# Multifunction Service Calibrator OCM 141

- ✓ DC and AC Voltage up to 750 V
- ✓ DC and AC Currents up to 2 A
- ✓ Resistors 10 Ω to 100 MΩ
- ✓ Thermocouples R,S,B,J,K,T,E,N
- ✓ Supply 115/230V 50/60 Hz
- ✓ RS 232 or IEEE488


MODEL OCM 141 is a bus compatible multifunction calibrator for precise generation of electric units. It is mainly designed for calibration by manufacturers of electronic instrumentation. It also finds its application at laboratories, design and service departments as well as at institutions that have to frequently calibrate their equipment in accordance with their internal quality certification system.
Compared with standard calibrators, the model OCM141 represents a new concept of multifunctional service calibrators, which generate not only the standard electric parameters but also parameters for temperature and resistance applications. Apart from this, the calibrator generates harmonic signals for testing of frequency characteristics of electronic circuits, oscilloscopes, multimeters and other instruments.
For frequency calibration purposes TTL 5V level square signals are generated from 0.1Hz to 2MHz.

OCM 141 is a high accuracy and high stability instrument with easy operation, which can be used for calibrations of multimeters, analog instruments, panelmeters, clamp ampmeters, hand calibrators, wattmeters, electrometers, oscilloscopes, thermometers, dataloggers, recorders and many others.

## VOLTAGE and CURRENT

The main function of the calibrator is the generation of DC and AC voltage between 0 μV and 1000 V and DC and AC currents from 0μA to 2A. By using an optional output booster, clamp amperemeters can be calibrated up to 100 A. The frequency range is programmable from 20Hz to 1000Hz. The best accuracy for DC and AC voltage is 0.01%, for DC and AC current 0.02%.

## RESISTORS

Precision resistors between 10 Ω and 100 MΩ with accuracy of 0.03% can be selected in decade steps.

## THERMOMETER

Thermocouples are simulated with accuracy of up to 0.2°C. The cold junction is automatically compensated with internal Pt-1000.
Simulation of RTD Thermometers from -200ºC to +850ºC is optionally available.

## DIGITAL CAMERA

For calibration of multimeters with LCD display a digital camera can be connected. The camera scans the LCD display and enters the measured data directly into the calibration software.
By using the *WinQbase* and the *Caliber* software packages, the system permits automatic calibration of multimeters with a complete documentation and calibration sheet at a PC printer output.

## FRONT PANEL

The control of the output signals is via the front panel keyboard or the data bus RS232 or IEEE488. The large scale LCD display shows the menu steps, the generated parameters as well as other additional information. Some of the keys are directly assigned to frequently used functions.

OCM 141 calibrator is equipped with RS232 serial data port and optionally with IEEE488 GPIB data bus. The instrument can be used in automatic calibrating and testing setups. The soft manager *WinQbase* permits data handling during the calibration of measuring instruments.

# SPECIFICATIONS

The stated errors are defined for an ambient temperature of 23 ºC ± 2 ºC and after a warm-up time of 10 minutes. They contain the long time stability, the temperature coefficient, the load characteristics, the mains stability and the traceability to the national standards. The parameters are valid for 12 month. For ambient temperature of 23ºC ± 5ºC the accuracy values doubles.

## VOLTAGE

RANGES: 0 µV - 750 V DC, 1 mV - 750 V AC
INTERNAL RANGES: 100 mV, 1 V, 10 V, 100 V, 750 V
FREQUENCY RANGE AC: 20 Hz to 1 kHz, Frequency accuracy 0.01%

**DC Voltage**

| RANGE | % VALUE + % RANGE |
|---|---|
| 0 µV - 10 mV | 0.05 + 0.0 + 10 µV |
| 10 mV - 100 mV | 0.01 + 0.001 + 10 µV |
| 100 mV - 1 V | 0.008 + 0.002 |
| 1 V - 10 V | 0.008 + 0.002 |
| 10 V - 100 V | 0.015 + 0.004 |
| 100 V - 750 V | 0.018 + 0.004 |

**AC Voltage**

| RANGE | % VALUE + % RANGE | % VALUE + % RANGE |
|---|---|---|
| | **20 Hz - 200 Hz** | **200 Hz - 1000 Hz** |
| 1 mV - 10 mV | 0.20 + 0.05 + 20 µV | 0.20 + 0.10 + 20 µV |
| 10 mV - 100 mV | 0.10 + 0.03 + 20 µV | 0.15 + 0.05 + 20µV |
| 100 mV - 1 V | 0.05 + 0.005 | 0.07 + 0.01 |
| 1 V - 10 V | 0.05 + 0.005 | 0.07 + 0.03 |
| 10 V - 100 V | 0.05 + 0.01 | 0.07 + 0.03 |
| 100 V - 750 V | 0.07 + 0.02 | 0.1 + 0.03 |

**Additional Parameters of the Voltage Output**

| RANGE | 10mV | 100mV | 1V | 10V | 100V | 750V |
|---|---|---|---|---|---|---|
| THD *[1] | 0.05% + 200 µV | 0.05% + 300 µV | 0.05% | 0.05% | 0.05% | 0.2% |
| Max. Current | 5 mA | 5 mA | 10 mA | 30 mA | 10 mA | 2 mA |
| Output Impedance | < 10 mΩ | < 10 mΩ | < 10 mΩ | < 10 mΩ | < 100 mΩ | < 100 mΩ |
| Max. Capacity Load | 500 pF | 500 pF | 500 pF | 500 pF | 300 pF | 150 pF |

*1 The parameters contain also the non-linear distortion of the output signal.

## CURRENTS

RANGES: 0 µA - 2 A DC, 1 µA - 2 A AC
INTERNAL RANGES: 200 µA, 2 mA, 20 mA, 200 mA, 2A
FREQUENCY RANGE AC: 20 Hz to 1 kHz, Frequency accuracy 0.01%

**DC Currents**

| RANGE | % VALUE + % RANGE |
|---|---|
| 0 µA - 200 µA | 0.05 + 0.0 + 20 nA |
| 200 µA - 2 mA | 0.025 + 0.005 |
| 2 mA - 20 mA | 0.015 + 0.003 |
| 20 mA - 200 mA | 0.015 + 0.003 |
| 200 mA - 2 A | 0.015 + 0.005 |

**AC Currents**

| RANGE | % VALUE + % RANGE | % VALUE + % RANGE |
|---|---|---|
| | **20 Hz - 200 Hz** | **200 Hz - 1000 Hz** |
| 1 µA - 200 µA | 0.25 + 0.0 + 20 nA | 0.30 + 0.10 + 20 nA |
| 200 µA - 2 mA | 0.10 + 0.01 | 0.20 + 0.05 |
| 2 mA - 20 mA | 0.07 + 0.005 | 0.20 + 0.05 |
| 20 mA - 200 mA | 0.07 + 0.005 | 0.20 + 0.05 |
| 200 mA - 2 A | 0.1 + 0.005 | 0.25 + 0.05 |

**Additional Parameters of the Current Output**

| RANGE | 200 µA | 2 mA | 20 mA | 200 mA | 2 A |
|---|---|---|---|---|---|
| Max. Inductive Load | 400 µH | 400 µH | 400 µH | 400 µH | 200 µH |
| Max. Load Voltage (p-p) | 2 V | 2 V | 2 VAC, 7V DC | 2 V | 2 V |
| THD *[2] | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% |

*2 The parameters contain also the non-linear distortion of the output signal

## RTD THERMOMETERS (Option)

TYPEN: Pt 1.385, Pt 1.392 und Ni
TEMPERATURBEREICH: -200 to +850 °C
BEREICH DER RO KONSTANTE: 20 Ω to 2 kΩ
TEMPERATURGENAUIGKEIT: 0.07 °C to 0.4 °C

| TYPE | RANGE -200…+250 °C MAX. ERROR (°C) | RANGE +250…+850 °C MAX. ERROR (°C) |
|---|---|---|
| Pt 100 | 0.1 °C | 0.3 °C |
| Pt 200 | 0.1 °C | 0.2 °C |
| Pt 1000 | 0.2 °C | 0.4 °C |
| Ni 100 | 0.07 °C *1 | - - |

*1 Valid for ranges - 60 °C to +180 °C

## THERMOCOUPLES (Standard)

| | | | | | |
|---|---|---|---|---|---|
| **R** | RANGE (°C) | -50 ... 0 | 0 ... 400 | 400 ... 1000 | 1000 ... 1770 |
| | MAX. ERROR (°C) | 2.9 | 2.1 | 1.4 | 1.7 |
| **S** | RANGE (°C) | -50 ... 0 | 0 ... 250 | 250 ... 1400 | 1400 ... 1770 |
| | MAX. ERROR (°C) | 2.7 | 2.1 | 1.7 | 2.0 |
| **B** | RANGE (°C) | 400 ... 800 | 800 ... 1000 | 1000 ... 1500 | 1500 ... 1820 |
| | MAX. ERROR (°C) | 2.8 | 1.8 | 1.6 | 1.8 |
| **J** | RANGE (°C) | -210 ... -100 | -100 ... 150 | 150 ... 700 | 700 ... 1200 |
| | MAX. ERROR (°C) | 0.9 | 0.5 | 0.6 | 0.7 |
| **T** | RANGE (°C) | -200 ... -100 | -100 ... 0 | 0 ... 100 | 100 ... 400 |
| | MAX. ERROR (°C) | 0.9 | 0.5 | 0.4 | 0.4 |
| **E** | RANGE (°C) | -250 ... -100 | -100 ... 280 | 280 ... 600 | 600 ... 1000 |
| | MAX. ERROR (°C) | 1.6 | 0.4 | 0.5 | 0.5 |
| **K** | RANGE (°C) | -200 ... -100 | -100 ... 480 | 480 ... 1000 | 1000 ... 1372 |
| | MAX. ERROR (°C) | 1.0 | 0.6 | 0.7 | 0.8 |
| **N** | RANGE (°C) | -200 ... -100 | -100 ... 0 | 0 ... 580 | 580 ... 1300 |
| | MAX. ERROR (°C) | 1.2 | 0.7 | 0.6 | 0.8 |

RTD Thermometers and Thermocouples correspond to IST 90, PTS 68.

## FIRM RESISTORS

RANGE: 10 Ω to 100 MΩ
MAX. VOLTAGE: 50 VRMS / 0.1 W

| RANGE | ACCURACY % FROM VALUE |
|---|---|
| 10 Ω | 0.03 + 10 mΩ |
| 100 Ω | 0.05 |
| 1 kΩ | 0.02 |
| 10 kΩ | 0.02 |

| RANGE | ACCURACY % FROM VALUE |
|---|---|
| 100 kΩ | 0.02 |
| 1 MΩ | 0.05 |
| 10 MΩ | 0.05 |
| 100 MΩ | 0.5 |

## FREQUENCY OUTPUT

TTL 5Vp-p, 0.1Hz - 2 MHz

## DATA BUS

STANDARD: RS 232
OPTION: GPIB-IEEE 488

## ADDITIONAL SPECIFICATIONS

SUPPLY: 115/230V, 50-60 Hz, 40 VA
DIMENSIONS: 325 x 111 x 316 mm
WEIGHT: 6 kg

TEMPERATURE: WORKING. 5 ... 40 ºC
STORING: 0 ... 40 ºC

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