



Serie Z-PC



EN

S203TA-D

Advanced Three-phase Network Analyzer with display

Installation Manual

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For manual and configuration softwares, see www.seneca.it

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GENERAL SPECIFICATIONS

Model S203TA-D is a complete three-phase network analyzer, with display, suited for use with up to 600Vac voltage range, and max current equal to 5A connected to the inputs. The instrument provides all the following electrical measurable quantities: **Vrms, Irms, Watt, VAR, VA, Frequency, Cosφ and Active Energy**. All measurements given above (except frequency) are available both single-phase and three-phase. Measurements are read through serial communication both in floating point and normalized format (except Frequency and Active Energy). It is possible the analog retransmission of any Vrms, Irms, Watt and Cosφ quantity either single phase or three-phase, or any phase chosen (by specific display or MODBUS registry). The module is also distinguished by:

- Communication configurability through software.
- RS485 serial communication with MODBUS-RTU protocol, maximum 32 nodes.
- Easy-wiring of power supply and serial bus by means of the bus housed in the DIN rail.
- High precision: 0,2 % class.
- Protection against ESD discharge up to 4 kV.
- Measure input insulation: 4000 Vac towards all the other circuits.
- Insulation between communication and power supply: 1500Vac.
- Insulation between retransmitted output and power supply: 1500Vac.
- Analog output signal settable in voltage or current.
- Digital output for energy counter
- Possibility for connection and management by external CTs with 5A output.
- All kind of insertion possible: single phase, Aron, four wires
- Possibility to compensate errors caused by frequency change in places where network frequency is not stable (frequency changes > 30 mHz).

TECHNICAL FEATURES

Communication port

RS485

Baud rate: 1200..115200 baud. Protocol: Modbus RTU

USB

Mini-USB, for programming (software Easy)

Input

Voltage input

Up to 600 Vac, frequency 50 or 60 Hz

Current input

Rated range :given by I_{NOMINAL} of CT.
Max Crest Factor :3.Max Current :3*I_{NOMINAL} of CT.

Class/Base Precision (1)

Network Frequency: 50 or 60 Hz.Voltmeter : 0,2 %.
Amperometer : 0,2 % .Wattmeter : 0,2 %.

Max Resistance of each CT's secondary wire :

To ensure the accuracy on nominal measure, cable lenght must be compatible with the current transformer. If Rtotal=sum of the resistance of the wire going (from CT to S203TA-D) and back (from S203TA-D to CT), then Rtotal*I< (CT nominal power)

(1) Precisions are given in the following range: **Vrms**: 40..600 Vac; Cosφ>0.9 (without error due to external CT) **Irms**: 0.4-100% Iprimary of TA

Digital output for energy counter

Type

Passive (it has to be powered on), no protection for short circuit

Range

50 mA / 28 V



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Analog Output

Voltage Output

0..10 Vdc, 0..5 Vdc, Min. load resistance: 2 kΩ.

Current Output

0..20 mA, 4..20 mA, Max load resistance: 500 Ω.

Transmission error

0,1 % (max range).

Response time

0,4 s (10%,.90%)

Thermal stability

100 ppm / K

Other Specifications

Voltage

11 ..40 V_{dc} or 19 ..28 V_{ac} @ 50 ..60 Hz

Consumption

Max 2,5 W

Installation

Installation category | III (up to 300 V), II (up to 600 V)

Environmental conditions

Temperature

-10 ..+65°C

Humidity

30 ..90%

Storage temperature

-20 ..+85°C

International protection

IP20

Connections

Connections | Screw terminals, 5,08 / 7,5 pitch

Dimensions / case / display

Dimensions

105 x 89 x 60 mm

Case

Plastic UL 94 VO, grey color.

Display

Front LCD 2 lines x 16 characters alphanumeric (backlighted)

Isolations

Insulation voltage

4000 Vac between the input and all the other circuits.
1500 Vac between power supply and communication.
1500 Vac between power supply and analog output.

Standards

Reference standards :



EN61000-6-4/2002 (electromagnetic emission, industrial environment).

EN61000-6-2/2006 (electromagnetic immunity, industrial environment).

EN61010-1/2001 (safety)



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OPERATING LOGIC

The module measures the following electrical quantities: Vrms, Irms, Watt, VAR, VA, Frequency, Cosφ and Active Energy, and provides the values in the corresponding MODBUS registers.

In three-phase environments, measurements given above corresponding to any phase are available, other than the three-phase value (except the frequency). These measurements are rendered in both floating point and normalized format (except Frequency and Active energy) between 0..+10000 (-10000 ..+10000 for VAR e Cosφ). Active energy value is stored in memory and when the instrument is switched off, the last value before switching is kept in memory.

The module output can transmit one of the following quantities: Vrms, Irms, Watt, cosΦ as either a current or voltage value. If the instrument is set for three-phase measurements, it transmits automatically the three-phase value of the selected measurement. However, via MODBUS register, the user can choose to transmit the measurement corresponding to any phase: A, B, C.

The user can set through MODBUS the values **MIN** and **MAX** of the measurement to transmit corresponding to 0% and 100% of the analog output. For example, if the signal is transmitted as current 4..20 mA and the quantity to transmit is voltage Vrms in the 10..300 V range, (therefore **MIN=10, MAX=300**), then if Vrms measured is 10V, analog output will be 4mA, while if Vrms=300V output will be 20mA. In the intermediate points the behaviour is linear. The analog output values saturate at approximately 11 V for voltage output and at 22mA for current output (analog output clamped at 110 %).

If network frequency oscillates more than 30 mHz from rated values (50 o 60 Hz), it's possible to compensate errors on measurements of Power and Energy caused by these variations. This option is selectable via MODBUS register. Vrms and Irms measurements are not influenced by these variations.

When the module is switched on, the appropriate setting coefficients are measured (depending on the choice of 50 or 60 Hz frequency). All the settings made will be automatically loaded when the module is reset.

NOTE: without load connected to the S203TA-D, only the (displayed) voltage and frequency assume a corrected value.



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ELECTRICAL QUANTITIES

Measured quantity of S203TA-D

ELECTRICAL QUANTITY	SYMBOLS USED	MEASURED VALUES	CALCULATED VALUES	EQUATION
Root-mean squared voltage (Vrms)	V _A , V _B , V _C	●		
Mean three phase voltage	V		●	(V _A +V _B +V _C)/3
Root-mean squared current (Irms)	I _A , I _B , I _C	●		
Mean three phase current	I		●	(I _A +I _B +I _C)/3
Active power (phase)	P _A , P _B , P _C	●		
Total three phase active power	P		●	P _A +P _B +P _C
Reactive power (phase)	Q _A , Q _B , Q _C		●	$\sqrt{(S_{A,B,C})^2-(P_{A,B,C})^2}$
Total three phase reactive power	Q		●	Q _A +Q _B +Q _C
Apparent power (phase)	S _A , S _B , S _C		●	V _{A,B,C} *I _{A,B,C}
Total three phase apparent power	S		●	S _A +S _B +S _C
cosφ (phase)	cosφ _A , cosφ _B , cosφ _C		●	P _{A,B,C} / S _{A,B,C}
Total three-phase cosφ	cosfi		●	P / S
Frequency	Hz	●		
Active Energy (phase)	E _A , E _B , E _C	●		
Total three-phase active energy	E		●	E _A +E _B +E _C

Retransmission range

Electrical Quantity	Measurement Range
V rms	0..600 Vac
I rms	0..I primary of CT
Active Power	(0..I primary of CT*600)W
Reactive Power	(0..I primary of CT*600)VAR
Apparent Power	(0..I primary of CT*600)VA
Cosφ	0..1
Frequency	40..70 Hz



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ELECTRIC CONNECTIONS

POWER SUPPLY

26

25

11 + 40 VDC

19 + 28 VAC

2,5 W

RS 485

33

32

31

B

A

GND

There is no insulation between RS485 and the analog output

INPUT SINGLE PHASE

V_G

A

N

13 14 15 16 17 18

19 20 21 22

CT

Z_L

ARON Three-Phase without Neutral

V_G

A

B

C

13 14 15 16 17 18

19 20 21 22

CT

Z_L

4 WIRES Three-Phase with Neutral

V_G

A

B

N

C

13 14 15 16 17 18

19 20 21 22

CT

Z_L

Note: You can't connect the secondary of any CTs to the Earth. Terminals 14, 16 18 and 22 are internally connected.

SINGLE PHASE WITHOUT CT

V_G

A

N

19 20 21 22

18 17 16 15 14 13

5 Arms Max

Z_L

Note: **PAY ATTENTION** to the different terminals position from the other schematics



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ANALOG OUTPUT

The module provides a programmable, analog output in voltage (0..10 Vdc) or active and passive current (0..20 mA). We recommend using shielded cables for the electric connections.

Voltage

35

34

V

Active current (1)

36

35

A

External power supply current (2)

36

34

A

I

There is no insulation between RS485 and the analog output.

DIGITAL OUTPUT

The module has a digital output: each pulse corresponds to a given number of increments about to the energy counter. I_{max}=V/R=50 mA, V_{max}=28V. For more informations, see the S203TA-D display settings manual.

I

V

R

29

30

Digital output

LEDs signalling

LED	STATUS	LEDs signalling
PWR	ON (GREEN)	The module is power on
ERR	ON (YELLOW)	At least one of the active phases' voltage is less than 40 Vac
TX	Blinking (RED)	Data are being transmitted through the RS485 comm. port
RX	Blinking (RED)	Data are being received through the RS485 comm. port

SERIAL INTERFACE

For detailed information on RS485 serial interface, consult the documentation provided by the website www.seneca.it, in the section **Prodotti/Serie Z-PC/MODBUS TUTORIAL**.

Programming

The communication parameters have the following default values:: baudrate=38400, no parity, bit number=8, bit stop=1. These values can be modified by display or Modbus protocol. To program the device, download the free software Easy Setup from the website www.seneca.it.



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CASE AND SCREW TERMINAL NUMBERS

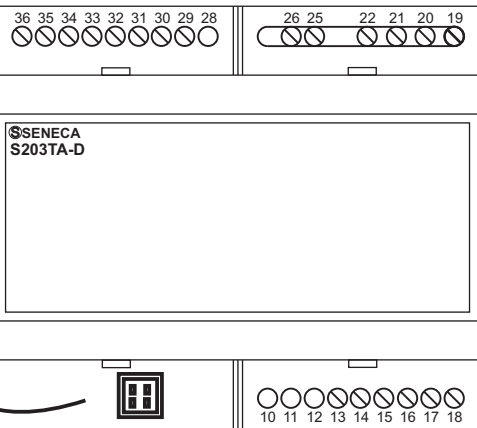
For communication debugging, remove the terminals cover to see the internal LEDs.

TX ERR

RX PWR

36 35 34 33 32 31 30 29 28

26 25 22 21 20 19



FRONT PANEL

S203TA-D

A) MEASURE CONFIG

ESC

OK MENU

DISPLAY PROGRAMMING

For detailed information on display programming, consult the documentation provided by the website www.seneca.it.



Disposal of Electrical & Electronic Equipment (Applicable throughout the European Union and other European countries with separate collections programs). This symbol, found on your product or on its packaging, indicates that this product should not be treated as household waste when you wish to dispose of it. Instead, it should be handed over to an applicable collection point for the recycling of electrical & electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product. The recycling of materials will help to conserve natural resources. For more detailed information about the recycling of the product, please contact your local city office, waste disposal service of the retail store where you purchased this product.



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