Reference Standard RS 2x30

Precision meter for electrical power and energy measurement

⇨ Highlights

- Single-phase and three-phase versions in classes 0.05, 0.02, 0.01
- Direct current measurement up to 120, 160 or 200 A
- Continuous voltage and current ranges with auto-range functionality
- Independent input channels (three fully independent differential voltage input circuits in three-phase version)
- Four independent fully programmable impulse outputs 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
- Programmable meter constant
- Precision 24-bit A/D conversion
- Digital signal processing

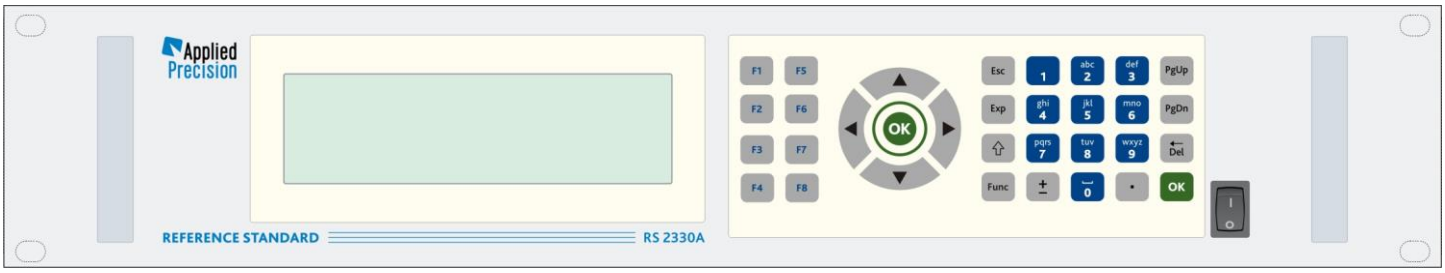
⇨ Description

The **Reference Standard RS 2x30** is a single-phase (RS 2130) and three-phase (RS 2330) 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 four frequency outputs 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. All four freely programmable independent impulse outputs can be assigned to various quantities which for example enable to triple the testing capacity of the three-phase test system when testing single-phase meters. Any of impulse outputs can be set to generate any precise constant frequency for testing purposes.

The Reference Standard RS 2330 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 outputs 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 of RS 2330

Rear panel of RS 2330

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⇨ Available Models

Model	Phases	Class	Max. Current
RS 2130A /5A	1	0.05	5 A
RS 2130A	1	0.05	120 A
RS 2130A /160A	1	0.05	160 A
RS 2130A /200A	1	0.05	200 A
RS 2130E /5A	1	0.02	5 A
RS 2130E	1	0.02	120 A
RS 2130E /160A	1	0.02	160 A
RS 2130E /200A	1	0.02	200 A
RS 2130S /5A	1	0.01	5 A
RS 2130S	1	0.01	120 A
RS 2130S /160A	1	0.01	160 A
RS 2130S /200A	1	0.01	200 A

Model	Phases	Class	Max. Current
RS 2330A /5A	3	0.05	5 A
RS 2330A	3	0.05	120 A
RS 2330A /160A	3	0.05	160 A
RS 2330A /200A	3	0.05	200 A
RS 2330E /5A	3	0.02	5 A
RS 2330E	3	0.02	120 A
RS 2330E /160A	3	0.02	160 A
RS 2330E /200A	3	0.02	200 A
RS 2330S /5A	3	0.01	5 A
RS 2330S	3	0.01	120 A
RS 2330S /160A	3	0.01	160 A
RS 2330S /200A	3	0.01	200 A

⇨ Technical Specification

General Parameters	
Test Voltage	30 .. 500 V *(phase to neutral)*
Voltage Ranges	continuous / autorange
Test Current	0.1 mA .. 5 A (RS 2x30 /5A) 1 mA .. 120 A (RS 2x30) 1 mA .. 160 A (RS 2x30 /160A) 1 mA .. 200 A (RS 2x30 /200A)
Current Ranges	continuous / autorange
Basic Frequency Range	40 .. 70 Hz
Bandwidth	up to 4000 Hz
Harmonics	up to 64th
Power Factor Range	0 .. 1 *(four-quadrant measurement)*
Communication Interface	RS 232 (*SCPI compatible comm. protocol)*
Meter Testing	direct testing of electromechanical or electronic meter or reference standard with usage of external error calculator fully controlled by internal software
Environmental Temperature	+20 °C .. +45 °C
Temperature Coefficient	< 0.0010 % / °C
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	< 80 VA
Dimensions *(W x D x H)*	490 x 490 x 90 mm *(2U form factor)*
Weight *(approx.)*	9.5 kg *(RS 2130)* 10.5 kg *(RS 2330)*

Maximum Error	RS 2x30S	RS 2x30E	RS 2x30A
Voltage	0.005 %	0.01 %	0.02 %
Current *1	0.005 %	0.01 %	0.02 %
Apparent Power *1	0.01 %	0.02 %	0.05 %
Active Power *1 *2	0.01 %	0.02 %	0.05 %
Reactive Power *1 *2	0.01 %	0.02 %	0.05 %
Frequency	0.005 Hz	0.005 Hz	0.005 Hz
Distortion	0.05 %	0.05 %	0.05 %

*1 *in range 1 mA .. 30 mA related to final range value*

*2 *related to the Apparent Power*

Impulse Output		
Number of independent impulse outputs		4 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	$F_{OUT}0$	2 MHz
	$F_{OUT}1-3$	320 kHz
Output signal levels		TTL (<1.0 V @ 4mA , >4.0 V @ -4mA)

Measurement Modes

- Active power and energy in 6-wire mode (3 independent channels) *3
- Active power and energy in 4-wire mode *3
- Active power and energy in 3-wire mode *3
- Active power and energy in 2-wire mode
- Reactive power and energy in 4-wire natural mode *3
- Reactive power and energy in 4-wire artificial (cross-connected) mode *3
- Reactive power and energy in 3-wire artificial (cross-connected) mode *3
- Reactive power and energy in 2-wire mode

*3 *only in three-phase version*

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⇨ Options / Accessories

● … standard * / ❍ … optional / – … not available

Code	Description	RS 2130S	RS 2130E	RS 2130A	RS 2330S	RS 2330E	RS 2330A
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	●	●	❍	●	●	❍
FCP 3121C	Single Phase Flexible Current Probe 6000 A, class 0.2	❍	❍	❍	–	–	–
FCP 3321C	Three Phase Flexible Current Probe 6000 A, class 0.2	–	–	–	❍	❍	❍

** Standard accessories defined for devices sold apart of Power Source*

Error Calculator **OPS**

Optical Sensor **OPTS 2100** with its Fixing Clamp **OPFC 1000**

Transport Case **RSTC 1000**