6½ Digits Digital Multimeter
VOAC7602

VOAC7602

5½ Digits Digital Multimeter
New # VOAC7502

VOAC7502

Display

Enables instantaneous copies of the screen to be taken

Easy-to-see Large Screen
Equipped with a high-resolution, wide color LCD display. The display is bright and provides a wider field of view, which becomes apparent the more it is used. The font used for the digits can be selected from normal (gothic) type and seven segment type. It is also possible to choose the background color from two colors (white and black).

4.3-inch high-resolution LCD monitor 109mm

Black background mode :
*The font for the numerical display is selected with NORMAL(gothic) on DISPLAY.

User-friendly Operability

This key illuminates when necessary.
Inputting numerals and characters, and list selection can be done quickly and directly. Simply rotate the knob and then press the knob to set parameters.

Arrow keys
These keys are used to move the cursor for numerical and character input. They can also be used for switching between the primary display of numerals, trend charts and histogram charts, etc., and the secondary displays of statistics and analog meters, etc.

New displays that make even better use of the judgment function

A larger screen for enhanced legibility

It is now possible to see the screen from a distance. Highly-acclaimed for enabling adjustment work to be carried out more easily and speedily.
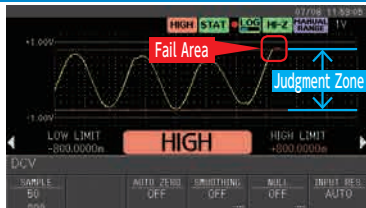
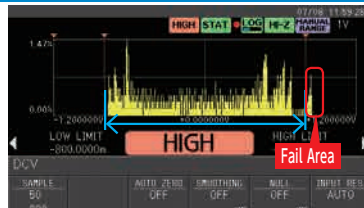**Unique needle meters. Pseudo analog-like fluctuations are displayed digitally**

In addition to the convenience of making estimated judgments, it is now possible to use combinations of the judgment function in a wide range of ways.
The color of the needle changes when the reading exceeds the judgment standards.

NEW FUNCTIONS

[Continuous data logging into USB memory] Longtime logging function

Previously, data can be stored into USB memory manually. Now it can be done automatically during measurements into USB memory.

Extended calculations for secondary statistical calculation

σ setting can be set at 1σ to 6σ which previously limited at 1σ to 3σ only.

A myriad of analyses can now be carried out without the use of a PC. Performance and functionality levels without selecting fields enhance work quality. The VOAC7602 is equipped with a wide range of new functions, including trend chart and histogram chart displays and enhanced analysis accuracy through 30k sampling/s, which exceeds expectations for normal DMMs.
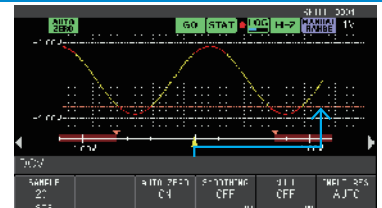
Real Time • Trend display + LIMIT judgment display
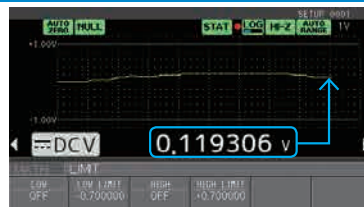

Real Time • Histogram display + LIMIT judgment display

Real Time • Trend display + Analog meter display

Real Time • Numerical display + LIMIT judgment display

Real Time • Trend display + Data Numerical display

Arc scale meter display + Data Numerical display

A myriad of analyses display combinations are now possible without the use of a PC

The primary display consists of several displays, including the numerical display, the trend charts, the histogram charts and the arc scale meter, and a secondary display to provide a wealth of information related to each of the primary displays is also available. A wide range of screen combinations can therefore be selected in alignment with measurement requirements.

Annunciator
(Displays indicators to show the operational status of the device)

Menu display area

Secondary display area
Secondary display

Analog meter display

Statistics display

LIMIT judgment display

Cursor measurement display

Numerical display

Primary display area
Primary display

Trend

Histogram

Arc scale meter

Accurate Sampling Rates Now Possible with the Bulk Mode.
This contributes greatly to improved analysis accuracy

A dedicated acquisition mode was added to enable 30k sampling/s. (DCV, DCI, 2W Ω and 4W Ω with 5½ digit displays) This has greatly improved the time resolution to load data, and is useful for transferring data across to other new DMM applications.

Sampling Rate Comparison

A comparison of data acquired with 1k sampling/s and 30k sampling/s using the same signals in the bulk mode.

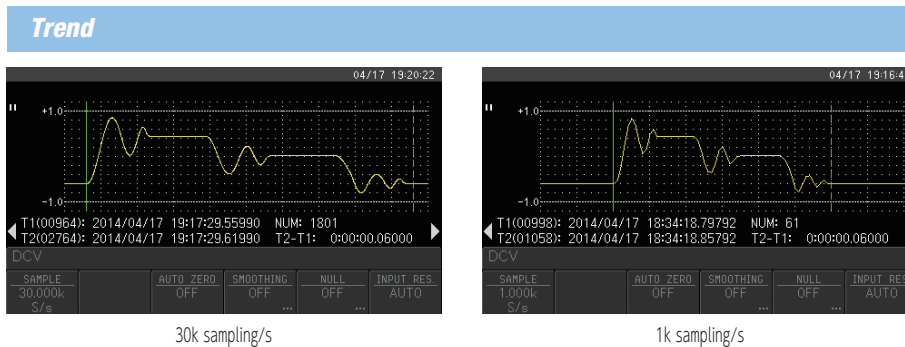**Trend**

30k sampling/s

1k sampling/s

Bulk mode

The bulk mode is a mode that concentrates only on acquiring measurement data.
Accurate sampling rates up to a maximum of 30k sampling/s are guaranteed when the display of measurement data on the screen is switched off during data acquisition. The measurement data is stored in bulk in the log memory, and can be used for displaying trends and histograms with the use of the offline browser function. Data can also be saved onto USB memories.

Logging is Possible for Long Periods of Time with Long Memory

Equipped with a data size equivalent to 100k points of data to supports extended logging periods.
Example: Logging exceeding one full day is possible at a sampling speed of one per second.

Sampling Rate (Sampling/s)	1	4	20	100	500	1k	2k	7.5k	15k	30k
Loading Time (HH:MM:SS)	27:46:40	6:56:40	1:23:20	0:16:40	0:03:20	0:01:40	0:00:50	0:00:13	0:00:07	0:00:03

Using this in combination with the trigger function's interval setting will enable parameters that are longer than the sampling cycle to be set (0 to 3,600 seconds), and even longer logging times can be obtained by setting the interval at one second or longer.

Offline Browser Function Equipped with a Powerful Cursor

Offline Histogram Chart Display Useful for Measurement Yields

The data loaded into the log memory is displayed in a histogram so that the yields can be easily measured with the cursor.
This function is conventionally carried out through PC analyses, but allowing judgment to be performed where the work is being carried out drastically improves work efficiency.
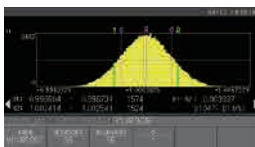
Off-line Trend Charts for Displaying the Time-Based Fluctuations in Measurements

In addition to an oscilloscope-like display, it is possible to recalculate the statistics within the range of the cursor to acquire statistical data within required ranges. It is also possible to perform this while copying the screens into the USB memory, which is very useful for improving work efficiency even further.

Vastly Upgraded Judgment Function

The VOAC7602 is capable of performing high-grade analyses based on the results of LIMIT judgment. The main feature here is the simple operations. The unit answers the questions that trouble operators, such as the number of defects occurring and the Date & Time of Occurrence.

"Occurrence Rate" Solution Screen

VOAC7502 Specifications

Performance levels hereinafter depend on the following conditions and definitions.
Warm-up time: One hour, Temperature/Humidity: 23℃±5℃/80%RH or less, Accuracy for one year, Response Time: Time to the accurate measurement at each range

1. Sampling rate and Resolution
1-1. DC Range (DCV, DCI, 2WΩ, 4WΩ)

Sampling Rate (S/s) ∗1		Display Digits	Remarks
Power Supply Frequency:50Hz	Power Supply Frequency:60Hz		
2.5(1) ~ 50(20)	2.5(1) ~ 60(20)	5½ digits	The Sampling rate shown in ( ) is at AUTOZERO or at 4WΩ.
100 ~ 30k	100 ~ 30k	4½ digits	The Sampling rate shown can not be selected at 4WΩ.

∗1 The Sampling rate is guaranteed only when loading data with the logging function MODE is set at the BULK mode.

1-2. AC Range (ACV, ACI)

AC Filter	Sampling Rate (S/s)		Display Digits	Response Time ∗1
	Power Supply Frequncy:50Hz	Power Supply Frequncy:60Hz		
MID	2.5	2.5	5½ digits	Within 3 seconds
HIGH	2.5 ~ 50	2.5 ~ 60	5½ digits	Within 2 seconds

∗1 Time to the accurate measurement at each range

2. Direct Current Voltage Measurement (DCV)
2-1. Accuracy and Resolution
Unit: ±(% of reading + % of range)

Range	Full Scale when 5½ Digits in Use	Resolution	Accuracy	Temperature Coefficient /℃	Input Impedance
100mV	119.999	1μV	0.018 + 0.003	0.0015 + 0.0004	1GΩ or more, or 10MΩ±1%
1V	1.19999	10μV	0.015 + 0.003	0.0015 + 0.0001	
10V	11.9999	100μV	0.012 + 0.001	0.0015 + 0.0001	
100V	119.999	1mV	0.015 + 0.003	0.0020 + 0.0001	10MΩ±1%
1000V	1100.00	10mV	0.015 + 0.003	0.0020 + 0.0001	

· Sampling Rate: 1S/s · Response Time: within 1 second
· Maximum Permissible Voltage: 100mV ~ 100V Range: 800Vpeak (continual), 1100Vpeak (for 1 minute)
　1000V Range: ±1100Vpeak (continual)

2-2. Noise Reduction
(50Hz/60Hz±0.1%)

PLC	NMRR	CMRR Unbalance Resistance 1k Ω
Integral Multiple for 1 PLC	55dB	120dB
Other than the above	0dB	-

3. Alternating Current Voltage Measurement (ACV)
3-1. Resolution and Measurement Range
Actual Effective Value Detection   Crest Factor :<3

Range	Full Scale	Resolution	Measurement Range		Input Impedance
			MD	HIGH	
100mV	119.999	1μV			
1V	1.19999	10μV			
10V	11.9999	100μV	20Hz ~ 100kHz	200Hz ~ 100kHz	Approx.1MΩ// 100pF or less
100V	119.999	1mV			
750V	750.00	10mV			

3-2. Accuracy
Unit: ±(% of reading + % of range)

Range	Frequency	Accuracy	Temperature Coefficient
100.000mV ~ 750.000V	20Hz ~ 45Hz	0.70 + 0.04	0.070 + 0.004
	45Hz ~ 100Hz	0.20 + 0.04	0.020 + 0.004
	100Hz ~ 20kHz	0.10 + 0.04	0.010 + 0.004
	20kHz ~ 50kHz	0.20 + 0.05	0.020 + 0.005
	50kHz ~ 100kHz	0.60 + 0.08	0.060 + 0.008

· The above shows Accuracy at sine wave.
· The maximum permissible voltage is 750Vrms or 1100Vpeak, but the DC component is ±500V or less.
· The 750V range is restricted to 100kHz or 8 x 107[V · Hz].
· The Crest Factor (CF) is guaranteed to upto either 3 or the maximum input voltage during full scale input, whichever is smaller.

4. Direct Current Measurement (DCI)
4-1. Accuracy and Resolution
Unit: ± (% of reading + % of range)

Range	Full Scale when 5½ Digits in Use	Resolution	Accuracy	Temperature Coefficient	Shunt Resistance
1mA	1.19999	10nA	0.050 + 0.002	0.003 + 0.0005	90Ω
10mA	11.9999	100nA	0.050 + 0.002	0.003 + 0.0005	5Ω
100mA	119.999	1μA	0.050 + 0.002	0.005 + 0.0005	5Ω
1A	1.19999	10μA	0.050 + 0.002	0.003 + 0.0005	0.1Ω
3A	3.0000	100μA	0.150 + 0.002	0.005 + 0.0005	0.1Ω

· The above is applied to the situation of Resolution 5½ digits. · The Maximum Permissible Current: 3ADC or 3Arms (continual)
(Guaranteed with 3A fuse)

5. Alternating Current Measurement (ACI)
5-1. Resolution and Measurement Range
Actual Effective Value Detection   Crest Factor:<3

Range	Full Scale	Resolution	Measurement Range		Shunt Resistance
			MD	HIGH	
1A	1.19999	10μA	20Hz ~ 5kHz	200Hz ~ 5kHz	0.1Ω
3A	3.0000	100μA			

5-2. Accuracy
Unit:± (% of reading + % of range)

Range	Frequency	Accuracy	Temperature Coefficient
1A/3A	20Hz ~ 45Hz	0.70 + 0.1	0.100 + 0.01
	45Hz ~ 100Hz	0.35 + 0.1	0.035 + 0.01
	100Hz ~ 5kHz	0.50 + 0.1	0.050 + 0.01

· The above shows Accuracy at sine wave. · The Maximum Permissible Current: 3Arms (continual) (Guaranteed with 3A fuse)

6.2 Terminal Resistance Measurement (2WΩ) /4 terminal resistance Measurement (4WΩ
6-1. Resolution, Accuracy and Measurement Current
Unit: ±(% of reading+ % of range)

Range	Full Scale	Resolution	Accuracy	Temperature Coefficient	Measurement Current
100Ω	119.999	1mΩ	0.020 + 0.003	0.002 + 0.0004	Approx.1mA
1kΩ	1.19999	10mΩ	0.018 + 0.003	0.002 + 0.0001	Approx.1mA
10kΩ	11.9999	0.1Ω	0.018 + 0.003	0.002 + 0.0001	Approx.100μA

Range	Full Scale	Resolution	Accuracy	Temperature Coefficient	Measurement Current
100kΩ	119.999	1Ω	0.018 + 0.003	0.002 + 0.0001	Approx.10μA
1MΩ	1.19999	10Ω	0.018 + 0.003	0.002 + 0.0002	Approx. 5μA
10MΩ	11.9999	100Ω	0.250 + 0.005	0.250 + 0.0005	Approx. 500nA
100MΩ	119.999	1kΩ	1.500 + 0.005	1.500 + 0.0010	Approx. 500nA //10MΩ

· The accuracy of the above shows 4 terminals resistance measurement or 2 terminals resistance measurement after zero compensation with the NULL operation using 5½ digits resolution. A margin of error equaling 0.2Ω is added to the 2 terminals resistance measurement if the NULL operation is not used.
· The Maximum Permissible Voltage

Between Ω and COM Terminals: 800Vpeak (continual),1100Vpeak (for 1 minute)
Between Sense Hi and Lo: 200 Vpeak
· Terminal Open-Circuit Voltage <17 V

7. Continuity Tests (CONT ▪||) , Diodes (▶|–)
Unit: ±(% of reading + % of range)

	Measurement Current	Accuracy	Temperature Coefficient	Remarks
Continuity Test	Approx.1mA	0.020+ 0.020	0.002+ 0.002	Threshold:1Ω~ 1000Ω
Diode	Approx. 1mA	0.020+ 0.020	0.002+ 0.002	Measurment Range: 0.1mV ~ 1.1999V

· The Maximum Permissible Voltage: 800Vpeak (continual), 1100Vpeak (for 1 minute)

8. Frequency Measurement (FREQ)
8-1. Accuracy and Display Digit Count,
AC Coupling, Reciprocal System, Crest Factor<3

Gate Time	Display Digit Count and Measurement Range	Accuracy (%) 3 ~ 5Hz	Accuracy (%) 5 ~ 10Hz	Accuracy (%) 10 ~ 40kHz	Accuracy (%) 40 ~ 300kHz
100ms	6 digits: 3.00000Hz ~ 300.00kHz	0.1	0.05	0.03	0.01
10ms	5 digits: 3.0000Hz ~ 300.00kHz	0.1	0.05	0.03	0.01
1ms	4 digits: 3.000Hz ~ 300.0kHz	0.1	0.05	0.03	0.01

· The Maxium Permissible Voltage: 750Vrms or 1100Vpeak, but the DC component is ±500V or less (continual).
· It is possible to switch the input range between automatic and manual for a range between ACV 100mV and 750V.
· Input Range: 100mVrms to 750Vrms between 3Hz and 100kHz, however, Maximum of 2.2 x 107 [V · HZ] between 100kHz and 300KHz.
· Maximum 100kHz is guaranteed for input of 200Vrms or more.
· Input values that are less than 3Hz or more than 300kHz may be measured and displayed, but Accuracy is not guaranteed.

9. Trigger Functions

Trigger Mode	AUTO, SINGLE	Trigger Delay	0.00ms ~ 3,600 s (Resolution 10μs)
Trigger Sampling Count	1 ~ 100,000	Trigger Intervals	0.00ms ~ 3,600 s (Resolution 10μs)

10. Operation Functions
Moving average, NULL, Scaling, Decibel, Statistic and Limit Operations

11. Logging Functions

NORMAL Mode	Measurement data is stored in the memory while monitoring it. The sampling rate is not guaranteed.
BULK Mode	Masurement data cannot be monitored in the real-time, but for which the sampling rate is guaranteed.
Data Size	NORMAL Mode: 100k, BULK Mode:1k, 2k, 5k, 10k, 20k, 50k, 100k Readings
STOP EVENT(BULK Mode only)	The following four ways can be selected; 1. NONE: No setting , 2. EXT TRIG: External TRIG input, 3. LEVEL: When the measurement value exceeds the threshold, 4. LIMIT; The four GO/ NO GO (HIGH or LOW)/HIGH/LOW settings can be selected from the LIMIT judgment result.
Post Trigger Count (BULK Mode only)	The acquiring data after STOP EVENT can be counted at 0 to100%. (The setting resolution is 1%)

12. Primary Display

Value Display	Font: Can be selected from 7 segments and NORMAL(gothic), Size: Can be selected from NORMAL and LARGE It is possible to display ACV/Frequency and NULL/Measured Value, and etc. at the same time when NORMAL has been set.
Trend Chart Display	Horizontal Axis: Can be selected from AUTO, FULLSCALE and MANUAL Offline Browsing Mode: Scrolling and expanding waveforms , Cursor display and Search function
Histogram Chart Display	BIN count: 2 ~ 400, Statistics Cursor and H1/H2 cursors functions are available. Offline Browsing Mode: The histogram can be generated by changing the number of bin, etc.
Arc Scale Meter Display	Scale: Can be selected from AUTO, FULLSCALE, MANUAL and LOG
Limit Display	Improves visual recognition of the judgment result (GO, HIGH, LOW) on the primary display, the display should be greatly larger than that of the secondary display.

13. Secondary Display

NUMERIC display, ANALOG METER display, STATISTIC display, or LIMIT calculation result display can be selected. Trend Chart display, Histogram Chart display, Each Chart Information display,or Each Cursor Measurement display also can be selected.

14. General Specifications

Interfaces	USB2.0 (Standard), GPIB (Option), LAN & RS-232 (Option), DIO Interface (Option) *USB Interface is available for remote usage only. USB memory, etc. can not be used.
REMOTE Command	SCPI or IWATSU VOAC752x series
Rear Input/Output terminals	TRIG input, COMPLETE output
Setup Memory	Internal 10
LCD	4.3-inch color LCD, 480 x 272dots, TFT active matrix, LED back light
Warm-up time	One hour after power switched on
Operation Guaranteed Temperature and Humidity	0℃~ 50℃ (less than 80% or equivalent moisture at 40℃ . No Condensation)
Storage Temperature and Humidity	− 20℃~ +60℃ (less than 90% or equivalent moisture at 40℃ . No Condensation)
Power Supply	AC100V/110V/220V/240V ± 10 % , 50Hz/60Hz All supplies with the exception of AC100V are optional (factory option)
Power Consumption	14VA or less (including options)
Withstand Voltage	DC ± 500V(between input terminals for all front panel measurements and the earth.)
Installation (Over-Voltage) Category	Cattegory II (Local level, Electrical appliances, Portable appliances)
Contamination Level	Contamination level 2 *Must not be used in envirnments containing conductive contamination.
External Dimensions	Approx. 225Wx100Hx366D mm (excluding the legs, handle, knobs and other protruding components)
Weight	Approx. 3.0kg (including the protectors and options)
Accessories	Test leads, Power cable, User's guide, Instruction manual(CD) ,Fuses(2pcs)

15. Configuration

Main body	VOAC7502	Digital Multimeter Main body
Option	SC-361	LAN & RS-232 Interface
	SC-362	DIO Interface
	SC-363	GPIB Interface

VOAC7602 Specifications

Performance levels hereinafter depend on the following conditions and definitions.
Warm-up time: One hour, Temperature/Humidity: 23℃±5℃/80%RH or less, Accuracy for one year, Response Time:
Time to the accurate measurement at each range

1. Sampling rate and Resolution
1-1. DC Range (DCV, DCI, 2WΩ, 4WΩ)

Sampling Rate(S /s) ∗1		Display Digits	Remarks
Power Supply Frequency: 50Hz	Power Supply Frequency: 60Hz		
2.5(1) ～ 50(20)	2.5(1) ～ 60(20)	6½ digits	The Sampling rate shown in ( ) is at AUTOZERO or at 4WΩ.
100 ～ 30k	100 ～ 30k	5½ digits	The Sampling rate shown can not be selected at 4WΩ.

*1. The sampling rate is only guaranteed when loading data with the logging function MODE is set at the BULK mode.

1-2. AC Range (ACV, ACI)

AC Filter	Sampling Rate(S /s)		Display Digits	Response Time ∗1
	50Hz	60Hz		
MID	2.5	2.5	6½ digits	Within 3 seconds
HIGH	2.5 ～ 50	2.5 ～ 60	6½ digits	Within 2 seconds

∗1 Time to accurate measurement at each range

2. Direct Current Voltage Measurements (DCV)
2-1. Accuracy and Resolution
Unit: ±(% of reading + % of range)

Range	Full Scale when 6½ Digits in Use	Resolution	Accuracy	Temperature Coefficient /℃	Input Impedance
100mV	119.9999	0.1 μV	0.0050+0.0035	0.0005+0.0005	1GΩ or more, or 10MΩ±1%
1V	1.199999	1 μV	0.0040+0.0007		
10V	11.99999	10 μV	0.0035+0.0005	0.0005+0.0001	
100V	119.9999	0.1mV	0.0045+0.0006		10MΩ±1%
1000V	1100.000	1mV	0.0045+0.0010		

· Sampling Rate: 1S/s · Response Time: within 1 second
· Maximum Permissible Voltage: 100mV ~ 100V Range: 800Vpeak (continual), 1100Vpeak (for 1 minute)
  1000V Range: ±1100Vpeak (continual)

2-2. Noise Reduction
(50Hz/60Hz±0.1%)

PLC	NMRR	CMRR Unbalance Resistance1k Ω
Integral Multiple for 1 PLC	55dB	120dB
Other than the above	0dB	-

3. Alternating Current Voltage Measurements (ACV)
3-1. Resolution and Measurement Range
Actual Effective Value Detection Crest Factor :<5

Range	Full Scale	Resolution	Measurement Range		Input Impedance
			MD	HIGH	
100mV	119.9999	0.1 μV	20Hz ～ 300kHz	200Hz ～ 300kHz	Approx.1MΩ// 100pF or less
1V	1.199999	1 μV			
10V	11.99999	10 μV			
100V	119.9999	0.1mV			
750V	750.000	1mV	20Hz ～ 100kHz	200Hz ～ 100kHz	

3-2. Accuracy
Unit: ±(% of reading + % of range)

Range	Frequency	Accuracy	Temperature Coefficient
100.0000mV	20Hz ～ 45Hz	0.70 + 0.04	0.070 + 0.004
	45Hz ～ 100Hz	0.20 + 0.04	0.020 + 0.004
	100Hz ～ 20kHz	0.06 + 0.04	0.005 + 0.004
	20kHz ～ 50kHz	0.12 + 0.05	0.011 + 0.005
	50kHz ～ 100kHz	0.60 + 0.08	0.060 + 0.008
	100kHz ～ 300kHz	4.00 + 0.50	0.200 + 0.020
1.000000V ～ 750.000V	20Hz ～ 45Hz	0.70 + 0.03	0.070 + 0.003
	45Hz ～ 100Hz	0.20 + 0.03	0.020 + 0.003
	100Hz ～ 20kHz	0.06 + 0.03	0.005 + 0.003
	20kHz ～ 50kHz	0.11 + 0.05	0.011 + 0.005
	50kHz ～ 100kHz	0.60 + 0.08	0.060 + 0.008
	100kHz ～ 300kHz	4.0 + 0.50	0.200 + 0.020

· The above shows Accuracy at sine wave.
· The maximum permissible voltage 750Vrms or 1100Vpeak, but the DC components is ±500V or less.
· The 750V range is restricted to 100kHz or 8 x107 (V・Hz)
· The Crest Factor (CF) is guaranteed to upto either 3 or the maximum input voltage during full scale input, whichever is smaller.

4. Direct Current Measurement (DCI)
4-1. Accuracy and Resolution
Unit:±(% of reading + % of range)

Range	Full Scale when 5½ Digits in use	Resolution	Accuracy	Temperature Coefficient/℃	Shunt Resistance
1mA	1.199999	1nA	0.050 + 0.006	0.0020 + 0.0050	90Ω
10mA	11.99999	10nA	0.050 + 0.020	0.0020 + 0.0020	5Ω
100mA	119.9999	100nA	0.050 + 0.005	0.0020 + 0.0005	5Ω
1A	1.199999	1 μA	0.100 + 0.010	0.0050 + 0.0010	0.1Ω
3A	3.00000	10 μA	0.120 + 0.020	0.0050 + 0.0020	0.1Ω

· The above is applied to the condition of Resolution 6½ digits. · The Maximum Permissible Current: All Ranges;3ADC or 3Arms
(continual) (Guaranteed with 3A fuse)

5. Alternating Current Measurement (ACI)
5-1. Resolution and Measurement Range
Actual Effective Value Detection Crest Factor: <5

Range	Full Scale	Resolution	Measurement Range		Shunt Resistance
			MD	HIGH	
1A	1.199999	1 μA	20Hz ～ 5kHz	200Hz ～ 5kHz	0.1Ω
3A	3.00000	10 μA			

5-2. Accuracy
Unit:±(% of reading + % of range)

Range	Frequency	Accuracy	Temperature Coefficient
1A	20Hz ～ 45Hz	0.70 + 0.04	0.100 + 0.006
	45Hz ～ 100Hz	0.30 + 0.04	0.035 + 0.006
	100Hz ～ 5kHz	0.10 + 0.04	0.015 + 0.006
3A	20Hz ～ 45Hz	0.70 + 0.06	0.100 + 0.006
	45Hz ～ 100Hz	0.35 + 0.06	0.035 + 0.006
	100Hz ～ 5kHz	0.15 + 0.06	0.015 + 0.006

· The above shows Accuracy at Sine Wave. · Maxium Permissible Current: 3Arms (continual) (Guaranteed with 3A fuse)

6. 2 Terminals resistance measurement (2WΩ)/4 Terminals resistance measurements (4WΩ)
6-1. Resolution, Accuracy and Measurement Current
Unit: ±(% of reading+% of range)

Range	Full Scale	Resolution	Accuracy	Temperature Coefficient	Measurement Current
100Ω	119.9999	0.1mΩ	0.010 + 0.004	0.0006 + 0.0005	Approx. 1mA
1kΩ	1.199999	1mΩ	0.010 + 0.001	0.0006 + 0.0001	Approx. 1mA
10kΩ	11.99999	10mΩ	0.010 + 0.001	0.0006 + 0.0001	Approx. 100 μA
100kΩ	119.9999	0.1Ω	0.010 + 0.001	0.0006 + 0.0001	Approx. 10 μA
1MΩ	1.199999	1Ω	0.010 + 0.001	0.0010 + 0.0002	Approx. 5 μA
10MΩ	11.99999	10Ω	0.040 + 0.001	0.0030 + 0.0004	Approx. 500nA
100MΩ	119.9999	100Ω	0.800 + 0.010	0.1500 + 0.0002	Approx. 500nA //10MΩ

· The accuracy of the above shows 4 terminals resistance measurement or 2 terminals resistance measurement after zero compensation with the NULL operation using 6½ digits resolution. A margin of error equaliing 0.2Ω is added to the 2 terminals resistance measurement if the NULL operation is not used.
· Maximum Permissible Voltage
  Between the Ω and COM Terminals: 800Vpeak (continual),1100Vpeak(for 1 minute)
  Between Sense Hi-Lo: 200 Vpeak
· Terminal Open-Circuit Voltage <17 V

7. Continuity Tests(CONT ⚫))) , Diodes(▶┤)
Unit:±(% of reading+ % of range)

	Measurement Current	Accuracy	Temperature Coefficient	Remarks
Continuity Test	Approx.1mA	0.010+ 0.020	0.001+ 0.002	Threshold: 1Ω～ 1000Ω
Diode	Approx.1mA	0.010+ 0.020	0.001+ 0.002	M't Range: 0.1mV ～ 1.1999V

· Maxium Permissible Voltage: 800Vpeak (continual), 1100Vpeak (for 1 minute)

8. Temperature Measurement (TEMP, TC: Thermocouple)
8-1. Accuracy and Resolution
Unit:±(% of reading+Digits)

Thermocouple	Measurement Range (℃)	Accuracy	Resolution	Max. allowable voltage
R	-50 ～ 0	0.02+70		
	0 ～ +100	0.02+50		
	+100 ～ +1765	0.02+30		
K(CA)	-200 ～ -100	0.15+50		
	-100 ～ 0	0.15+35		
	0 ～ +1370	0.15+20		
T(CC)	-200 ～ -100	0.15+50	0.01℃	800 Vpeak (Continual) 1100 Vpeak (1 minute)
	-100 ～ 0	0.15+35		
	0 ～ +400	0.15+20		
J(IC)	-200 ～ -100	0.15+50		
	-100 ～ 0	0.15+35		
	0 ～ +1200	0.15+20		
E(CRC)	-200 ～ -100	0.15+50		
	-100 ～ 0	0.15+35		
	0 ～ +1000	0.15+20		

· The above does not include thermocouple accuracy.
· The cold junction temperature is input by the TEMP/SENSOR menu, and the margin of error is not included.
· ±0.1℃ /℃ (total thermocouple) is added to the guaranteed operating temperature between 0℃ to18℃ and 28℃ to 50℃ .
· -200℃ or less tempareture may be measured and displayed, but Accuracy is not guaranteed.
· The standard thermoelectromotive force is aquired with piecewise linear approximation calculations in accordance with JIS C 1602-1995.

9. Temperature Range (TEMP, RTD: Resistance temperature detector)
9-1. Measurement Range, Accuracy and Resolution
Unit:±(% of reading+Digits)

RTD	Measurement Range (℃)	Accuracy	Temperature Coefficient	Resolution
Pt100	-200 ～ +850	0.06℃	0.003℃	0.01℃
JPt100	-200 ～ +510			

· Pt100: Conforms to JIS C1604JIS-1997 standards.
· JPt100:Conforms JIS C1604 -1989 standards.
· The 4 conductance cable equation does not include measurement cable (or probe) accuracy.
· Maximum Permissible Voltage: 800vpeak (continual), 1100Vpeak (for 1 minute)

10. Frequency Measurement (FREQ)
10-1. Accuracy, Display Digit Count
AC Coupling, Reciprical System, Crest factor<5

Gate Time	Display Digit Count, Measurement Range	Accuracy(%)			
		3 ～ 5Hz	5 ～ 10Hz	10 ～ 40Hz	40 ～ 300kHz
1s	7 digits: 3.000000Hz ～ 300.0000kHz	0.1	0.05	0.03	0.01
100ms	6 digits: 3.00000Hz ～ 300.000kHz	0.1	0.05	0.03	0.01
10ms	5 digits: 1.0000Hz ～ 300.00kHz	0.1	0.05	0.03	0.01
1ms	4 digits: 3.000Hz ～ 300.0kHz	0.1	0.05	0.03	0.01

· Maxium Permissible Voltage: 750Vrms or 1100Vpeak, but the DC component is ±500V or less (continual).
· Input Range: 100mVrms to 750Vrms between 3Hz and 100kHz
   *However, up to a maximum of 2.2 x 107 [V/HZ] between 100kHz and 300KHz
· Maximum 100kHz is guaranteed for input of 200Vrms or more.

11. Trigger Functions

Trigger Mode	AUTO, SINGLE	Trigger Delay	0.00ms ～ 3,600 s (Resolution 10 μs)
Trigger Sampling Count	1 ～ 100,000	Intervals	0.00ms ～ 3,600 s (Resolution 10 μs)

12. Operation Functions
Moving average, NULL, Scaling, Decibel, Statistic and Limit Operations

13. Logging Function

NORMAL Mode	Measurement data is stored in the memory while monitoring it. The sampling rate is not guaranteed.
BULK Mode	Masurement data cannot be monitored in the real-time, but for which the sampling rate is guaranteed.
Data Size	NORMAL Mode: 100k, Reading fixed BULK Mode: 1k, 2k, 5k, 10k, 20k, 50k, 100k Readings
STOP EVENT(BULK Mode only)	he following four ways can be selected; 1. NONE: No setting , 2. EXT TRIG: External TRIG input, 3. LEVEL: When the measurement value exceeds the threshold, 4. LIMIT; The four GO/NO GO (HIGH or LOW)/HIGH/LOW settings can be selected from the LIMIT judgment result.
Post Trigger Count (BULK Mode only)	The acquiring data after STOP EVENT can be counted at 0 to100%. (The setting resolution is 1%)

14. Primary Display

Value Display	Font: Can be selected from 7 segments and NORMAL(gothic), Size: Can be selected from NORMAL and LARGE It is possible to display ACV/Frequency and NULL/Measured Value, and etc. at the same time when NORMAL has been set.
Trend Chart Display	Horizontal Axis: Can be selected from AUTO, FULLSCALE and MANUAL Offline Browsing Mode: Scrolling and expanding waveforms , Cursor display and Search function
Histogram Chart Display	BIN count: 2 ~ 400, Statistics Cursor and H1/H2 cursors functions are available. Offline Browsing Mode: The histogram can be generated by changing the number of bin, etc.
Arc Scale Meter Display	Scale: Can be selected from AUTO, FULLSCALE, MANUAL and LOG
Limit Display	Improves visual recognition of the judgment result (GO, HIGH, LOW) on the primary display, the display should be greatly larger than that of the secondary display.

15. Secondary Display

NUMERIC display, ANALOG METER display, STATISTIC display, or LIMIT calculation result display can be selected. Trend Chart display, Histogram Chart display, Each Chart Information display,or Each Cursor Measurement display also can be selected.

16. General Specifications

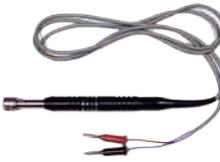|	
Interfaces	USB2.0 (Standard), GPIB (Option), LAN & RS-232 (Option), DIO Interface (Option) *USB Interface is available for remote usage only. USB memory, etc. can be used.
REMOTE Command	SCPI or IWATSU VOAC752x series
Rear Input/Output terminals	TRIG input, COMPLETE output
Setup Memory	Internal 10
LCD	4.3-inch color LCD, 480 × 272dots, TFT active matrix, LED back light
Warm-up time	One hour after power switched on
Operation Guaranteed Temperature and Humidity	0℃~ 50℃ (less than 80% or equivalent moisture at 40℃ . No Condensation)
Storage Temperature and Humidity	− 20℃~ +60℃ (less than 90% or equivalent moisture at 40℃ . No Condensation)
Power Supply	AC100V/110V/220V/240V ± 10 % , 50Hz/60Hz All supplies with the exception of AC100V are optional (factory option)
Power Consumption	21VA or less (including options)
Withstand Voltage	DC ± 500V(between input terminals for all front panel measurements and the earth.)
Installation (Over-Voltage) Category	Cattegory II (Local level, Electrical appliances, Portable appliances)
Contamination Level	Contamination level 2 *Must not be used in envirnments containing conductive contamination.
External Dimensions	Approx. 225Wx100Hx366D mm (excluding the legs, handle, knobs and other protruding components)
Weight	Approx. 3.0kg (including the protectors and options)
Accessories	Test leads, Power cable, User's guide, Instruction manual(CD) ,Fuses(2pcs)

17. Configuration

Main body	VOAC7602	Digital Multimeter Main body
Option	SC-361	LAN & RS-232 Interface
	SC-362	DIO Interface
	SC-363	GPIB Interface

■ **Standard Functions List**

Main body	VOAC7602	VOAC7502	Remarks
Direct-Current Voltage measurement(DCV)	○	○	100 mV ~ 1000 V
Alternating-Current Voltage measurement(ACV)	○	○	100 mV ~ 750 V
Direct-Current Current measurement(DCI)	○	○	1 mA ~ 3 A
Alternating-Current Current measurement(ACI)	○	○	1 A ~ 3 A
2-wire lelvin test(2WΩ)	○	○	100 Ω~ 100 MΩ
4-wire kelvin test(4WΩ)	○	○	100 Ω~ 100 MΩ
Continuity test	○	○	
Diode test	○	○	
Frequency test(FREQ)	○	○	3 Hz ~ 300 kHz
Temperature test(TEMP)	○	×	Thermocouple(Type-R、K、T、J、E) Resistance temperature detectrr (Pt100、JPt100)
NULL operation	○	○	
SMOOTHING	○	○	
Statistic operation	○	○	MAX/MIN/AVG/Standard Deviation
Scaling operation	○	○	(X-a)*b/c、d/x
Decibel operation	○	○	dB、dBm、dBV
Limit operation	○	○	Hi/Go/Lo
Logging function(Off line browsing function)	○	○	Modes: NORMAL/BULK
Interval test	○	○	
Trend Chart display(On line/Off line)	○	○	
Histogram Chart display(On line/Off line)	○	○	
USB host port function(USB memory is used.)	○	×	Screen/Data Out put of LOG memory , Save/Recall, Firmwafre Updates
Remote Interface(USB)	○	○	
Panel Setting memory	○	○	Internal memory:10
Remote Interface(LAN & RS-232)	△	△	LAN&RS-232 Interface SC-361 is required.
DIO output	△	△	SC-362 is required.
Remote Interface(GPIB)	△	△	GP-IB Interface SC-363 is required.

(note) ○ : Equipped as standard
△ : Factory option
X : Not available

VOAC7602 / 7502 Optional Accessories

LAN&RS-232 Interface
SC-361

* Factory option
* Can not be munted at the same time as the SC-363(GPIB Interface).

DIO Interface
SC-362

* Factory option

GPIB Interface
SC-363

* Factory option
* Can not be mounted at the same time as SC-361(LAN&RS-232 Interface).

USB-RS Converter
SC-525

USB-RS-232 conversion cable

Sheath-type thermocouple (Type-K)
SC-0107

* Cold-junction-temperature Input is required.
* This product can not be used for VOAC7502.

Sheath-type thermocouple (Type-K)
SC-0116

* Cold-junction-temperature Input is required.
* This product can not be used for VOAC7502.

Clamp-on current probe
SC-028

DC180A, AC130A

High-resistance test lead
SC-004

Shielded cable for high-value resistance less than100MΩ

4-Wire Kelvin test lead (90cm)
TKL 90cm BAN

* Manufactured by PMK GmbH

Test leads
SC-020

Standard accessories Red 1pc, Black 1pc

Alligator clip H
SC-023
For SC-020 only Strength voltage: 600V / 10A, CE compliance
Arrow clip
SC-026
For SC-020 AC30V/DC60V 3A

4-wire Kelvin test clips (Mechatronics products)
KELVIN : L
KELVIN : M
KELVIN : S