SENECA

Serie S - Analizzatori di rete

S203RC-D

EN

Advanced Three-phase Network Analyzer with display for Rogowski's sensors

Installation Manual

Contents:

SENECA s.r.l.
Via Austria, 26 – 35127 – PADOVA – ITALY
Tel. +39.049.8705355 - 8705359 - Fax +39.049.8706287
For manuals and configuration software, please see www.seneca.it

GENERAL SPECIFICATIONS

Model S203RC-D is a complete three-phase network analyzer, with display, **that can be use only with Rogowski's coil**: up to 600Vac voltage range, max current equal to 2000 A 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: 0,5 % 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
- 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

Class/Base Precision (1)	Network Frequency: 50 or 60 Hz.Voltmeter : 0,5 %. Amperometer : 0,5 %. Wattmeter : 0,5 %.
Voltage input	Up to 600 Vac, frequency 50 or 60 Hz
Rogowski's coil features, supplied by Seneca and calibrated (accessory RC-V400-100)	Output signal for S203RC-D current input: • 100 mV correspond to 1000 A @ 50 Hz (sinusoidal) • 120 mV correspond to 1000 A @ 60 Hz (sinusoidal) Max measurable current: 100 kA @ 50/60 Hz Internal resistance: 30 Ohm / 400 mm Accuracy **after calibration**: ± 1 % (**see the chapter «Rogowski's coil»**) Linearity: ± 0.2 %

(1) Precisions are given in the following range: ***Vrms***: 40..600 Vac; Cosϕ>0,9 (without error due to external Rogowski's coil) ***Irms***: 0,4-100% Iprimary of Rogowski's coil

Digital output for energy counter

Type	Passive (it has to be powered on), no protection for short circuit
Range	50 mA / 28 V

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	2 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	II (up to 300 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 :

CE

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

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

EN61010-1 (safety)

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 possibile 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 S203RC-D, only the (displayed) voltage and frequency assume a corrected value.

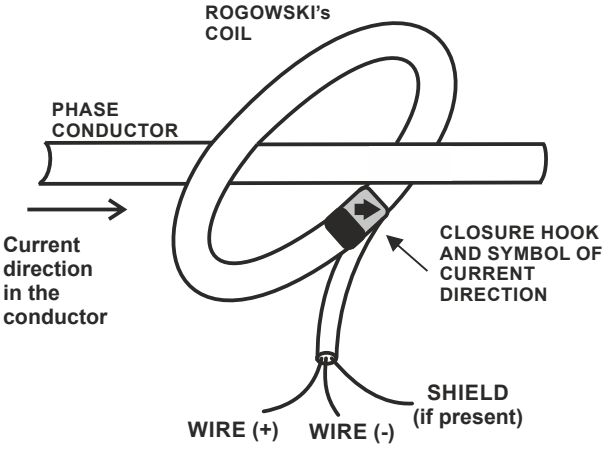
ROGOWSKI'S COIL

Rogowski's coil have been designed for accurate non-intrusive measurement of AC, pulsed DC or complex waveforms. To use in an appropriate way,
- wrap the ring on the conductor so that the arrow symbol (stamped in the ring) is oriented in the same direction of the current in the conductor
- make sure that the connections are performed properly: the white output wire is positive (+), the brown wire is the negative (-).

- For an more accurate measurement, place the cable conductor in a central position with reference to the ring
- For a correct measurement, calibrate the Rogowski's coil: write the calibration coefficient to the corresponding Modbus register (refer to the user manual) or set it using the menu on the display (see display programming manual).

Example: if the Rogowski's coil feature is 90 mV / 1000 A, set the tarature register (corresponding to the phase where the Rogowski's coil is applied) with the value: 1000 / (90 · 10).

NOTE ABOUT ACCURACY: The device is provided with 0.5% accuracy. Global accuracy is the sum between the device accuracy and the connected Rogowski's coil accuracy.



Retransmission range

Electrical Quantity	Measurement Range
V rms	0..600 Vac
I rms	0..1000 A
Active Power	(0..1000 * 600)W
Reactive Power	(0..1000 * 600)VAR
Apparent Power	(0..1000 * 600)VA
Cosϕ	0..1
Frequency	40..70 Hz

ELECTRIC CONNECTIONS

POWER SUPPLY

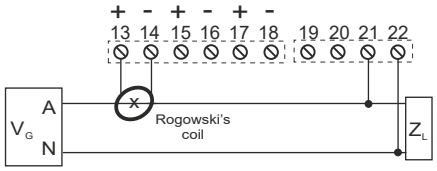
26 — 11 ÷ 40 VDC
25 — 19 ÷ 28 VAC
2.5 W

RS 485

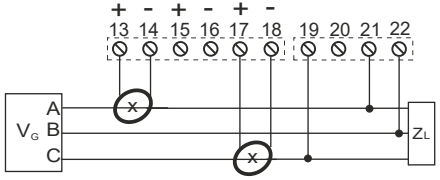
33 — B
32 — A
31 — GND

There is no insulation between RS485 and the analog output

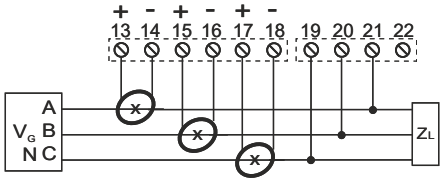
SINGLEPHASE
Phase Neutral



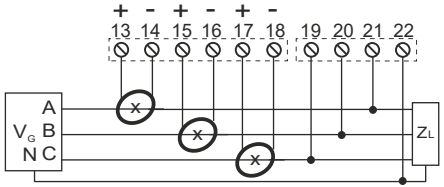
ARON
Three-Phase
without Neutral



3 WIRES
Three-Phase
without Neutral



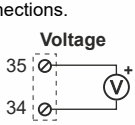
4 WIRES
Three-Phase
with Neutral

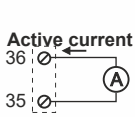


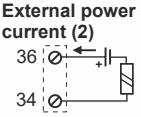
Note: Connect the shield of the Rogowski's coil at negative (-), so one of the terminals 14, 16, 18, 22. Terminals 14, 16 18 and 22 are internally connected.

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.



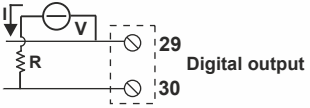




There is no insulation between RS485 and the analog output.

DIGITAL OUTPUT

The module has a digital output: each pulse corresponds to a given number of increments about to the energy counter. Imax=V/R=50 mA, Vmax=28V. For more informations, see the display settings manual.



LEDs signallings

LED	STATUS	LEDs signallings
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

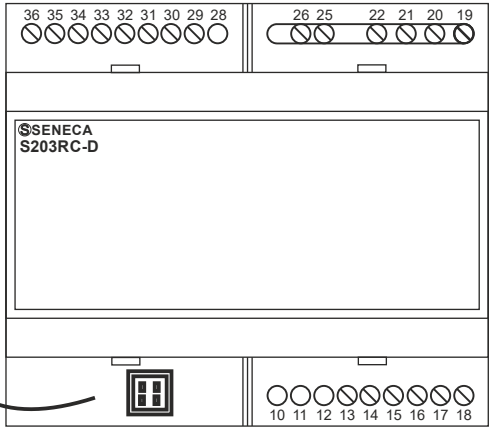
For detailed information on RS485 serial interface, consult the documentation provided by the website www.seneca.it, in the section **Prodotti/Serie Z-PC/MODBUS TUTORIAL**.

Programming

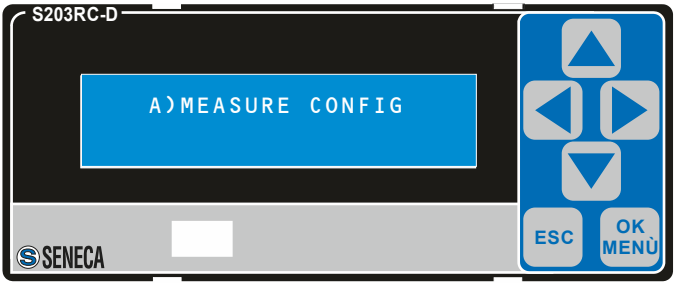
The communication parameters have the following default values:: baudrate=38400, no parity, bit number=8, bit stop=1. These values can be modified by display or Modbus protocol. To program the device, download the free software Easy Setup from the website www.seneca.it.

CASE AND SCREW TERMINAL NUMBERS

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



FRONT PANEL



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 producr 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 didposed 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.