IWATSU

The Key to Accuracy and Reliability

Digital Multimeters

VOAC 7523 / VOAC 7522
VOAC 7520 / VOAC 7521A

Built for Stability & Reliability

— Display Digits Show The Ultimate Accuracy

VOAC 7523

Isolated 2CH input
Dual function
0.1 μV, full-scale 509999, 5-1/2 digits

VOAC 7522

Resistance 4WΩ measurement
Dual function
0.1 μV, full-scale 509999, 5-1/2 digits

VOAC 7520

Isolated 2CH input
Dual function
1 μV, full-scale 509999, 5-1/2 digits

VOAC 7521A

Resistance 4WΩ measurement
Dual function
1 μV, full-scale 509999, 5-1/2 digits

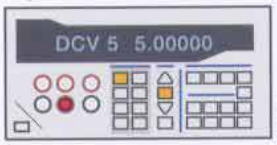
Top-of-the-class Counting Delivers First-Class Accuracy

The VOAC 752X Series — digital measurement you can count on.

Replaced by resistance 4WΩ measurement input section in the VOAC 7522/7521A.

❶ Easy-to-See FL Display

In the single display mode, the measured value and its attribute information (time stamp, function, range) are displayed.
In the dual display mode, the measured values for two different functions can be displayed simultaneously on the left and right. The photo above shows the display when DC voltage values are displayed in both windows. In the single display mode, the selected function and the measured range can be displayed as shown in the diagram.



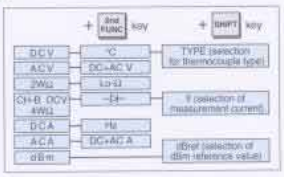
Example of Single Display

❷ Signal Input

VOAC 7523/7520: Provides a common input section for voltage, resistance, temperature and frequency, as well as input for measurement of 0.5 A/10 A current and CH-B input.
VOAC 7522/7521A: Provides resistance 4WΩ measurement input using CH-B input.

❸ FUNCTION

Select the measurement item. The current selected function key will be illuminated.



❹ RANGE

Used to select the measurement range.
In AUTO mode, an optimum range is selected according to the input signal.

❺ UTILITY

Used to select the calculation item, measured data, write/read the panel setting and system setting.

❻ DISP

Used to alternate the single display and dual display measurement mode.
Press the SEL key to switch between the main and sub functions.

❼ SAMPLE

Used to select the measurement sampling rate, hold the measured value, and used to trigger the single measurement.

❽ SUB DISP UNITS

In dual display mode. the LED lights up to show the units for the sub window (on the right).

Utility Setup Menu List

+ SHIFT key

- REL → REF
- AVG → N-AVG
- COMP → Red HI/LO → Yellow HI/LO
- SCLE → A, B, C, D
- MAX/MIN → MODE → Sample
- Ω< → Rth
- SAVE → RECALL*1
- SET UP → SYSTEM
  - PowOn-Setup
  - SAVE : Start → Count → AdrInit → TimeInit → Clear
  - C M P : Src → Level
  - BEEP : Key → Caution → Max/Min → COMP
  - LOW-POWER → TimeInit
  - GPIB : Address*2 → Delim → OldComd
  - I P : Address*3 → Subnet → Gateway → MAC Adr → Port → Delim
  - R S : RATE → Parity → Stop-bit → Data-Lng → Delim
  - Remote I/F
  - DIO Trig*4

*1 RECALL mode
Normal recall, address jump, time stamp display, statistic data type jump, comparator calculation result jump
*2 Valid when GP-IB Interface option is installed
*3 Valid when LAN Interface option is installed
*4 Valid when DIO Interface option is installed

VOAC 752X Series

	CH-B	DCV 0.1 µV ACV 300 kHz
VOAC7523	○	○
VOAC7520	○	×
VOAC7522	×	○
VOAC7521A	×	×

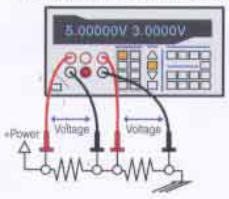
Features

Highest Resolution of 0.1 μV for DC Voltage
(VOAC 7523/7522)

Isolated 2CH Input (VOAC 7523/7520)

The VOAC 7523/7520 is equipped with independent 2-channel inputs for measuring two different voltages at the same time. This makes it possible to measure the difference between the two potentials in the same circuit, or to measure input and output voltages with a single unit. A connection example is shown on the right.

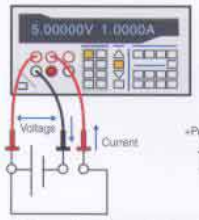
●CH-B Measurement (VOAC 7523/7520)*



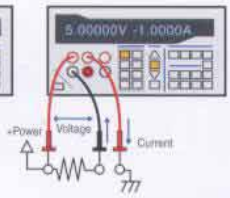
Dual Display & Dual Function

Measurements normally requiring two units can be performed with a single unit, improving efficiency and enhancing productivity. Connection examples are shown below, indicating when simultaneous display and simultaneous measurements are performed.

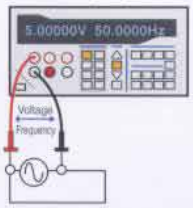
●DCV & DCA Measurement 1*



●DCV & DCA Measurement 2*



●ACV & Frequency Measurement*



* The units shown in the display window will not be shown in actual usage. The unit for the value on the left window is indicated with the illuminated LED in the "FUNCTION" section. The unit for the value on the right window is indicated by the illuminated LED in the "SUB DISP UNITS" section.

Full-scale 509999
— Highest Count in the Class

Provides the highest count readout among 5-1/2-digit models.

Versatile Interface
— Network Connectivity

Standard: RS-232 interface
Options: LAN Interface (10BASE-T Ethernet), GP-IB Interface
(LAN interface and GP-IB interface cannot be used simultaneously)

Long-Time Measurements of up to 3,000 Hours

By combining the interval measurement that can be set between 10 msec. and 3,600 sec. and the data storage function with up to 3,000 time stamps, the long interval measurement from 30 seconds to 3,000 hours are made possible.

True RMS Measurement

Measurement of true RMS (root-mean-squared) AC voltage and AC current.
Measurement of RMS value including the DC value is also possible. (DC+AC) V, (DC+AC) A

Versatile Mathematical Functions

Provides decibel calculation (dBm, dBμ), scaling calculation, moving average calculation, differential calculation, statistic calculation (MAX, MIN, $\bar{x}$, σ), comparator calculation (can be output with optional DIO Interface), four rules calculations between dual functions.

DC/AC/(DC+AC) Measurement in 10 A Range

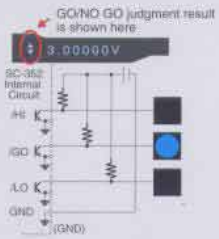
The measurement is available for all models.

Options

SC-352 Digital Input/Output Interface
— Useful for GO/NO GO Judgment

GO/NO GO judgment

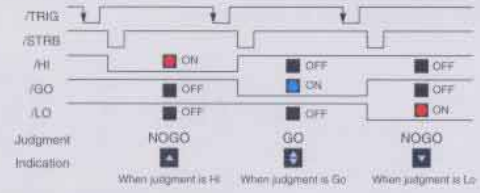
With the optional DIO Interface installed, when the comparator calculation is performed, the calculated result can be output to the /HI, /GO, /LO pins of the DIO output terminal as an open collector status.
The diagram on the right shows an example when the GO/NO GO judgment is performed using this function; the comparator calculation result indicates "GO".



Comparator operation timing

Set to Yellow-HI/LO or Red-HI/LO with Comparator menu.

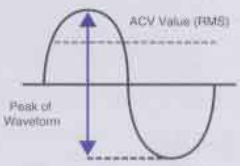
After the trigger signal is input, the STRB signal indicating the end of measurement goes low, and either of the output status /HI, /GO or /LO is updated and short-circuited to the ground by the threshold value selected by the DIO output (Yellow or Red).
The DC 40 V, 100 mA signal can be driven by the open collector output and can be used for GO/NO GO judgment for the lamp, buzzer, or relay. When applied to a production line, this can help ensure better quality and more efficient operation.



Example of Scaling Calculation

1. To get the peak value of sine wave

With the sine wave, when the RMS value of the ACV measurement is multiplied by $2\times\sqrt{2}$, the peak value of the waveform is resulted.
By using the scaling calculation with the VOAC 752X Series model, the peak value calculation is performed with the single unit only. The display shows the calculated result.



2. Conversion from Celsius to Fahrenheit value

Use the following equation to obtain the Fahrenheit temperature with the VOAC 752X Series model only. (Temperature measured value X + 17.77) x 9/5

LAN Interface	SC-351
DIO Interface	SC-352
GP-IB Interface	SC-353
Sheath-Type Thermocouple	SC-0107 -200°C – +600°C
Surface Thermocouple	SC-0116 0°C – +500°C
Clamp-On Current Probe	SC-011 DC ± 200 A Max., AC 150 Arms Max., 40 Hz – 500 Hz
High-Voltage Probe	SC-003 Max. DC 30 kV
High-Resistance Test Lead	SC-004

Test Leads SC-020
1 pair (Red x 1, Black x 1)

Alligator Clip SC-022
AC 30 V/DC 60 V/DC 10 A
for SC-020

Alligator Clip H SC-023
600 Vrms, CAT II/10 A
for SC-020

Arrow Clip SC-021
AC 30 V/DC 60 V/DC 3 A
for SC-020

Resistance 4WΩ
Measurement Cable
SC-005

Banana Plug
POMONA1286-
Used for thermocouple connection

Resistance 4WΩ Measurement Ultra-Compact Clips

KELVIN L
For 0.8 – 2.54 (mm) pitches
(manufactured by Mechano Electronic)

KELVIN M
For 0.5 – 1.0 (mm) pitches
(manufactured by Mechano Electronic)

KELVIN S
For 0.2 – 0.5 (mm) pitches
(manufactured by Mechano Electronic)

Photo shows type M

VOAC 7523 / 7520 / 7522 / 7521A Specifications

1. Sample Rate

Sample Rate	Resolution	Reading Rate	Hum Rejection
SLOW	5.5-digit	approx. 4 times/sec	Yes
MID	5.5-digit	approx. 20 times/sec	Yes
FAST	4.5-digit	approx. 100 times/sec	N/A

2. DC Volt (DCV) 50 mV range for VOAC 7523/7522 only

Range	Resolution		Input Resistance	Accuracy*	
	5.5-digit	4.5-digit		SLOW/MID	FAST
50 mV	0.1 µV	1 µV	100 MΩ or more	0.025+10	0.025+15
500 mV	1 µV	10 µV	1000 MΩ or more	0.012+5	0.012+10
5 V	10 µV	100 µV		0.012+2	0.012+7
50 V	100 µV	1 mV	approx. 10 MΩ	0.016+5	0.016+10
500 V	1 mV	10 mV		0.016+2	0.016+7
1000 V	10 mV	100 mV			

The accuracy specified for the 50 mV and 500 mV ranges is based on the REL calculation with zero calibration.
Sample rate in the 50 mV range SLOW/MID: Approx. 0.5 times/sec., FAST: Approx. 50 times/sec.
Max. input voltage: 500 mV to 5 V range ±800 V (continuous), 50 V to 1000 V range ±1100 V (continuous)

Resolution and noise rejection

Resolution	Sample Rate	NMRR	CMRR
5.5-digit	SLOW	55 dB or more	120 dB or more
5.5-digit	MID	55 dB or more	120 dB or more
4.5-digit	FAST	0 dB	55 dB or more

3. CH-B DC Volt (DCV) VOAC 7523/7520 only

Range	Resolution	Input Resistance		Accuracy*	
	4.5-digit			SLOW/MID	FAST
5 V	100 µV	CH-B: H – CH-B: L	10 MΩ ±3%	0.025+2	0.025+30
50 V	1 mV	CH-B: H – CH-A: L	5 MΩ ±3%		0.025+8
300 V	10 mV	CH-B: L – CH-A: L	5 MΩ ±3%		0.025+5

Max. input voltage ±300 V, between CH-A L and CH-B ±300 V

Resolution and noise rejection

Resolution	Sample Rate	NMRR	CMRR	Isolation between CH-A and CH-B
4.5-digit	SLOW/MID	55 dB or more	120 dB or more	56 dB or more
4.5-digit	FAST	0 dB	55 dB or more	

4. AC Volt (ACV, DC+ACV) detection of True RMS Up to 100 kHz for VOAC 7520/7521A

Range	Resolution	Measurement Range		Input Resistance
	5.5-digit	SLOW	MID/FAST	
500 mV	1 µV	15 Hz – 300 kHz	200 Hz – 300 kHz	less than approx. 1 MΩ 100 pF
5 V	10 µV			
50 V	100 µV			
500 V	1 mV	45 Hz – 100 kH	200 Hz – 100 kHz	
750 V	10 mV	45 Hz – 20 kHz	200 Hz – 20 kHz	

Accuracy: SLOW Sample (Sine wave)

Frequency	Accuracy*
15 Hz – 45 Hz	0.5+150
45 Hz – 100 Hz	0.25+150
100 Hz – 30 kHz	0.2+150
30 kHz – 100 kHz	0.5+300
100 kHz – 300 kHz (for VOAC 7523/7522 only)	2.5+1000

Coefficient to input other than sine wave

Frequency	Crest Factor		
	1 – 1.5	1.5 – 2	2 – 3
15 Hz – 30 kHz	0.05%	0.15%	0.30%
30 kHz – 300 kHz	0.20%	—	—

Response time

Sample Rate	Resolution	Reading Rate	Response Time
SLOW	5.5-digit	4 times/sec	less than 3 sec
MID/FAST	5.5-digit	20 times/sec	less than 2 sec

Max. input voltage: 780 Vrms, ±1100 V DC (continuous)
In the case of DC+ACV, 500 (less than 45 Hz) or 300 (45 Hz or higher) must be added to the value of Accuracy digit.
Sample rate of FAST becomes the same value as MID (approx. 20 times/sec).

5. DC Current (DCA)

Range	Resolution		Accuracy*		Input Resistance
	5.5-digit	4.5-digit	SLOW/MID	FAST	
5 mA	10 nA	100 nA	0.05+7	0.05+17	less than 150Ω
50 mA	100 nA	1 µA			less than 15Ω
500 mA	1 µA	10 µA			less than 2Ω
10 A	100 µA	1 mA	0.2+7	0.2+17	less than 0.1Ω

Auto range is not available at 5 mA – 500 mA range and 10 A range because of using different input terminals.
Max. input current: 5 mA – 500 mA range 500 mA (FUSE 0.5 A/250 V)
10 A range 10 A (FUSE 15 A/250 V)

6. AC Current (ACA, DC+ACA)

Range	Resolution	Measurement Range		Input Resistance
	5.5-digit	SLOW	MID / FAST	
5 mA	10 nA	15 Hz – 5 kHz	200 Hz – 5 kHz	less than 150Ω
50 mA	100 nA			less than 15Ω
500 mA	1 µA	45 Hz – 5 kHz		less than 2Ω
10 A	100 µA			less than 0.1Ω

Accuracy: SLOW Sample (Sine wave) 5% or more against the range

Frequency	Accuracy*	Crest Factor		
		1 – 1.5	1.5 – 2	2 – 3
15 Hz – 45 Hz	1+200	0.05%	0.15%	0.30%
45 Hz – 1 kHz	0.4+200			
1 kHz – 5 kHz	5.0+200			

Response time

Sample Rate	Resolution	Reading Range	Response time
SLOW	5.5-digit	4 times/sec	less than 3 sec
MID/FAST	5.5-digit	20 times/sec	less than 2 sec

Max. input current: 5 mA – 500 mA range 500 mA (FUSE 0.5 A)
10 A range 10 A (FUSE 15 A)
DC component on input current must be included in the Max. input current.
In the case of 10 A range at 45 Hz – 1 kHz, 0.3 must be added to %.
In the case of DC+ACA, 500 (less than 45 Hz or 300 (45 Hz or higher) must be added to the value of Accuracy digit.
Sample rate of FAST becomes the same value as MID (approx. 20 times/sec).

7. Resistance (2WΩ / 4WΩ) 4WΩ: VOAC 7522/7521A only

Range	Resolution		Accuracy*		Test Current
	SLOW/MID	FAST	SLOW/MID	FAST	
50Ω	0.1 mΩ	1 mΩ	0.025+10	0.025+15	approx. 10 mA
500Ω	1 mΩ	10 mΩ	0.014+3	0.014+8	approx. 10 mA
5 kΩ	10 mΩ	0.1Ω			approx. 1 mA
50 kΩ	0.1Ω	1Ω			approx. 100 µA
500 kΩ	1Ω	10Ω	0.015+3	0.015+33	approx. 10 µA
5 MΩ	10Ω	10Ω	0.033+30	0.033+30	approx. 1 µA
50 MΩ	100Ω	100Ω	0.25+30	0.25+30	approx. 100 nA
500 MΩ	1 kΩ	1 kΩ	1.5+50	1.5+50	approx. 10 nA

Max. input voltage: ±500 V peak, Open circuit test voltage less than 12 V.
The accuracy specified for the 50Ω – 5 kΩ range is based on the REL calculation with zero calibration.
Sample rate of FAST at 5 MΩ – 500 MΩ range becomes the same value as MID (approx. 20 times/sec).

8. Low-Power Resistance (2WΩ)

Range	Resolution	Accuracy*		Test Current
	SLOW/MID/FAST	SLOW/MID	FAST	
500Ω	10 mΩ	0.1+5	0.1+15	approx. 1 mA
5 kΩ	0.1Ω			approx. 100 µA
50 kΩ	1Ω			approx. 10 µA
500 kΩ	10Ω	0.2+30	0.2+40	approx. 1 µA
5 MΩ	100Ω		0.2+30	approx. 100 nA
50 MΩ	1 kΩ	1.5+30	1.5+30	approx. 10 nA

Max. input voltage: ±500 V peak, Open circuit test voltage less than 12 V.
The accuracy specified for the 50Ω – 5 kΩ range is based on the REL calculation with zero calibration.
Sample rate of FAST at 5 MΩ – 500 MΩ range becomes the same value as MID (approx. 20 times/sec).
Measurement results are shown in 4.5 digits for all SLOW/MID/FAST modes.

9. Diode

Test Current	Measurement Range	Accuracy*	Open Circuit Test Voltage	Max. Input Voltage
approx. 1 mA or 10 mA	0.1 mV – 5.0999 V	0.014+13	less than 12 V	±500 V peak

10. Temperature

Thermo Couple	Measurement Range	Resolution	Accuracy*	Max. Input Voltage
R	0 – 50 – +1768°C	0.1°C	0.2+30	±500 V peak
K (CA)	-270 – +1372°C		0.1+15	
T (CC)	-270 – +400°C		0.15+15	
J (IC)	-210 – +1200°C			
E (CRC)	-270 – +1000°C			

Resolution: 4.5-digits, Sample rate at SLOW/MID/FAST: approx. 2 times/sec

11. Frequency (AC couple, Crest Factor: less than 3)

Sample Rate	Reading Rate (Gate time)	Display Digits and Measurement Range		Accuracy*
SLOW	approx. 0.5 times/sec (1s)	6-digit	15.0000 Hz – 1.00000 MHz	0.02+2
MID	approx. 4 times/sec (100ms)	5-digit	15.000 Hz – 1.0000 MHz	
FAST	approx. 10 times/sec (10ms)	4-digit	150.00 Hz – 1.000 MHz	

AUTO range of ACV must be used with input attenuator.
Max. input voltage: 780 Vrms, ±1100 V peak

12. Chart for combination of Dual Function

	DCV	CHB-DCV	ACV	DC+ACV	DCA	ACA	DC+ACA	2WΩ	4WΩ	Hz	°C
DCV	x	○	△	△	△	△	△	x	x	△	△
CHBDCV	○	x	○	○	○	○	○	○	/	○	○
ACV	△	○	x	○	○	△	△	x	x	○	x
DC+ACV	△	○	○	x	○	△	△	x	x	○	x
DCA	△	○	○	○	x	△	△	△	△	○	x
ACA	△	○	△	△	△	x	○	△	△	△	x
DC+ACA	△	○	△	△	△	○	x	△	△	△	x
2WΩ	x	○	x	x	△	△	△	x	△	x	x
4WΩ	x	/	x	x	△	△	△	△	x	x	x
Hz	△	○	○	○	○	△	△	x	x	x	x
°C	△	○	x	x	x	x	x	x	x	x	x

○: Availsble, △: have a limitation, x: N/A, /: not provided
Refers to Iwatsu Test Instruments Corp. web site for the limitations indicated by △.
CH-B: VOAC 7523/7520 only, 4WΩ: VOAC 7522/7521A only

13. General

MATH		Moving Average, Scale, Decibel (dBm, dBµ), Difference, Statistics (MAX, MIN, x̄, σ), Comparison (COMP), Arithmetic Calculation between Dual Function
Memory	DATA	Max. 3,000 data with 10 msec resolution time mark (Elapsed time)
	SET UP	10
Interfaces (Full Remote)	Standard	RS-232
	Option	LAN, GPIB
Power Supply	Voltage	100 V, 110 V, 220 V, 240 V
	Frequency	50 Hz, 60 Hz
	Power Consumption	less than 21 VA (includes options)
Operation Temperature and Humidity		0C° – 50C° (less than 80%RH) no-condensation, less than 70%RH at 40C° – 50C°
Storage Temperature and Humidity		-20C° – 60C° (less than 70%RH) no-condensation, includes operation temperature
Size	Measurement	210W x 99H x 353L mm (Options are built into the main unit)
	Weight	less than 3.5 kg (includes options)
Standard Accessories		Fuse, Test Leads, Alignment Screwdriver, Operation Manual, Power Cord

* Accuracy X% of reading ±Y digits indicated by X+Y
Accuracy is assured for 1 year after the calibration is performed.

ISO9001/ISO14001 Certification

Iwatsu Test Instruments Corp. has received ISO9001 and ISO14001 certification, the international standards for quality control and environmental control respectively.
Certificate No.: 961550 / 772520

ISO9001 Certificate No:961550 ISO14001 Certificate No:772520

CAUTION! To use this product correctly and safety, be sure to read the Operation Manual and Safety Cautions before use. Also do not install the unit where it may be exposed to water, humidity, steam, dust, oily smoke, etc. This could cause a fire, electric shock or malfunction.

For More Information For updated product information, please check our web site.

IWATSU Test Instruments Corp. Web Site: http://www.iti.iwatsu.co.jp/
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Design and specifications subject to change without notice.

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