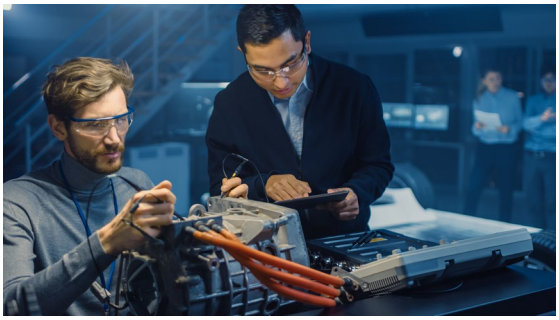
Test&Measurement

YOKOGAWA
Co-innovating tomorrow™

Automated Calibration System for Power Meters

Ensuring Long-Term Measurement Reliability



Introduction

Calibration ensures the accuracy and reliability of measurement results, forming the foundation for data-driven decision-making in R&D. It enables engineers to confidently validate product specifications and ensures that performance metrics are based reliable data.

Accurate measurement is essential for maintaining process capability and achieving high first-pass yield. Measurement errors introduce variation and bias into the process, leading to incorrect conclusions and suboptimal design or process decisions.

In production environments, calibration ensures that critical-to-quality (CTQ) parameters are measured correctly, supporting consistent compliance with specifications. This reduces the risk of producing non-conforming products that fall outside tolerance limits, minimizing scrap, rework, and yield loss.

Ultimately, effective calibration helps prevent defects, reduce process variation, and avoid costly consequences such as production downtime, warranty claims, and field failures and its consequences. Ensuring both operational efficiency and customer satisfaction.

Challenges

Among various types of measuring instruments, the calibration of power meters involves numerous test points and must be performed under demanding high-voltage and high-current conditions, making highly accurate and stable signal sources essential.

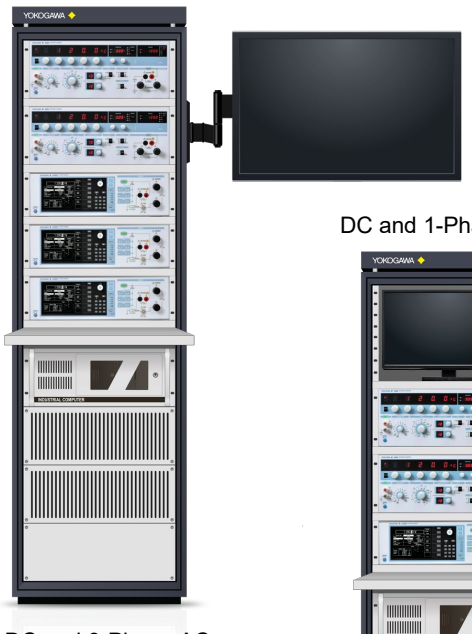
WT310E (1 input element)

WT333E (3 input elements)

Calibration target power meters
(example)

Solution

We offer highly precise, scalable, and flexible solutions for automated power meter calibration, helping streamline and optimize your workflow.



DC and 1-Phase AC

DC and 3-Phase AC

Power Meter Calibration System
(for illustration purposes only)

Features

Supports a wide range of wiring configurations, from 1-Phase to 3-Phase, both for AC and DC systems.

- Provides optimal output range, accuracy, and stability for power meter calibration.
- Enables automated calibration through communication with the target instrument *1
- Setup/Connection wizard to prevent human errors
- Standard test points and pass/fail criteria are pre-configured, with customization available *1
- Calibration results can be exported as CSV files; a sample Excel macro is provided to generate test certificates.

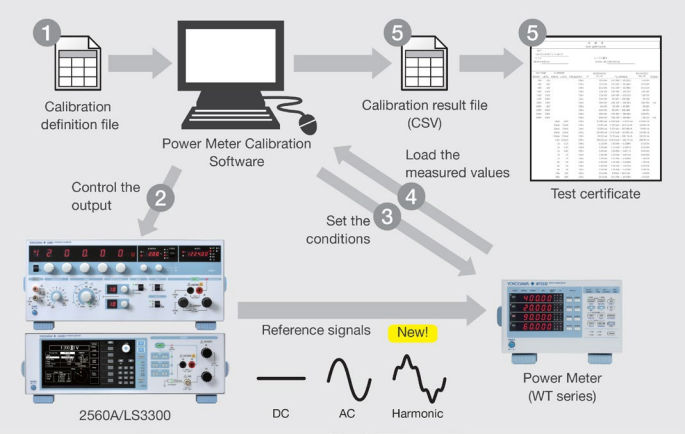
*1 Applicable Instruments: YOKOGAWA WT300E / WT300 / WT200 series / WT100 series.

For instruments other than the above, including third-party products, some manual operation or creation of configuration files are required.

Benefits

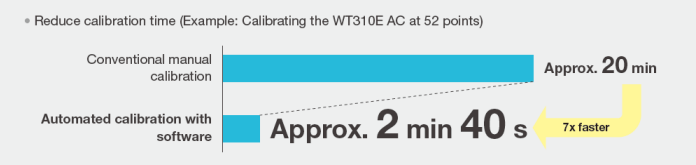
Calibration quality improvement through process standardization

The system streamlines the entire calibration workflow, from setup through data collection and analysis to test certificate generation, minimizing the risk of human error.



Time efficiency

Automation significantly reduces power meter calibration time compared to manual methods, minimizing downtime and improving productivity.



Flexibility and scalability

Our Power Meter Calibration System supports calibration of a wide range of power meters and measurement parameters and can easily scale to meet changing calibration requirements.

Strong ROI

Our Power Meter Calibration System reduces labour costs, minimizes errors, and maximizes uptime—while also enabling you to select the most suitable hardware configuration for your specific needs, ensuring strong ROI over time.

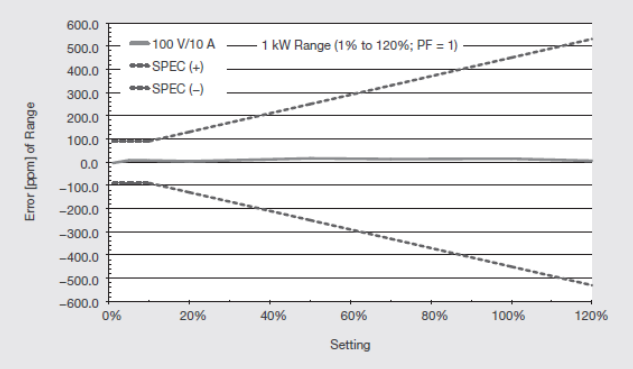
Traceability and compliance

Our automated calibration system maintains detailed records of calibration procedures and measurement data. While the system is not intended specifically for ISO/IEC 17025 accreditation, it can support calibration activities that take relevant requirements into account.

Calibration Capability

Wide voltage and current ranges with high accuracy and stability

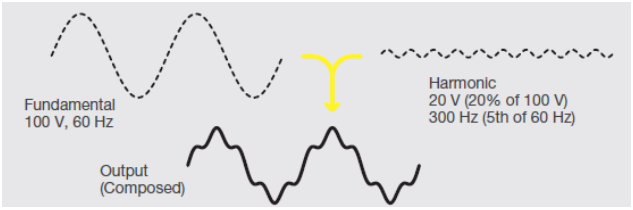
A power calibration system must support a wide output range, from low- to high-level signals, while minimizing the impact of calibration conditions—such as voltage and current calibration points, power factor and frequency—on accuracy. Our Power Meter Calibration System is purpose-designed to deliver reliable performance, ensuring confident signal generation under various calibration conditions.



Example of Power linearity characteristic

Harmonic superimposition

For calibration of the harmonic measurement function of power meters, harmonic components can be superimposed on the fundamental waveform. (/HRM1 option required on the LS3300) Any harmonic up to the 51st order can be specified, with an adjustable amplitude ratio of up to 20% relative to the fundamental. Even with superimposed harmonics, the fundamental's range and accuracy remain unaffected, preventing accidental calibration under conditions of increased error.



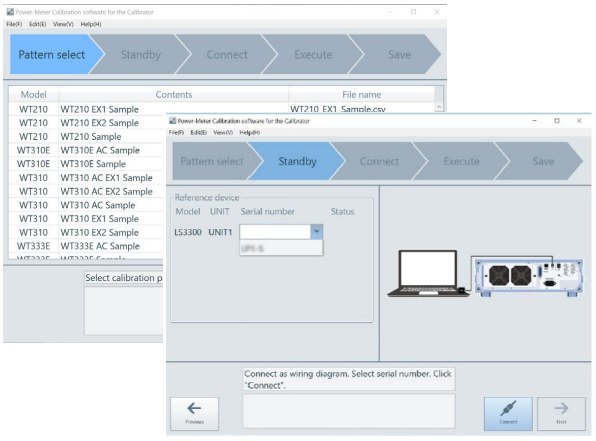
Comprehensive calibration of power measurement parameters

In addition to voltage, current, and power, the system enables calibration of frequency, power factor, and phase, comprehensively covering the primary measurement parameters of power meters.

Software Operation

Loading pattern file and connecting the reference and the target instrument

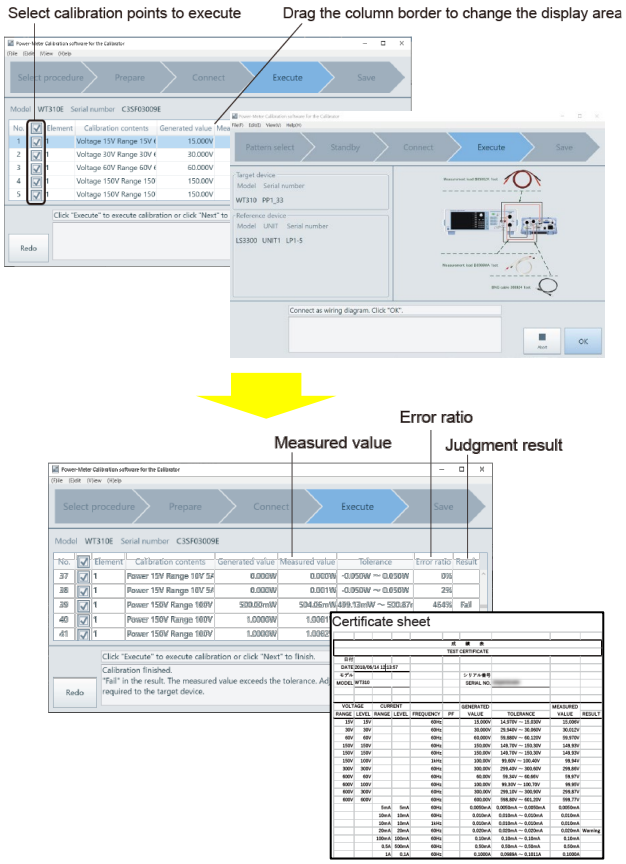
Select a preconfigured pattern file and connect the PC, calibrator, and calibration target with ease using the on-screen guidance.



Executing calibration, report generation

The calibration points defined in the pattern file are clearly displayed, allowing users to easily select the points to be executed. Guided connection diagrams provide step-by-step assistance for wiring between the reference instrument and the device under calibration.

Once calibration is complete, users can add comments and save the results as a CSV file. Test reports can be easily generated from the saved data.

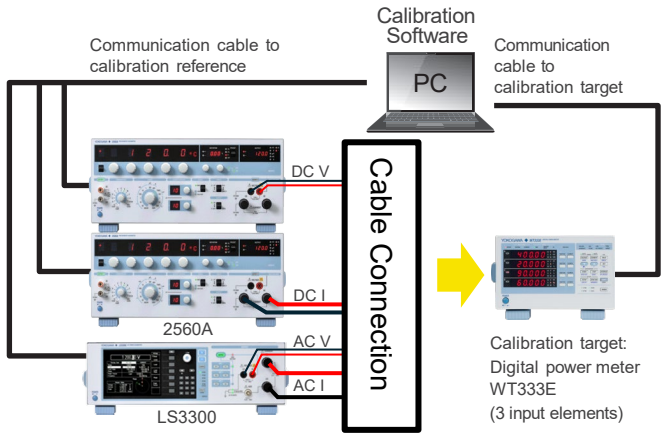


Instrument Configuration

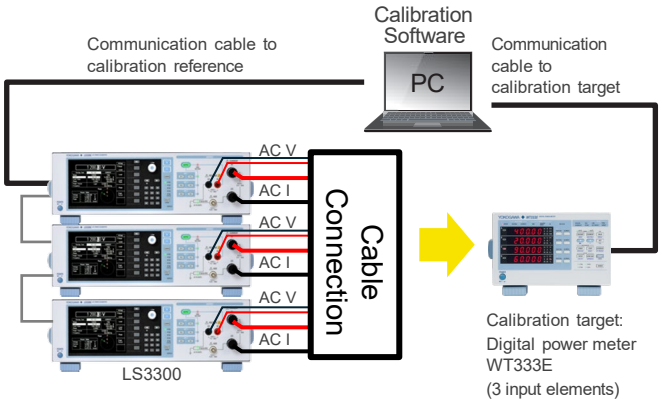
The optimal configuration can be selected according to the calibration target and parameters. The WT300E digital power meter is available with one to three input elements. By sequentially switching the wiring, each input element can be calibrated as a 1P2W connection. For AC-only calibration*, a single LS3300 is sufficient, while AC/DC calibration requires two additional 2560A units.

When it is necessary to calibrate the WT300E using 3-phase signals, this is realized by synchronizing three LS3300 units.

*AC calibration is from 40 Hz to 1.2 kHz.



System for 1P2W, AC / DC



System for 3-phase, AC

NOTICE
- Before operating the product, read the user's manual thoroughly for proper and safe operation.

Required Calibrators by Wiring

Calibration Function		AC	DC
Voltage		LS3300	2560A
Current		LS3300	2560A
Power *1	1P2W	LS3300	2560A×2
	1P3W	LS3300×2	N/A
	3P3W	LS3300×2	N/A
	3P4W	LS3300×3	N/A
Harmonic	Voltage	LS3300*2	N/A
	Current	LS3300*2	N/A
Others	Phase	LS3300	N/A
	Power Factor	LS3300	N/A
	Frequency	LS3300	N/A

*1 For power meters with independent input elements, including the WT series, a single LS3300 enables calibration by sequentially switching the wiring and calibrating each element as a 1P2W connection.

*2 The /HRM1 option is required.

Calibration Specifications

AC (LS3300)		
Voltage		10 mV to 1250 V
Current		0.3 mA to 62.5 A
Harmonics (voltage and current)		Up to 51st order
Frequency		40 to 1200 Hz
Power Factor		0 to 1
Phase		−180 to 180 degree
Output accuracy (at 1 year)	Voltage	±0.035% (±350 ppm)
	Current	±0.045% (±450 ppm)
	Power	±0.045% (±450 ppm)
	Frequency	±0.01% (±100 ppm)

DC (2560A)		
Voltage		−1224 V to +1224 V
Current		−12.24 mA to +36.72 A
Output accuracy (at 1 year)	Voltage	±0.007% (±70 ppm)
	Current	±0.01% (±100 ppm)

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https://tmi.yokogawa.com/

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