2A)

Auxiliary power supply:
Standard versions:.....230/240Vac +/- 10% 50/60Hz
On request versions:..... 15÷36Vac 50/60Hz, 18÷60Vdc
..... 115/120Vac +/- 10% 50/60Hz
400Vac +/- 10% 50/60Hz
Self consumption: ..... < 3VA

Galvanic insulation:
Auxiliary power supply:..... 4kV
RS-485 port:..... 1,5kV
Digital inputs and outputs:..... 1,5kV

Atto EcoAlarm characteristics

RS-485 port: ..... same as Atto DC 3I
Voltage input: max 900Vdc
Ratio: 3/1 (e.g. input. 900Vdc - output 300Vdc)
Alarms system against the theft and tampering of the solar panels
Auxiliary power supply:..... .230/240Vac +/- 10% 50/60Hz

Atto D4 DC 3I and Atto EcoAlarm

Front Panel

Led indicators:..... 1 indicating instrument's state and 1 for the RS485 port operation

Mechanical characteristics

Enclosure ..... Self-extinguishing plastic material class V0
Protection degree:.....IP40 Front panel
.....IP20 Terminals side
Dimensions: .....70 x 90 x 58 mm
Mounting ..... on DIN rail

How to order

Type	*Code*
ATTO D4 DC 3I RS485 230-240V	*PFA7481-02*
ATTO D4 DC 3I RS485 230-240V 1DI 2DO	*PFA7481-12*
ATTO D4 DC 3I RS485 230-240V 2DI 1RO	*PFA7481-22*
ATTO D4 DC 3I RS485 230-240V 1DI 2DO SELF POWERED	*PFA7481-E2*
ATTO D4 DC 3I other versions available on request	
VOLTAGE DIVIDER D2 DC 900V/300V ..	*PFAQ280-00*
ATTO D4 DC ECOALARM RS485 900V/300V	*PFAT401-02*
SHUNT 10A 60mV WITH SOCKET	*PFARQ70010*
SHUNT 25A 60mV WITH SOCKET	*PFARQ70025*
SHUNT 50A 60mV	*PFAR070050*
SHUNT 100A 60mV	*PFAR070100*
SHUNT – other versions on request	

Distributor

ELECTREX the energy saving technology

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