

## Primary Standard for Verification of Reference Standard Meters and Precision Electrical Measuring Equipment

### ⇒ Highlights

- 7" Colour Multi-Touch Screen
- Highest accuracy 0.01 % (optionally up to 0.005 %)
- Wide measuring range 0.1 mA to 120 A and 0.1 V to 600 V
- Extreme bandwidth 10 kHz and sampling rate 24-bit 125 000 samples/second
- Harmonics and interharmonics up to 200<sup>th</sup> harmonic (digital processing up to 1024<sup>th</sup> harmonic)
- Power quality measurement according to IEC 61000-4-30
- Current and voltage inputs designed for safety category CAT IV 300 V / CAT III 600 V
- Four independent impulse inputs
- Four independent fully programmable impulse outputs assignable to selected quantities
- Programmable constant of the impulse outputs up to 4 MHz
- Ethernet networking for worldwide remote control and data exchange
- Full compatibility with ELMA systems

### ⇒ Description

The **Reference Standard RS 3330** is designed for the highest possible precision meter for quantities related to electrical power and energy measurements. The Reference Standard is designed to meet all requirements put on a reference standard in single and three-phase testing and calibration systems.

The extreme bandwidth 10 kHz and sampling rate 125 000 samples/second enables harmonic and interharmonic analysis of distorted signals up to 200<sup>th</sup> harmonic of the basic signal.

Power quality measurement according to IEC 61000-4-30. Designed to provide functions as standard power quality meter of Class A. Monitoring and assessing the stability and quality of electrical power signals in an electrical network. These measurements ensure that voltage, current, and frequency levels remain within acceptable limits by identifying issues like voltage dips, harmonics, interruptions and flickers. Superior parameters enable to use this device as a standard for verification and calibration of power quality meters of Class A and S.

The Reference Standard is equipped with four universal free programmable impulse outputs. The impulses can be assigned by user to various measured quantities or to generate constant frequency for testing purposes. The high output frequency exceeding 4 MHz allows minimization of integration period at meter testing without impact on the accuracy.

Range selection may be made either manually or automatically.

The Reference Standard is equipped with interfaces USB, RS232 and Ethernet for computer systems and networks.



## ⇒ Available Models

Model	Phases	Class	Max. Current
RS 3330S	3	0.01	120 A

Model	Phases	Class	Max. Current
RS 3330E	3	0.02	120 A

## ⇒ Technical Specification

General	
Power Supply	100 .. 240 V <sub>AC</sub> , 47 .. 63 Hz
Operating Temperature	0 .. +45 °C
Storage Temperature	-15 .. +60 °C
Dimensions (L x W x H)	500 x 320 x 155 mm
Weight	9 kg (approx.)

Safety	
Degree of Protection	IP-40
Isolation Protection	IEC 61010-1
Measurement Category	CAT IV 300 V / CAT III 600 V

Interfaces	
Integrated Display	7" (800 x 480 pixels) Colour IPS TFT Capacitive Multi-Touch Screen
External Monitor Port	DVI-D (full HD resolution)
Communication Interfaces	Ethernet (LAN), RS232, RS422 4 x USB 2.0 Type A (2 front, 2 rear) 1 x USB 2.0 Type B (slave) Bluetooth (via external USB dongle)
Communication Protocol	SCPI
Ports for External Sensors	3 (AUX, In A, In B)
General I/O Pins / Relays	8 x Digital I/O, 4 x Relays

Impulse Inputs / Outputs	
Number of Impulse Inputs / Outputs	4 fully independent impulse inputs (AUX + optically isolated F <sub>IN1</sub> , F <sub>IN2</sub> , F <sub>IN3</sub> ) 4 fully independent impulse outputs (AUX + optically isolated F <sub>OUT1</sub> , F <sub>OUT2</sub> , F <sub>OUT3</sub> )
Output Impulses Assigned to	Active / Reactive / Apparent Energy / Constant frequency
Meter Constant	Programmable
Max. Impulse Frequency	4 MHz
Output Signal Level	5 V

Measurement Specifications	
Basic Frequency Range	15 .. 70 Hz
Voltage Measurement	0.1 .. 600 V (phase to neutral)
Voltage Ranges	1.5 - 5 - 8 - 25 - 40 - 120 - 230 - 600 V
Current Measurement	0.1 mA .. 120 A
Current Ranges	12 - 36 - 60 - 180 - 360 mA - - 1 - 2 - 5 - 12 - 36 - 60 - 120 A
Power Factor Range	0 .. 1 (four-quadrant measurement)
Bandwidth	Up to 10 kHz
Sampling	24-bit 125 000 samples/second
Harmonics and Interharmonics	Up to 200 <sup>th</sup> (digital processing up to 1024 <sup>th</sup> )
Temperature Coefficient	< 0.0003 % / K
Long-term Stability	< 0.0030 % / Year
Measurement Modes	2-wire active / 2-wire reactive 3-wire active / 3-wire reactive (artificial) 4-wire active / 4-wire reactive (artificial) 4-wire reactive (natural)
Meter Testing	Direct testing of inductive or electronic meters or reference standards with simultaneous usage of up to 4 error evaluations

Maximum Errors	RS 3330S	RS 3330E
Voltage <sup>*1 *2</sup>	0.005 %	0.01 %
Current <sup>*1 *3</sup>	0.005 %	0.01 %
Active Power <sup>*1 *2 *3 *4</sup>	0.01 %	0.02 %
Reactive Power <sup>*1 *2 *3 *4</sup>	0.01 %	0.02 %
Apparent Power <sup>*1 *2 *3 *4</sup>	0.01 %	0.02 %
Angle <sup>*1 *2 *3</sup>	0.002 °	0.002 °
Frequency <sup>*2 *3</sup>	0.0001 Hz	0.0001 Hz
Distortion <sup>*2 *3</sup>	0.005 %	0.005 %

<sup>\*1</sup> in frequency range 40 .. 70 Hz

<sup>\*2</sup> in voltage range 20 .. 600 V, for voltages < 20 V is maximum error related to 20 V

<sup>\*3</sup> in current range 20 mA .. 120 A, for currents < 20 mA is maximum error related to 20 mA

<sup>\*4</sup> related to the Apparent Power

## ⇒ Standard Accessories

Code	Description
PTECS 1312	Current Cable Set – three phase version, 6 current cables, cable length 1.5m (each), diameter 35mm <sup>2</sup> , 120A max., MC female terminal on both sides, 6 eye terminals with hole diameter 8mm, 6 brass pin terminals with diameter 5mm
PTEVS 2360	Voltage Cable Set – three phase version (600V CAT IV), 3 + 1 voltage cables, cable length 1.5m (each), 4mm bananas
VC 2360	Voltage Clips – three phase set (3 + 1 crocodile clips, 4mm banana compatible, 600V CAT IV)
OPTS 2100	Optical Sensor + Connection Cable
OPFC 1000	Fixing Clamp for Optical Sensor
RSTC 3000	Transport Case on Wheels, with Retractable Handle
Other accessories	Supply Cord, USB key with documentation, printed User's Guide and Calibration Certificate from ISO/IEC 17025:2017 accredited laboratory