The **Reference Standard RS 2x30** is 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 individual quantities per phase and 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 a harmonic content and a 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 within the 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 output to any combination of the input channels, enables to use the device for example in single-phase system with one channel as a 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.

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, 160, 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

Reference Standard 2x30 *(front panel)*

Reference Standard 2130 *(rear panel)*

Reference Standard 2330 *(rear panel)*

*Error Calculator **OPS***

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

*Transport Case **RSTC 1000***

*Flexible Current Probe 6000 A **FCP 3121***

Technical data

General Parameters	
Basic Frequency Range	40 ... 70 Hz
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) 1mA ... 200 A (RS 2x30/200A)
Current Ranges	continuous / autorange
Bandwidth	up to 4000 Hz
Harmonics	up to 64th
Power Factor Range	0 ... 1 (four-quadrant measurement)
Communication Interface	RS 232 (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 ... +45 °C
Temperature Coefficient	< 0,0010 % / °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	<80 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 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	2 MHz - **F_{OUT}0**
	320 kHz - **F_{OUT}1-3**
Output signal levels	TTL(<1,0V @ 4mA,>4,0V@-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*

Accessories

		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 accessory** (*Standard accessories defined for devices sold apart of Power Source)*, ❍ … optional accessory, − … not available

Available Types

Model	Phases	Class	Max. Current
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	1	0,02	120 A
RS 2130E /160A	1	0,02	160 A
RS 2130E /200A	1	0,02	200 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	3	0,05	120 A
RS 2330A /160A	3	0,05	160 A
RS 2330A /200A	3	0,05	200 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	3	0,01	120 A
RS 2330S /160A	3	0,01	160 A
RS 2330S /200A	3	0,01	200 A