RISHABH

Data Sheet

RISHABH 6012/13/15/16

True RMS Digital Multimeter

RoHS CE

Measure Control Record Analyze Optimize

Data Sheet

RISHABH 6012/13/15/16

The 6012-6016 series of new multimeters is made for professional use that offers safety, high resolution, large range count, reliability, ruggedness, a complete tool for test automation and is equipped with more than 30 different measuring functions.

Application

Low input impedance (Ri = 1MΩ)

Trouble shooting a branch circuit with dead or disconnected circuit is made easy with VAC1MΩ. Low impedance VAC1MΩ measurement helps eliminating error readings resulting from ghost voltages caused by long wires that share a common conduit.

Single fuse(16A)

Instrument contains a single fuse of 16A common for all the ranges of current from 600µA to 10A AC/DC as compared to the two fuses in traditional DMMs. This eliminates the accidental blowing of 1.6A fuse due to operator's error when higher current is applied in lower ranges.

Tool for automation, USB 2.0 Interface

With ready to use communication protocol and plug and play USB 2.0 add-on device, one can easily automate his test system. The extensive data capturing and analysis is possible with DMM software.
With vast functionality and editable report settings DMM software is a real help for easy report generation and analysis of a device under test.

Square Wave Output

A square wave output can be generated from the DMM with the user selectable frequency and adjustable duty cycle.This can be used as baud rate generator,to check flow meters, to test frequency counters, accelerometer and frequency transmitter.
It can also be used as audio signal in audio signal testing.

Current measurement with clamp sensor

Measurement with various clamp sensors is possible, which helps in accurate measurement of current from 60mA to 6000A without interrupting the circuit. The measured current is automatically calculated from the selected clamp ratio.

Low pass filter(LPF) in VAC10MΩ & VAC1MΩ

A selectable 1kHz low pass filter offers advanced variable frequency drive filtering to help you accurately analyze non-traditional sine waves and noisy signals.
In LPF mode DMM rejects all high frequency noise making it suitable for making measurements on inverters and high frequency drives.

Measure Control Record Analyze Optimize

True RMS measurement with high crest factors

Accurate true RMS measurement of distorted waveform with crest factor CF between 1 to 10.

Data Logging

DMM 6015/6016 offers continuous data logging of up to 32000 readings with real time stamping. Log rate is adjustable from as low as 0.1 sec to as high as 1hr.

Adjustable Beep Level

With Beep level setting, the limit for continuity can be adjusted from 10Ω to 90Ω depending upon application.

Separate fuse compartment

Easier access to fuse when replacing the blown fuse.

Auto Power OFF with adjustable timing

Flexibility to adjust “Auto off ” period from 5 minutes to 60 minutes.

60mv & 600mV DC & ACDC

This helps in accurate measurement of low output voltages <600mV from sensors & transmitters. High frequency low voltage signal from RF transmitters can also be measured. Signal as low as 0.001mV can be measured accurately.

Min / Max / Avg measurement

Min/Max/Avg function records the minimum, maximum and average of all the readings applied since its activation. With dual display it makes it even flexible for the user to keep the trace of the applied readings while viewing Min/Max/Avg readings. The average reading is useful for smoothing out unstable inputs,& verifying circuit performance.

Dedicated keys for easy navigation

Dedicated navigation keys makes scrolling through menu and setting of parameters easy & comfortable.

External Power Adapter (DC Jack)

The external power supply adapter helps in conserving battery while performing long hours of measurements. When DC jack is connected batteries inside DMM are electronically disconnected, and reconnected in absence of mains, hence there is no need of removing the battery when using the power adapter.

100kHz Bandwidth

Alternating voltages with frequencies up to 100kHz can be measured accurately. This is useful while analyzing high frequency analog signals.

Self battery voltage measurement

Capable of measuring self battery voltage.

Room temperature measurement

Room temperature can be sensed and measured without any external sensor. The same is used as internal reference temperature in thermocouple based temperature measurements

Fully programmable GO NO-GO

The Go - NoGo function gives an indication through a buzzer for the applied input lying inside or outside the set band. The values for low limit, high limit and buzzer condition can be easily set through NoGo function in menu settings. Once the NoGo function is set, user can get busy doing other activities in the vicinity of the meter, whenever the condition is met it will be indicated by a buzzer. It eliminates the need of operator to continuously monitor the display.

View Function

Data logged on meter can be viewed directly on the meter itself, hence the data analysis is also possible without a PC based software. However for graphical and large data analysis PC based software can be used.

Dangerous Contact Voltage Indication

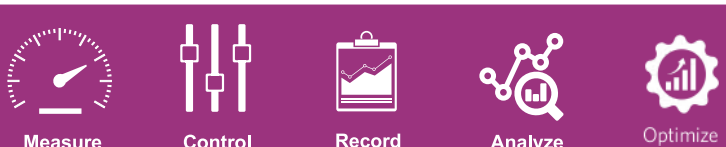
Presence of hazardous voltage (>35Vrms 50/60Hz and 50Vdc) at the contact terminal are indicated on display. This is very useful while performing measurements in the circuit which takes longer time to discharge its capacitors, or where unexpected danger voltage are present.

Model Wise Functional Overview

Functions/Features	6012	6013	6015	6016
Voltage VDC (Ri>9MΩ)	•	•	•	•
Voltage VAC TRMS (Ri>9MΩ)	•	•	•	•
Voltage LoZ VAC TRMS (Ri=1MΩ)		•	•	•
Voltage VAC TRMS (Ri>9MΩ) LPF 1kHz		•	•	•
Voltage LoZ VAC TRMS (Ri=1MΩ) LPF 1kHz		•	•	•
Voltage VACDC (Ri>9MΩ)	•	•	•	•
High impedance, high bandwidth mV measurement	600mV	60mV/ 600mV	60mV/600mV	60mV/600mV
Bandwidth VAC & mV ACDC	10kHz	10kHz	10kHz	100 kHz
Frequency Measurement			•	•
Duty cycle %				
Voltage level measurement dB,dBu,dBm		•	•	•
Resistance	•	•	•	•
Conductance measurement	•	•	•	•
Continuity test (I const = 1 mA)	•	•	•	•
Diode measurement (I const = 1 mA)	•	•	•	•
Temperature measurement (TYP J,TYP K)		•	•	•
Temperature measurement (PT100,PT1000)	•		•	•
Capacitance measurement			•	•
Current ADC	600mA	6 A/16 A (20 A)	600 µA/6 mA 60 mA/600 mA 6 A/10 A (16 A)	600 µA/6 mA 60 mA/600 mA 6 A/10 A (16 A)
Current AAC+DC TRMS				
Current AAC TRMS				
Bandwidth @ AAC+DC or AAC 10 kHz	•	•	•	•
Measurement with Clamp Sensor	•	•	•	•
Data Logging / Viewing Function			•	•
Protective rubber holster	•	•	•	•
Fuse 16A / 1000V	1.6A		•	•
0-20mA / 4-20mA percentage scale			•	•
Square wave Out			•	•
Self battery voltage measurement	•	•	•	•
MIN/MAX/AVG and Auto Hold functions	•	•	•	•
Dangerous contact voltage indication	•	•	•	•
REL/Zero function	•	•	•	•
USB IR-interface	Optional			
External power supply adapter				
Measuring Category	1000 V CAT III 600 V CAT IV	1000 V CAT I 600V CAT II	1000 V CAT III 600 V CAT IV	1000 V CAT III 600 V CAT IV

Environmental Condition

Operating temperature	-10 to +50°C
Storage temperature	- 25 to +70°C
Relative humidity	<75% non condensing.
IP	IP 50 for Housing, IP20 for terminals.
Altitude	Up to 2000 m



Technical Specification

Voltage

Measurement Function	Measuring Range	Resolution	Input Impedance	Intrinsic Uncertainty under Reference Condition ±(...% of the rdg.+...Digits)			Overload Capacity [2]	
				DC[7]	AC [1) 3)]	ACDC [1) 3)]	Value	Time
V	6V	100µV	>9MΩ	0.05 + 5	0.5 + 9	1 + 30	1000 V DC/ AC RMS Sine	Continuous
	60V	1mV		0.05 + 5				
	600V	10mV		0.05 + 9				
	1000V	100mV		0.09 + 10				
mV	60mV	1µV	>10MΩ	0.09 + 15	-	1 + 30		Max 10 s
	600mV	10µV		0.09 + 15				

Influence Quantity	Range of Influence	Range	Accuracy	
			DMM 6016	Others[4]
Frequency [6)9)]	>15 Hz...45 Hz	60 mV ~[5], 600 mV ~	3+30	
	>65 Hz...100kHz			
	>15 Hz...45 Hz	6V, 60V, 600V ~	2+9	3+9
	> 65Hz... 1kHz		1+9	3+9
	>1kHz.....20kHz		3+9	4+9 [10]
	>20kHz....100kHz [8]		3.5+30	
	>15 Hz...45 Hz	1000V ~	2+9	3+9
	> 65Hz... 1kHz		2+9	3+9
	>1kHz.....10kHz		3+30	

1) Specified Accuracy is valid as of 3% of the measuring range.With Short- circuited test probes: residual value of 1 to 30 d at zero point due to the TRMS converter.

2) At 0°C to 40°C (Accuracy Range)

3) In VAC measurement, Frequency will be shown above 10% of the present range, except for 1000V & 60mV range i.e. 25% & 50% respectively.

4) Frequency Influence upto 10kHz.

5) Frequency response up to 50 kHz

6) Frequency response is valid from 10% to 100% of range

7) With Zero Balancing

8) Frequency response up to 100 kHz, for greater than 50 kHz plus 2.5%

9) Overload capacity of the voltage measurement input: power Limiting: Frequency x Voltage Max : $6x10^6$ V x Hz for V>100V

10) Frequency response greater than 2 kHz plus 2.5%

Frequency, Duty Cycle

Measurement Function	Measuring Range	Frequency	Intrinsic Uncertainty	Overload Capacity [1)]	
				Value	Time
Hz[5)]	600Hz, 6kHz, 60kHz, 600kHz, 1MHz	fmin[2)]: 6Hz	0.05 +5	1000 V DC/ AC RMS Sine	Max 10 s
Hz(V)[3)]	10Hz.....100kHz		0.1 +5[4)]		
Duty Cycle(%)	2.0...98%	15Hz 1kHz	0.1 R + 5 d		
	5.0...98%	.... 10kHz	0.2 R per kHz + 5d		
	10...90%	.... 50kHz	0.5 R per kHz + 5d		

1) At 0°C to 40°C (Accuracy Range)

2) Lowest measurable frequency for square measuring signals symmetrical to the zero point (±5V).

3) Overload capacity of the voltage measurement input :
Power limiting: Frequency x voltage max : $6x10^6$V x Hz for U> 100V.

4) Input sensitivity, sinusoidal signal , 10% to 100% of the measuring range

5) At input ±5Vrms ,Square wave, Bipolar inputs.

R= Range d= digit

Current

Measurement Function	Measuring Range	Resolution	Votlage Drop Approx.	Intrinsic Uncertainty under Reference Condition ±(...% of the rdg.+...Digits)			Overload Capacity [2]	
				DC[4]	AC [1]	ACDC [1]	Value	Time
mA	600 µA	10 nA	60 mV	0.5 + 15	1 + 10	1.5 + 10	0.7A	Continuous
	6 mA	100 nA	60 mV	0.5 + 5	1 + 10	1.5 + 10		
	60 mA	1 µA	60 mV	0.1 + 5	1 + 10	1.5 + 10		
	600 mA	10 µA	60 mV	0.2 + 5	1 + 10	1.5 + 10		
A	6 A	100 µA	60 mV	0.9 + 10	1 + 10	1.5 + 10	10 A: = 5 min [3]	
	10 A	1 mA	300 mV	0.9 + 10	1 + 10	1.5 + 10		

Influence Quantity	Range of Influence	Range	Accuracy	
			DMM 6016	Others
Frequency [5]	>15 Hz....45 Hz	600µA..... 10A	3+10	
	>65Hz....10 kHz			

1) Specified Accuracy is valid as of 3% of the measuring range. With Short- circuited test probes: residual value of 1 to 30 d at zero point due to the TRMS converter.

2) At 0°C to 40°C (Accuracy Range)

3) Off time 30 min and TA = 40°C

4) With Zero Balancing

5) Frequency response is valid from 10% to 100% of range

Resistance, Diode, Continuity

Measurement Function	Measuring Range[4]	Resolution	Open Ckt. Voltage	Meas. curr. @ range limit	Intrinsic Uncertainty	Overload Capacity	
						Value	Time
Ω [1]	600Ω	10mΩ	<1.4V	Approx. 300 µA	0.1 + 10	1000 V DC/ AC RMS Sine	Max 10 s
	6kΩ	100mΩ		Approx. 250 µA	0.1 + 10		
	60kΩ	1Ω		Approx. 100 µA	0.1 + 10		
	600kΩ	10Ω		Approx. 12 µA	0.5 + 10		
	6MΩ	100Ω		Approx. 1.2 µA	1 + 10		
	60MΩ	10kΩ		Approx. 125 nA	5 + 10		
Continuity	600Ω	-	Appx. 8V	Approx. 1 mA	3 + 5		
Diode [1]	6.0V [3]	-	Appx. 8V	Approx. 1 mA	0.5 + 5		

1) Measurement of Resistance, Diode will be more accurate after removal from device under test

2) At 0°C to 40°C (Accuracy Range)

3) Displays up to max 6.0 V, "OL" in excess of 6.0V.

4) With Zero Balancing

Temperature

Measurement Function	Measuring Range		Intrinsic Uncertainty	Overload Capacity [1]	
				Value	Time
Temperature °C/°F	Pt 100	-200 °C .. +850 °C	0.3 + 15 [2]	1000 V DC/ AC RMS Sine	Max 10s
	Pt 1000	-150 °C .. +850 °C	0.3 + 15 [2]		
	TC K	-200 °C .. +1372 °C	1% +20 [2]		
	TC J	-210 °C .. +1200 °C	1% +20 [2]		

1) At 0°C to 40°C (Accuracy Range)

2) Plus Sensor Deviation

Capacitance

Measurement Function	Measuring Range	Resolution	V_0MAX	Intrinsic Uncertainty	Overload Capacity [2]	
					Value	Time
F [3][4]	10 nF	10 pF	0.7 V	1 + 10 [2]	1000V DC / AC RMS Sine	Max 10 s
	100 nF	100 pF		1 + 6 [2]		
	1 µF	1 nF		1 + 6 [2]		
	10 µF	10 nF		1 + 6 [2]		
	100 µF	100 nF		5 + 6 [2]		
	1000 µF	1 µF		5 + 6 [2]		

1) At 0°C to 40°C (Accuracy Range)
2) Applies to measurements at film capacitors and battery operated.
3) Measurement of Capacitance will be more accurate after removal from device under test
4) With Zero Balancing

Square Wave Out

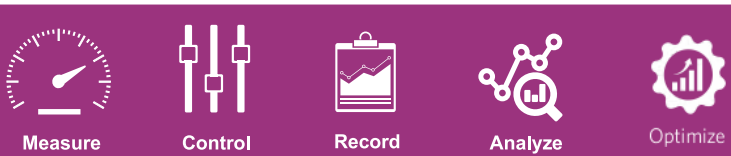
Output	Range	Accuracy
Frequency	30Hz - 10kHz	0.1% x output frquency + 2 counts of DMM display
Duty Cycle	10% - 100% [2]	0.2% of Full scale [1]
Amplitude	Fixed -3.15 to 3.15V	±0.4V
1) For signal greater than 1kHz, add 0.2% per kHz to the accuracy		
2) In Multiple of 10		

Influence Error

Influence Quantity	Range of Influence	Measured Quantity / Measuring Range [1]	Variation ± (….%of rdg. + ….digits)/10k
Temperature	-10 °C to 21 °C & +25 °C to 50 °C	VDC	0.2 + 20
		V~, VACDC	0.4 + 10
		600Ω to 600 kΩ	0.5 + 10
		> 600 kΩ	1 + 10
		mA / ADC	0.6 + 10
		mA / AAC, ACDC	0.8 + 10
		10nF…10µF	1 + 5
		100µF...1000µF	1.5+10
		Hz, %	0.2 + 10
		°C/°F pt100/pt1000	0.5 + 10
		°C/°F thermocouple K/J	0.2 + 10
Relative humidity	75% 3 Days Meter off	V,A,Hz,%,Diode,F,Ω	1 × intrinsic error
Battery voltage	1.8 to 3.6V	V,A,Hz,%,Diode,F,Ω	1 × intrinsic error
1) With Zero Balancing			

Reference Condition for Accuracy

Reference Temperature	23°C ± 1K
Relative Humidity	45%...55% RH
Waveform of measured quantity	Sinusoidal
Input frequency	45...65 Hz
Battery Voltage	3 V ± 0.1 V



Influence Quantity

Influence Quantity	Range of Influence	Measuring Ranges	Attenuation
Common Mode interference voltage	Noise quantity max. 1000 V dc	V dc	> 120 dB
	Noise quantity max. 1000 V ~ 50-60 HZ sinusoidal	6.0 V~,60 V~	>80 dB
		600 V~	> 70 dB
		1000 V~	> 60 dB
Normal Mode interference ratio	Noise quantity V ~ Value of the measuring range at a time Max. 1000V~ ,50Hz, 60Hz Sinusoidal	V dc	> 50dB
	Noise quantity max. 1000 V dc	V~	>110dB

Applicable Regulations & Standards

EMC Immunity	IEC 61326-1:2012, Table A.1
Immunity	IEC 61000-4-2 : 8 KV atmosphere discharge, 4 KV contact discharge
	IEC 61000-4-3 : 3 V/m
Safety	IEC 61010-1-2010
IP for water & dust	IEC 60529 : IP 50 For Instrument and IP20 for socket
Pollution degree:	2
Installation category:	1000 V CATIII / 600 V CATIV, 600V CATII for DMM 6013
High Voltage Test	7.4 kV (IEC 61010-1-2010), 3.5kV For DMM 6013
Test & Procedure	IS 13875

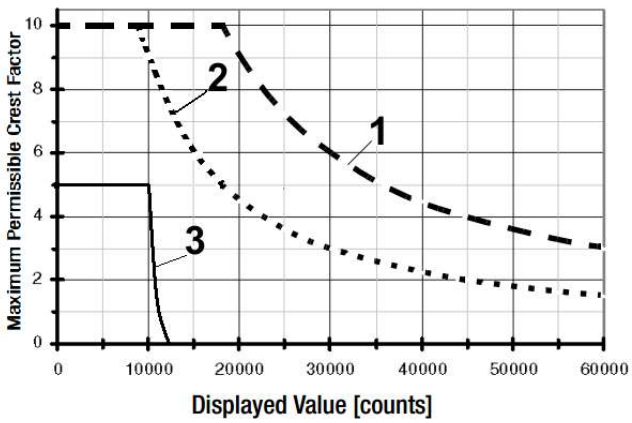
Battery

Battery Voltage	2 X 1.5 V Cells (LR6 Battery)
Battery type	Alkaline manganese cells.
Battery Life	Appx. 100 Hrs. (Backlight off)
Battery test	Automatic display of symbol when battery voltage drops below approx. 2.4V

Mechanical Design

Housing	PC ABS
Dimension	200 x 91 x 54 mm
Weight	Approx. 0.5 kg with batteries

Crest Factor



Additional error caused by signal's crest factor: 1 < CF < 3: 1% R+ 30D
3 < CF < 10: 3% R

Curve 1: Range from 0.06V to 60V,
0.6mA to 60mA, 6A

Curve 2: Range 600V
600mA

Curve 3: Range 1000V
10A

Note: With Unknown Waveform (CF >2), measurement should be made with manual range selection.
R = Reading
D = Digit

Internal Clock

Time Format	dd.MM.yy hh.mm.ss
Resolution	1 s
Accuracy	±1min. per month
Temperature Influence	50 ppm/K

Display

LCD display field 67 mm X 54 mm with digital display, analog scale and with display of measurement unit, and Various special functions.

Analog

Display:	LCD scale with bar graph or pointer, depending on the selected parameter setting
Scaling:	2 bar/pointer corresponds to 2500 counts at the digital display
Over range Display (Digital):	By triangle " ▶ "
Polarity Display:	With automatic switching
Sample rate (Digital):	10 measurements / sec and display refresh

Digital

Display:	7-segment characters
Character Height:	Main Display - 12.88mm Sub Display - 7.37mm
Resolution:	60,000 counts
Overflow Display:	"OL" is displayed
Polarity Display:	"-" (minus) is displayed if plus pole is connected to " ⊥ "
Measuring Rate:	10 measurement / sec with the Min-Max function except for the capacitance, frequency and duty cycle measuring Function
Refresh Rate:	4 times/ sec
Number of Digits:	5

Fuse

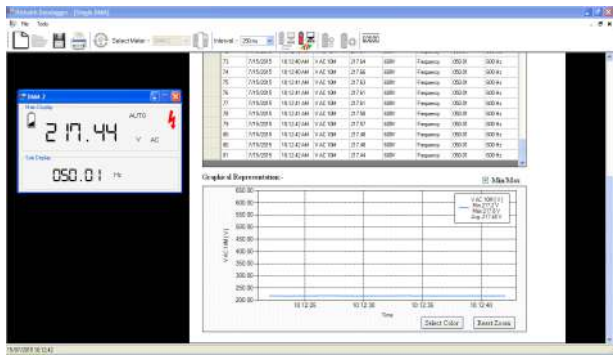
Fuse	FF (UR) 16 A/ 1000 V AC/DC; 10 mm x 38 mm (DMM 6015 & DMM 6016)
	FF (UR) 1.6 A/ 1000 V AC/DC ; 6.3 mm x 32 mm (DMM 6012)
Switching Capacity	30 kA at 1000 V AC/DC (DMM 6015 & DMM 6016)
	10 kA at 1000 V AC/DC (DMM 6012)

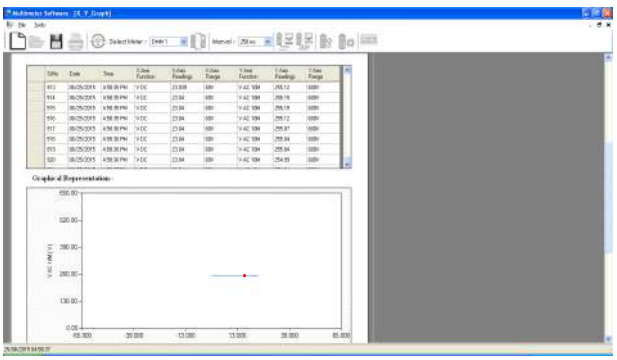
Accessories For Operation at a PC

Interface Adapter For USB Communication

Communication: Bi-Directional
Baud Rate: 9600
Data Bit: 8
Stop Bit: 1
Flow Control: None

A CD ROM is included which contains current drivers for Windows operating systems, Installation Guide, Rishabh Datalogger User Manual and Rishabh Datalogger Setup File.





Scope of Supply

Model Name	Scope of Supply
RISHABH 6012 RISHABH 6013 RISHABH 6015 RISHABH 6016	1. Digital Meter
	2. Cable Set
	3. Protective Case
	4. Battery
	5. Operating Manual
	6. Test Certificate
OPTIONAL ACCESSORIES	
1. External Power Supply Adapter	
2. USB Interface Adapter + Software CD	

RISHABH

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