

- ✓ Three Phase Calibration
- ✓ Voltage and Current
- ✓ Power, $\cos \varphi$ and Energy
- ✓ VA, W or VAR
- ✓ Energy kVAs, kW, kVARs
- ✓ Phase Shift 0 - 360°
- ✓ Frequency Range 40 - 400 Hz
- ✓ IEEE 488
- ✓ Automatic Calibration Sequences



Model OCM-103 is a bus compatible three-phase calibrator for precise calibration of power and energy measuring electronic instruments, voltage and ampere meters, phase meters, integrators, power transmitters and many other. It also finds its application at laboratories, design departments and service departments as well as at institutions, which have to frequently calibrate their equipment in accordance with their internal quality certification system.

Voltage and Current

The calibrator's main function is the generation of AC- voltage between 6V and 240V and AC- current from 100mA to 10A.

The voltage at three isolated terminals has a constant phase shift of 120°. The phase shift at the three current outputs can be individually adjusted from 0 to 360°. The outputs can be programmed as four wire terminals.

The achieved accuracy is 0.05%.

The ranges of the output signals have been set in consideration of most of the calibration ranges of

power transmitters 80V and 240V as well as 1A, 5A and 10A. The setting of the $\cos \varphi$ is available in a range from 0 to ± 1 , or 0-360°.

Very precise energy batches can be programmed and generated for the calibration of energy measuring equipment. The energy can be set in preselected steps from Wsec to kWh.

The high output current source ability of the voltage output permits calibration of classic analog watt meters with low internal resistance. The frequency range can be precisely set from 40Hz to 400 Hz.

OPERATION

The keyboard at the front permits the setting of the output signal parameters. The large scale LCD display shows the concentrated information, the absolute and the relative deviations of the output signal, the actual error bands, calibration and test sequences, the four wire terminal connection and others.

Frequently used functions are directly assigned to the keyboard and can be selected very easily.

The calibrator contains functions, which permit fast calibration of power transmitters generating DC voltage or current outputs. The output currents of up to ± 25 mA and the voltage of up to ± 13 V are precisely measured while the transmitter is calibrated.

The deviation in % of the transmitter's output signal is shown at the LCD display.

The serially built-in IEEE488 data bus permits the communication with programmable controllers and other peripheral instrumentation. It permits an operation at automatic calibration and testing set-ups.

The setting of the IEEE488 address, the grounding of the output terminals, the phase settings and the multimeter function are stored in a non-volatile memory.

A precise software calibration can be performed by using a password.

The internal calibration constants which were stored during the instrument's production can be accessed and the instrument can be calibrated at any time upon demand.

PARAMETERS

The parameters are valid after 60 minutes of operation and at an ambient temperature of $23\text{ °C} \pm 2\text{ °C}$. They contain long term stability, temperature coefficient, loading characteristics, mains stability as well as the traceability with national standards. The published values are valid for 12 months.

SPECIFICATIONS

AC - VOLTAGE

Adjustment to 5 decimal points
Output: 6V to 240V AC
Impedance: < 40 mΩ for 6 - 80 V
< 100 mΩ for 80.001 - 240 V
Frequency range: 40Hz to 400Hz.
Accuracy: 0.03% f. Value + 0.02% f. Range
Output current: min. 30mA.
Max. capacitive load: 1nF.
Phase shift: 120°.

AC - CURRENT

Adjustment to 5 decimal points
Output: 100mA - 10A
Frequency range: 40Hz to 400Hz.
Accuracy 0.1-1A: 0.03% f. Value + 0.02% f. Range
Accuracy 1-5A: 0.04% f. Value + 0.02% f. Range
Accuracy 5-10A: 0.04% f. Value + 0.03% f. Range
Output voltage: min. 2.5V.
Phase shift: 0 ... 360° adjustable

FREQUENCY

Range: 40 ... 400Hz
Accuracy: 0.01%
Setting: to 3 decimal points

PHASE

Range: 0 ... 360° adjustable in 1° steps
Error: 0.1° for $V \geq 30V$, $I \geq 300mA$, $f = 50-200Hz$.
0.2° for all other ranges

COS φ

Range: -1.00...+1.00 lead or lag, Resolution 0.01.
Error: $\cos(\varphi + 0.1) - \cos \varphi$
Valid for $V \geq 30V$, $I \geq 300mA$, $f = 50-200Hz$.
 $\cos(\varphi + 0.2) - \cos \varphi$
valid for all other ranges

TIME

Range: 10 sec. to 1999 sec.
Resolution: 0.1 sec.
Max. Error: 0.01%

AC - POWER

Programmable power in each phase: 0.6 VA to 2400 VA.
Accuracy: 0.07% to 0.1%.

Errors:

The maximum error can be calculated:

$$VA: \quad dP = \sqrt{(dU^2 + dI^2 + dPF^2)} \quad [\%]$$

$$VAR: \quad dP = \sqrt{(dU^2 + dI^2 + dPF^{*2})} \quad [\%]$$

$$W: \quad dP = \sqrt{(dU^2 + dI^2)} \quad [\%]$$

Whereas

$$dP \quad \text{max. error of power} \quad [\%]$$

$$dU \quad \text{max. error of voltage set} \quad [\%]$$

$$dI \quad \text{max. error of current set} \quad [\%]$$

$$dPF \quad \text{max. error of } \cos \varphi \text{ set} \quad [\%]$$

$$dPF^* \quad \text{max. error of } \sin \varphi \quad [\%]$$

The best accuracy is 0.07%.

AC - ENERGY

The maximum error can be calculated:

$$dE = \sqrt{(dP^2 + dt^2)} \quad [\%]$$

Whereas

$$dE \quad \text{max. error of energy} \quad [\%]$$

$$dP \quad \text{max. error of power set} \quad [\%]$$

$$dt \quad \text{max. error of time set} \quad [\%]$$

The best accuracy is 0.07%.

DC - VOLTMETER

Max. error: 1.5mV (0.015%)
Range: $\pm 10V$, max $\pm 13V / 1M\Omega$
Resolution: 1mV / 0.01%
Display: Volt or %

DC - AMPEREMETER

Range: 20mA, max $\pm 25mA / 1\Omega$
Resolution: 1μA / 0.015%
Display: mA or %
Max. error: 3μA (0.015%)

GENERAL INFORMATION

WARM-UP TIME: 30 min.
WORKING TEMP.: $23\text{ °C} \pm 10\text{ °C}$
STORING TEMP.: 0 to 40 °C @ max. 80% r.h.
REFERENCE TEMP.: $23\text{ °C} \pm 2\text{ °C}$

AMBIENT: 860 to 1060 hPa
SIZE: 540 x 520 x 320 mm
WEIGHT: 40 kg
SUPPLY: 230VAC; 47-63 Hz, max. 800 VA