Model 1040C and 1040CU

Panel Meter Calibrator

The Arbiter Systems®, Inc. Model 1040C Panel Meter Calibrator (PMC) integrates eight calibration functions: voltage, current, frequency, power, power factor, phase, reactive power (VARs), and synchroscope into one compact, portable package. All of these functions in one lightweight yet rugged instrument, allow you to easily calibrate virtually every type of panel meter and many types of transducers, circuit breakers and overcurrent relays. A hand-held control is also provided, so you can operate the Model 1040C at a distance when calibrating panel meters in the control room or substation.

The Model 1040C's precision ac/dc voltage and current sources may operate independently to calibrate voltmeters, ammeters and frequency meters, or together to calibrate watt meters, watthour meters, power factor meters, VAR meters, and phase meters.

The Model 1040C is also an excellent source for calibrating high-accuracy transducers and revenue meters, when used with an external standard. The Model 931A Power System Analyzer is a good companion instrument for these tests, with basic accuracy of 0.05% and 0.05°, built-in transducer output measurement capability and timer. The Model 931A also performs a wide variety of other measurements. Together, these two instruments can calibrate and measure the vast majority of your work load requirements.

The lower-priced Model 1040CU offers the same performance and features as the 1040C, but has binding post outputs instead of detachable output cables, and it has no hand-held control unit. There is also no storage compartment in the unit's lid, and the maintenance manual is optional. For applications that do not require these features, the Model 1040CU offers significant savings.

Extensive self-test, diagnostic and calibration features are standard on the Model 1040C. Upon power-up, the self-tests verify instrument performance; should a fault be detected, it is localized with the diagnostic functions. Calibration is performed either manually through the front panel, or automatically via the standard IEEE-488 interface.

Built-in store-recall memory for voltage, current, power, frequency, and phase settings reduces test time in complex measurement sequences. With all these features and more, the Model 1040C is a real time saver. Put one to work for you today!

ARBITER SYSTEMS

Model 1040C / 1040CU Specifications

Model 1040CU

Operation

Setup and operation of the Model 1040C for meter calibration is easy. The PMC output cables connect to the device under test, and the output values for current, voltage, frequency, power or phase are set either from the front panel or remotely via the IEEE-488 (GPIB) Interface Bus.

Parameters selected from the front panel keyboard, or via GPIB, are displayed on a bright, easy-to-read vacuum-fluorescent display. A settling indicator is provided to eliminate erroneous measurements. Memory, for up to 99 output settings, provides for storing frequently used values, such as a set of cardinal points for one or more meters. Settings can also be displayed as error in percent of full scale for the meter under test. The hand-held control for remote calibration of panel meters allows operation up to 3 meters (10 feet) from the Model 1040C PMC. The standard output cables are also 3 meters long; 6-meter output cables, and a 3-meter hand-held unit extension are available.

Calibration and Diagnostics

The Model 1040C's calibration and alignment feature allows adjustment of internal calibration constants from either the front-panel keyboard or remotely, through the GPIB interface. Each operating range is calibrated for optimum performance in that range.

Extensive self-test and diagnostic features are also provided in the Model 1040C. A self-test is performed upon power-up, exercising major modules of the PMC and verifying accuracy before beginning routine operation. Diagnostic tests allow the operator to localize failures of individual circuit cards or components.

If repair should ever become necessary, the Model 1040C's design allows easy replacement of defective assemblies in minutes with simple tools.

Output Signals

Voltage

Output Range	10 mV to 1050 Vdc
	1.5 to 750 Vrms
Accuracy	$\pm$(0.2% setting + 0.05% FS)[1] (dc)
$\leq$ 150 Vrms	$\pm$(0.2% setting + 0.05% FS)[1]
> 150 Vrms	$\pm$(0.2% setting + 0.1% FS)[1]
Burden	15 mA; $\geq$ 25 mA overload (dc)
$\leq$ 150 Vrms	300 mArms
> 150 Vrms	10 VA
Noise (dc)	$\leq$ 0.25% setting; 10 kHz BW
Distortion	$\leq$ 0.45%

Auxiliary Voltage

Synchroscope Output is connected to the Voltage Output with a selectable 0° or 180° phase relationship. The total burden of both outputs must not exceed specification.

Current

Output Range	0.1 mA to 10.5 Adc
	0.1 to 7.5 Arms
Accuracy	$\pm$(0.2% setting + 0.05% FS)[2] (dc)
$\leq$ 1.05 Arms	$\pm$(0.2% setting + 0.05% FS)[2]
> 1.05 Arms	$\pm$(0.2% setting + 0.1% FS)[2]
Compliance	6 Vrms; 6.5 V overload (ac)
$\leq$ 50 mAdc	12 Vdc; 12.5 V overload
> 50 mAdc	3 Vdc; 3.5 V overload
Noise (dc)	$\leq$ 0.25% setting; 10 kHz BW
Distortion (ac)	$\leq$ 0.45%

Frequency - AC Operation

Ranges	50 to 75 Hz
	333.3 to 500 Hz
Accuracy	$\leq$ 0.01% of reading

General

Stability	$\leq$ (0.03% setting + 0.015% FS)[1,2]
	averaged one minute or longer
Resolution	$\leq$ 0.1% setting
Settling Time	8 seconds maximum

[1] Internal voltage ranges have full-scale (FS) values of 105 mV, 1.05 V, 10.5 V, 105 V, and 1050 V (dc), and 15.75 Vrms, 157.5 Vrms, and 750 Vrms (ac).

[2] Internal current ranges have full-scale (FS) values of 1.05 mA, 10.5 mA, 105 mA, 1.05 A, and 10.5 A (dc), and 1.05 Arms, and 7.5 Arms (ac).

Model 1040C / 1040CU Specifications

Output Signals (Continued)

AC Power, VARS

Range	1.5 to 5625 VA
Current	0.1 to 7.5 Arms
Voltage	15 to 750 Vrms
Phase Angle	+180° to -180°
Phase Accuracy	±0.33°
Stability	≤ (0.06% setting + 0.03% FS)[3] averaged one minute or longer

Other ac power specifications are derived from the individual specifications for current and voltage.

Phase, Power Factor

Phase Angle	+180° to -180°
Phase Accuracy	±0.33°
Phase Stability	≤ 0.2° rms, avg. at least one minute
Resolution	≤ 0.1°

Interface

Operator Interface

Display	20-character alphanumeric VFD
Display Mode	Normal, deviation(%), reset
Instrument Mode	DC, 60 Hz, and 400 Hz
Function	Voltage, current, synchroscope, power, power factor, reactive power, frequency, & phase
Output	Standby (outputs disabled) Operate (outputs active)
Connectors	Detachable, 3 m cables (1040C) 5-way binding posts (1040CU)
Keyboard	Front-panel numeric keyboard Up/down increment keys Digital knob
Synchroscope	0° or 180° (selectable)
Memory	Clear, store, and recall of up to 99 states
Hand-Held Unit (1040C only)	Store, recall, up, down, operate, standby, normal and % deviation keys.

System Interface

Computer	IEEE-488

[3] Full-Scale (FS) value determined from full-scale values of voltage and current ranges being used.

Power Requirements

External Power

Range	115 Vrms ±10%, 47 to 500 Hz 0.5 A (standby); 3 A (operate) max.

General

Physical

Size	38 x 38 x 28 cm (15 x 15 x 11 in.) 533 x 533 x 533 mm (21 x 21 x 21 in.), shipping
Weight	17 kg (38 lbs), net
	20.4 kg (45 lbs), shipping 25 kg (55 lbs), shipping with manuals and cables

Environmental

Temperature	Operating: 0° to 55° C Nonoperating: -40° to +75° C
Cooling	Forced air

Accessories

Included

Model 1040C

Hand-held control unit with 3 m (10 ft) cable, 3 m (10 ft) voltage output cable, 3 m (10 ft) current output cable, power cord, operation manual, maintenance manual

Model 1040CU

Power cord, operation manual

Available

Model 1040C

6 meter Voltage and Current Cables	AS0017800
Service Kit	AS0012900
3 meter Hand-Held Control Unit Extension Cable	CA0011103
Operation Manual	AS0020200
Maintenance Manual	AS0020100

Model 1040CU

Service Kit	AS0012900
Operation Manual	AS0020200
Maintenance Manual	AS0020100
Add Hand-Held Control Unit	AS0058500