

⇒ Highlights

- Precision 24-bit A/D conversion and digital signal processing
- Single-phase and three-phase versions in classes 0.05, 0.02, 0.01
- Independent input channels (three fully independent differential voltage input circuits in three phase version)
- Current measurement up to 120 A, up to 160 A or with optional Current Extender up to 240 A
- Continuous voltage and current ranges with auto-range functionality
- Programmable meter constant
- One independent fully programmable impulse output assignable to various quantities or constant frequency
- Direct meter testing possibility (with supplied accessories)
- Portable with special transport case
- Rack mountable with 2U form factor

⇒ Description

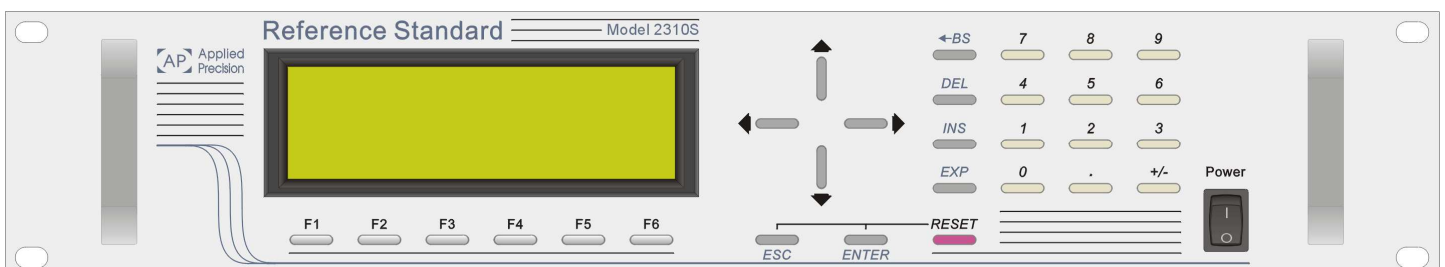
The **Reference Standard RS 2x10** is single-phase (RS 2110) and three-phase (RS 2310) version of precision meter for electrical power and energy measurement. The Reference Standard is designed to meet all requirements put on a reference standard in a single- and three-phase electricity meter testing and calibration systems. The Reference Standard can be set to any real or artificial mode of operation in three phase system and is capable to evaluate the individual quantities per phase and the three-phase cumulative quantities as well.



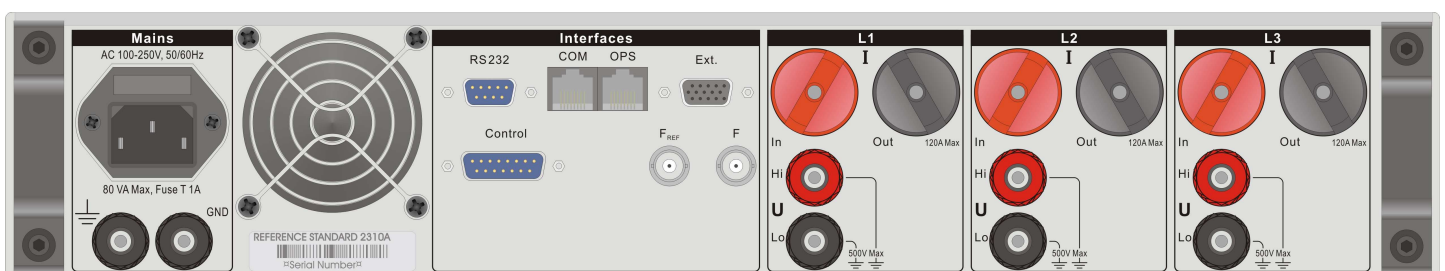
Reference Standard is based on precision 24-bit A/D conversion and digital signal processing technology enabling accurate evaluation of all main and informative quantities. Beyond measurement of all kinds of power, voltage, current and phase, the meter measures the harmonic content and distortion of the input signals.

The meter constant of Reference Standard generating value-proportional impulses on the frequency output is freely programmable. This unique feature along with the extremely high maximum output frequency exceeding 2 MHz allows precision error evaluation of tested meters even at shortest integration period. Freely programmable independent impulse output can be assigned to various quantities or can be set to generate any precise constant frequency for testing purposes.

The Reference Standard RS 2310 is equipped with three fully independent differential voltage input circuits. Therefore the meter can be configured to evaluate signals on three independent channels. This feature in combination with possibility to assign the impulse output to any combination of the input channels enables to use the device for example in single-phase system with one channel as reference while the free channels can monitor additional information like power consumption of the current and voltage circuits or contact error in the test circuit.



Front Panel



Rear Panel

⇒ Technical Specification

General Parameters	
Basic Frequency Range	40 .. 70 Hz
Test Voltage	0.5 .. 500 V
Voltage Ranges	continuous / autorange
Test Current	1 mA .. 120A (optionally up to 5 or 160A)
Current Ranges	continuous / autorange
Basic Frequency Range	40 .. 70 Hz
Bandwidth	up to 4000 Hz
Power Factor Range	0 .. 1 (four-quadrant measurement)
Communication Interface	RS 232 with SCPI compatible communication protocol
Meter Testing	direct testing of inductive or electronic meters or reference standards with simultaneous usage of up to 3 error calculators
Environmental Temperature	+20 °C .. +30 °C
Temperature Coefficient	< 0.0015 % / °C
Pre-warming Time	20 minutes
Recalibration Period	2 years
Influence of the mains power supply on measurement results with a variation of 10%	< 0.002 %
Power Supply	86 .. 268 V AC, 47 .. 65 Hz
Power Consumption	<120 VA
Dimensions (W x D x H)	490 x 490 x 90 mm (2U form factor)
Weight (approx.)	9.5 kg (single-phase version) 10.5 kg (three-phase version)

Maximum Error **	RS 2x10S	RS 2x10E	RS 2x10A
Voltage	0.005 %	0.01 %	0.02 %
Current	0.005 %	0.01 %	0.02 %
Apparent Power	0.01 %	0.02 %	0.05 %
Active Power *	0.01 %	0.02 %	0.05 %
Reactive Power *	0.01 %	0.02 %	0.05 %
Frequency	0.005 Hz	0.005 Hz	0.005 Hz
Distortion	0.05 %	0.05 %	0.05 %

* related to the Apparent Power

** related to sine-wave test parameters with automatic range selection and at 23°C

Impulse Output	
Number of outputs	1 optically isolated (TTL level)
Impulses assigned to	Active / Reactive / Apparent Energy, Square Voltage, Square Current (all in any combination of input channels) or programmable constant frequency
Meter constant	programmable
Max. impulse frequency	2 MHz
Output signal levels	TTL (<1.0 V @ 4mA , >4.0 V @ -4mA)

Measurement Modes	
<ul style="list-style-type: none"> Active power and energy in 6-wire mode (3 independent channels) *** Active power and energy in 4-wire mode *** Active power and energy in 3-wire mode *** Active power and energy in 2-wire mode Reactive power and energy in 4-wire natural mode *** Reactive power and energy in 4-wire artificial (cross-connected) mode *** Reactive power and energy in 3-wire artificial (cross-connected) mode *** Reactive power and energy in 2-wire mode 	

*** only in three-phase version

⇒ Available Models

Model	Phases	Class	Max. Current
RS 2110A /5A	1	0.05	5 A
RS 2110A	1	0.05	120 A
RS 2110A /160A	1	0.05	160 A
RS 2110E /5A	1	0.02	5 A
RS 2110E	1	0.02	120 A
RS 2110E /160A	1	0.02	160 A
RS 2110S /5A	1	0.01	5 A
RS 2110S	1	0.01	120 A
RS 2110S /160A	1	0.01	160 A

Model	Phases	Class	Max. Current
RS 2310A /5A	3	0.05	5 A
RS 2310A	3	0.05	120 A
RS 2310A /160A	3	0.05	160 A
RS 2310E /5A	3	0.02	5 A
RS 2310E	3	0.02	120 A
RS 2310E /160A	3	0.02	160 A
RS 2310S /5A	3	0.01	5 A
RS 2310S	3	0.01	120 A
RS 2310S /160A	3	0.01	160 A

⇒ Accessories

● ... standard accessory*, ○ ... optional accessory

Options and Accessories		RS 2110A	RS 2310A	RS 2110E	RS 2310E	RS 2110S	RS 2310S
RSCS 1100	Single - Phase Cable Set	●	-	●	-	●	-
RSCS 1300	Three - Phase Cable Set	-	●	-	●	-	●
OPS	Error Calculator (Local Evaluation Unit OPS)	●	●	●	●	●	●
OPTS 2100	Optical Sensor	●	●	●	●	●	●
OPFC 1000	Fixing Clamp for Optical Sensor	●	●	●	●	●	●
ED 1000	External Divider	○	○	●	●	●	●
RSTC 1000	Transport Case	○	○	●	●	●	●
CE 1124B	Single - Phase Current Extender 240 / 5 A, class 0.005	○	-	○	-	○	-
CE 1324B	Three - Phase Current Extender 240 / 5 A, class 0.005	-	○	-	○	-	○

* Standard accessories defined for devices sold apart of Power Source