Measurements International

Metrology is Our Science, Accuracy is Our Business™

7070A AC RATIO BRIDGE

Motto, Product Description

Featuring

- Calibration of Voltage and Current Transformers from a Single Instrument
- Calibration of Instrument Transformers with Different Rated Ratios Using One Single Reference Standard
- Calibration of Voltage Transformers (VT) Up to 800 kV When Used with MI 2500 Series of HV Dividers and Standard Capacitors
- Calibration of Current Transformers (CT) Up to 10000 A When Used with MI 7020 and/or 7200 Series of Precision Current Transformers and/or Current Comparators
- Test Frequency from 15 to 100 Hz

Overview

Feature	Benefit
Six voltage ranges and/or ten current ranges	Eliminates the need to use multiple single ratio standard VTs or CTs.
Simultaneous 24-bit sampling technology	Increased accuracy and resolution. More stable phase shift readings..
High ratio accuracy, typically less than 0.01%	Satisfies most Laboratories requirements for calibrating CTs and/or VTs.
Multiple testing modes	Users can select simple ratio measurements or measurements with Standard CT/VT and DUT information included.
Manual and Remote operation	Permits users to operate as stand-alone unit or integrate it in a complex system for a wide range of applications.

7070A AC RATIO BRIDGE

The accurate measurement of electric energy in high-voltage, high current distribution systems relies on 3 key components: a watt-hour meter, a high-voltage transformer and a high current transformer to step down high-voltage and high current to accurate low levels for input to the kWh meters or other electrical measuring devices. However, if the instrument transformers are not calibrated with similar accuracy, then the precise measurements made by the measuring devices will be with high uncertainty and misleading. For high-voltages and currents, this inaccuracy can have a significant impact on the result. Therefore, the calibration of the instrument transformers has become increasingly important.

Beginning with single instruments such as automated high-voltage capacitance tan delta bridge, high-voltage dividers and wattmeter/power analyzers and systems such as the MI Power Calibration Systems (PCS) and Automated Load Loss Measurement System (ALMS) and Isolating Current Transformer (ICT) systems. MI is also 17025 accredited for both in-house and on-site calibration of these measurements. This capability authenticates not only our credentials as an industry-leading instrument developer but also as a calibration service provider for the calibration of instrument transformers.

The model 7070A series of AC ratio bridges developed at MI are fully automated for fast and accurate measurements of instrument transformer errors. The 7070A can be easily integrated into complex systems to achieve calibration of voltage transformers up to 800 kV and current transformers to 10,000 Amps. The 7070A will set new standards of measurement in the calibration of instrument transformers.

Three different models are available that can operate with MI or other suppliers' standards related to the calibration of both voltage transformers and current transformers. These models consist of the following:

Model 7070A-I

The model 7070A-I is an AC Current Ratio Bridge and its main application is the calibration of current transformers using a reference CT, such as the MI 7020 series or another manufacturer reference CT. The 7070A-I has 10 input current ranges as follows: 5, 2, 1, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01 and 0.005 A. Higher testing currents can be achieved using external precision CTs. The high number of input current ranges gives the flexibility of using one single ratio reference CT to test current transformers of different rated ratios. Figure 1 shows the setup diagram for testing current transformers.

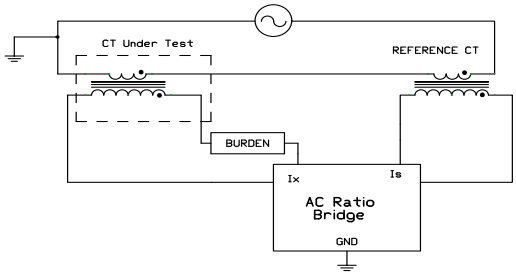

Figure 1. *Model 7070A-I Current Transformer Configuration*

Model 7070A-U

The model 7070A-U is an AC Voltage Ratio Bridge and its main application is the calibration of voltage transformers using either a standard reference voltage transformer or a high-voltage standard capacitor and standard reference voltage divider. The 7070A-U has six input voltage ranges, 6, 15, 30, 60, 150 and 300 Volts.

Only one setup is needed to test voltage transformers when the 7070A-U is combined with a high-voltage standard reference capacitor and MI 2500 series high-voltage divider. In this case, the HV divider rated output is 100 V on each range. The HV divider output voltage and the UUT output voltage are applied directly to the input voltage channels of the AC Voltage Ratio Bridge. Figure 2 and Figure 3 show the setup diagrams for testing voltage transformers using MI HV divider or a standard reference VT.

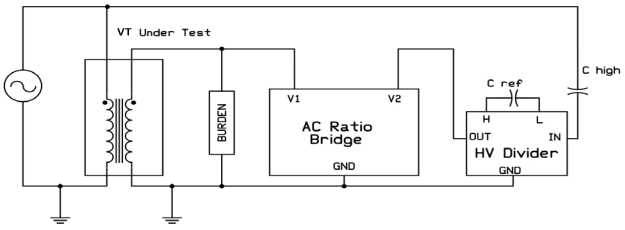

Figure 2. *Model 7070A-U Voltage Transformer configuration using a high-voltage capacitor and MI HV divider.*

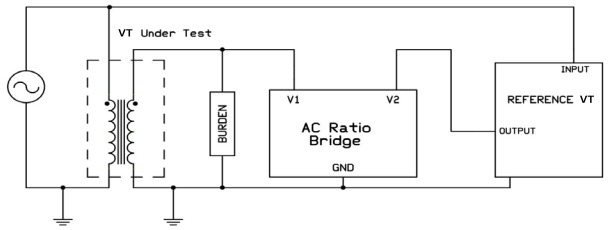

Figure 3. *Model 7070A-U Voltage Transformer configuration using a high-voltage reference potential transformer.*

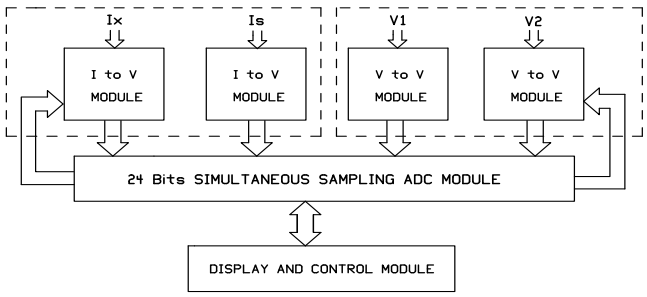

Figure 4. *Model 7070A-UI for 4 inputs*

Model 7070A-UI

The model 7070-UI is an AC Ratio Bridge that combines the AC current and voltage ratio measurement capabilities. It provides the user with the convenience of one single measuring unit to calibrate VTs and CTs without losing accuracy. Its main application is for VT and CT test sets. The flexibility and high accuracy of this design can be a single instrument solution for multiple measurements at any AC lab. The block diagram for the 7070A-UI is shown in Figure 4.

*Optional Power Measurement Function available upon request

Measurement Systems

MI designs and supplies system solutions for current and voltage transformer measurements customized for specific requirements. Some of the system components are listed below:

1. 7020 series of Standard Current Transformers
2. 7200 series of Current Comparators
3. 2500 series of Voltage Dividers
4. Model CG series of High-Voltage Capacitors
5. Electronic burdens
6. Computer and printer for external control and data recovery

7070A AC RATIO BRIDGE

Specifications: Rev 3

Model No.	7070A-I	7070A-U	7070A-UI
Input Channels	2	2	4
Current Measurements			
Input Ranges per Channel (A)	0.005, 0.01, 0.02, 0.05, 0.1, 0.2, 0.5, 1, 2, 5	N/A	0.005, 0.01, 0.02, 0.05, 0.1, 0.2, 0.5, 1, 2, 5
Current Accuracy (ppm of FS) @ 50/60 Hz (23 ° C ± 5 °C)	± 50	N/A	± 50
Ratio Accuracy (ppm) (23 °C ± 5 °C)	± 75 For $0.5 \leq I_x/I_s \leq 2.0$	N/A	± 75 For $0.5 \leq I_x/I_s \leq 2.0$
	± 100 For $0.5 \geq I_x/I_s \geq 2.0$	N/A	± 100 For $0.5 \geq I_x/I_s \geq 2.0$
Phase Shift Accuracy (min) (23 °C ± 5 °C)	± 0.2 For $0.5 \leq I_x/I_s \leq 2.0$	N/A	± 0.2 For $0.5 \leq I_x/I_s \leq 2.0$
	± 0.4 For $0.5 \geq I_x/I_s \geq 2.0$	N/A	± 0.4 For $0.5 \geq I_x/I_s \geq 2.0$
Linearity (ppm)	≤ 20	N/A	≤ 20
Input Impedance (Ω)	≤ 3.5	N/A	≤ 3.5
Isolation (V_{pp})	600	N/A	600
Frequency Range (Hz)	15 to 100	N/A	15 to 100
Voltage Measurements			
Input Ranges per Channel (V)	N/A	6, 15, 30, 60, 150, 300	6, 15, 30, 60, 150, 300
Voltage Accuracy (ppm of FS) @ 50/60 Hz (23 °C ± 5 °C)	N/A	± 50	± 50
Ratio Accuracy (ppm) (23 °C ± 5 °C)	N/A	± 75 For $0.5 \leq V_x/V_s \leq 2.0$	± 75 For $0.5 \leq V_x/V_s \leq 2.0$
	N/A	± 100 For $0.5 \geq V_x/V_s \geq 2.0$	± 100 For $0.5 \geq V_x/V_s \geq 2.0$
Phase Shift Accuracy (min) (23 °C ± 5 °C)	N/A	± 0.2 For $0.5 \leq V_x/V_s \leq 2.0$	± 0.2 For $0.5 \leq V_x/V_s \leq 2.0$
	N/A	± 0.4 For $0.5 \geq V_x/V_s \geq 2.0$	± 0.4 For $0.5 \geq V_x/V_s \geq 2.0$
Linearity (ppm)	N/A	≤ 20	≤ 20
Input Impedance (MΩ)	N/A	5	5
Frequency Range (Hz)	N/A	15 to 100	15 to 100

7070A AC RATIO BRIDGE

Specifications: Rev 3

Model No.	7070A-I	7070A-U	7070A-UI
Input Channels	2	2	4
Power Measurements[1]			
Line-to-Neutral (ppm of FS) @ 50 or 60 Hz (23 °C ± 5 °C)	N/A	N/A	± 100 For PF ≤ 0.5
	N/A	N/A	± 150 For PF > 0.5
Line-to-Line (ppm of FS) @ 50 or 60 Hz (23 °C ± 5 °C)	N/A	N/A	± 125 For PF ≤ 0.5
	N/A	N/A	± 150 For PF > 0.5
Operating Environmental Conditions			
Temperature (°C)	15 to 40	15 to 40	15 to 40
Relative Humidity	10 to 80 Non-condensing	10 to 80 Non-condensing	10 to 80 Non-condensing

[1] Power Measurement option only available on special request

Dimensions (L × W × H):
483 × 585 × 235 (mm)

Weight:
15 kg

Shipping Weight:
20 kg

Main Power:
100 V to 240 V – 47 to 63 Hz
40 VA

Corporate Headquarters
Measurements International
PO Box 2359, 118 Commerce Drive
Prescott, Ontario, Canada K0E 1T0

Phone: 613-925-5934
Fax: 613-925-1195
Email: sales@mintl.com

Toll Free: 1-800-324-4988

Worldwide Offices
MI-USA
Phone: 407-706-0328
Email: sales@mintl.com

MI-China
Phone: +(86) 10-64459890
Email: sales@mintl.com

MI-Europe
Phone: +(420) 731-440-663
Email: sales@mintl.com

MI-Japan
Phone: +(81) 72 39 64 660
Email: kaz@mijpn.com

MI-India
Phone: +(91) 98 10 134 932
Email: sales@MILLP.co.in

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