

# Data Sheet

**RISHABH 612...616**  
**Digital Multimeter**



# RISHABH 612...616

## Digital Multimeter

- \* Direct and alternating voltages from 100 $\mu$ V ... 1000V
- \* Direct and alternating currents from 10 $\mu$ A ... 10.00A
- \* Resistance from 100m $\Omega$ ... 60.00M $\Omega$
- \* Capacitance from 1pF ... 40.00 mF with zero correction.
- \* Frequencies from 10.00Hz ... 10MHz
- \* Diode measurement and continuity testing
- \* Hold measurement .
- \* Relative measurement
- \* Duty cycle (%) measurement
- \* Temperature measurement with K type Thermocouple
- \* Peak value measurement

### Application

RISHABH digital multimeters are suited for universal, general applications in the electrical and electronics radio and television service, training and education.

**Root mean square value with distorted wave form(for 616 only).** Measuring principal employed permits the measurement of root mean square value (TRMS) of AC quantities regardless of wave form.

#### Dual Display

The dual display included a main display and a sub display. Main display always display current measurement value where as sub display shows some special measurements like maximum/ minimum value, reference value for relative value measurement. Also dual display is used to display at the same time Voltage/ Current with Frequency, Frequency with Duty cycle etc.

#### Peak Hold

Minimum and maximum Peak values are hold in VAC, mAAC, AAC.

#### MIN/MAX Function

By pressing min/max button instrument will start recording minimum and maximum readings. All functions can measure MIN/MAX except Hz/Duty functions.

#### Temperature measurement

Multimeters measures temperature with "K" type thermocouple (NiCr - Ni) sensor in the range from 0C to 1300°C.

#### Indication of negative values on the analog scale.

When measuring DC quantities negative values are shown on the analog scale so that variations of the measured value can be observed at the Zero point.

#### Analog Scale

Analog scale that updates at the rate 28 times/sec to observe

#### Protection from dust and water:

Instrument: IP 50

For terminals: IP20 as per IEC60529.

#### Applicable International Safety standards

1000 V CAT III/600V CAT IV as per International Safety standard IEC 61010-1- 2010 and IEC 61557



#### Auto Power OFF (APO)

Multimeter has a default auto power off function. If the Meter is idle for more than the 15 minutes, the meter automatically turns the power off.

#### Hold

By pressing the HOLD/ON key, the currently displayed Measurement value can be held and "HOLD" is simultaneously displayed.

#### Relative measurement (REL)

By pressing and holding PEAK and then pressing AUTO/MAN key, the zero correction is made and relative Value is measured. It is not active in Hz/Duty functions.

#### Automatic blocking System(ABS)

The automatic terminal blocking system prevents incorrect connection of test lead and incorrect selection of measurement quantity, which provide safety to the user.

#### Auto and Manual ranging modes

In AUTO ranging mode the instrument automatically selects the range with best resolution depending on the applied input. In manual ranging mode range is user selectable using AUTO/MAN Key.

Note: For AAC, ADC, Temperature ,Continuity ,Diode and Duty cycle measuring range is manual. No AUTO range selection is possible.

#### Diode and Continuity testing

This provides for the testing of the polarity of diodes, as well as inspection for short -circuits and circuit interruptions. In addition to the display, resistance of less than 30  $\Omega$ (approx.) Are Indicated with an acoustic signal.

#### Backlit

Large white LED backlit to work in poorly light area.

#### ContinuousON mode

In this mode, AUTO POWER OFF is disabled.



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### Reference conditions for Accuracy

|                               |                 |
|-------------------------------|-----------------|
| Reference Temperature         | 23°C ± 2K       |
| Relative Humidity             | 45%...55% RH    |
| Waveform of measured quantity | Sinusoidal      |
| Input frequency               | 50 or 60 Hz ±2% |
| Battery Voltage               | 3 V ± 0.1 V     |


### Applicable regulations and standards

|                        |   |
|------------------------|---|
| EMC                    | IEC 61326: Class B  |
| 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   |
| Pollution degree:      | 2   |
| Installation category: | 1000 V CATIII / 600 V CATIV (for 616,615,612)                     |
|                        | 1000 V CATII / 600 V CATIII (for 613)                             |
| High Voltage Test      | 6.7 kV (IEC 61010-1-2010) (for 616,615,612)                       |
|                        | 3.5 kV (IEC 61010-1-2010) (for 613)                               |

### Environmental Conditions

|                       |   |
|-----------------------|---|
| Operating temperature | 0 to +50°C                                    |
| Storage temperature   | - 25 to +70°C                                 |
| Relative humidity     | <75% non condensing.                          |
| Terminal Protection   | IP 50 for instrument and IP 20 for terminals. |
| Altitude              | Up to 2000 m                                  |

### Battery

|                 |   |
|-----------------|---|
| Battery Voltage | 2 X 1.5 V Cells   |
| Battery type    | Alkaline manganese Dioxide cells.   |
| Battery Life    | for 612, 613, 615: 600 hrs. for VDC, ADC<br>300 hrs. for VAC, AAC   |
|                 | for 616: 400 hrs. for VDC, ADC<br>200 hrs. for VAC, AAC   |
| Battery test    | Automatic display of  symbol when battery voltage drops below approx. 2.4V |



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### Specifications

| Meas. Function    | Measuring Range         | 612 | 613 | 615 | 616 TRMS | Resolution       | Input Impedance  | Digital display Inherent deviation at reference condition<br>+ (...%rdg + ...digits)     | Overload capacity <sup>1)</sup>              |                   |
|-------------------|-------------------------|-----|-----|-----|----------|------------------|------------------|--|--|-------------------|
|                   |                         |     |     |     |          |                  |                  |  | Overload Values                              | Overload Duration |
| V(DC)             | 660.0mV                 | ●   | ●   | ●   | ●        | 100μV            | >100 MΩ // <40pF | 0.7 + 5  | 1000 V<br>DC<br>AC<br>eff / rms<br>Sine wave | Cont.             |
|                   | 6.600V                  | ●   | ●   | ●   | ●        | 1mV              | 11 MΩ // <40pF   | 0.4 + 5  |  |                   |
|                   | 66.00V                  | ●   | ●   | ●   | ●        | 10mV             | 10 MΩ // <40pF   | 0.4 + 5  |  |                   |
|                   | 660.0V                  | ●   | ●   | ●   | ●        | 100mV            | 10 MΩ // <40pF   | 0.4 + 5  |  |                   |
|                   | 1000.0V                 | ●   | ●   | ●   | ●        | 1V               | 10 MΩ // <40pF   | 0.4 + 5  |  |                   |
| V(AC)             | 660.0mV                 | ●   | ●   | ●   | ●        | 100μV            | >100 MΩ // <40pF | 1.2 + 5  | 1.0 + 3                                      |                   |
|                   | 6.600V                  | ●   | ●   | ●   | ●        | 1mV              | 11 MΩ // <40pF   |  |  |                   |
|                   | 66.00V                  | ●   | ●   | ●   | ●        | 10mV             | 10 MΩ // <40pF   |  |  |                   |
|                   | 660.0V                  | ●   | ●   | ●   | ●        | 100mV            | 10 MΩ // <40pF   |  |  |                   |
|                   | 1000V                   | ●   | ●   | ●   | ●        | 1V               | 10 MΩ // <40pF   |  |  |                   |
| A(DC)             |                         |     |     |     |          |                  | Voltage Drop     |  |  |                   |
|                   | 66.00mA                 | ●   | ●   | ●   | ●        | 10μA             | 66.00mV          | 0.8 + 5  | 0.7A   | Cont.             |
|                   | 660.0mA                 | ●   | ●   | ●   | ●        | 100μA            | 66.00mV          | 0.8 + 5  |  |                   |
| 10.00A            |                         | 16A | ●   | ●   | 10mA     | 10.00mV          | 1.5 + 5          | 12A  |  |                   |
| A(AC)             | 66.0mA                  | ●   | ●   | ●   | ●        | 10μA             | 66.00mV          | 0.8 + 5  | 0.7A   | Cont.             |
|                   | 660.0mA                 | ●   | ●   | ●   | ●        | 100μA            | 66.00mV          | 0.8 + 5  |  |                   |
|                   | 10.00A                  |     | 16A | ●   | ●        | 10mA             | 10.00mV          | 1.5 + 5  | 12A  |                   |
| >C(AC)            | 66.00A                  | ●   |     |     |          | 10mA             | 66.00mV          | 0.8 + 5  | 0.7A   | Cont.             |
|                   | 660.0A                  | ●   |     |     |          | 100mA            | 66.00mV          | 0.8 + 5  |  |                   |
| Ω                 |                         |     |     |     |          |                  | No load Voltage  |  |  |                   |
|                   | 660.0Ω                  | ●   | ●   | ●   | ●        | 100mΩ            | -3.3V            | 0.8 + 5  | 1000 V<br>DC<br>AC<br>eff / rms<br>Sine wave | 10Sec.            |
|                   | 6.600KΩ                 | ●   | ●   | ●   | ●        | 1Ω               | -1.08V           | 0.8 + 5  |  |                   |
|                   | 66.00KΩ                 | ●   | ●   | ●   | ●        | 10Ω              | -1.08V           | 0.8 + 5  |  |                   |
|                   | 660.0KΩ                 | ●   | ●   | ●   | ●        | 100Ω             | -1.08V           | 0.8 + 5  |  |                   |
|                   | 6.600MΩ                 | ●   | ●   | ●   | ●        | 1KΩ              | -1.08V           | 1.0 + 5  |  |                   |
| 66.00MΩ           | ●                       | ●   | ●   | ●   | 10KΩ     | -1.08V           | 2.0 + 5          |  |  |                   |
| BUZZER            | 660.0Ω                  | ●   | ●   | ●   | ●        | 100mΩ            | -3.3V            | 0.8 + 5  |  |                   |
| DIODE             | 2.000V                  | ●   | ●   | ●   | ●        | 1mV              | 3.3V             | 2.0 + 10   |  |                   |
| F                 | 6.600nF                 |     |     | ●   | ●        | 1pF              | —                | 3.0+40   | 1000 V<br>DC<br>AC<br>eff / rms<br>Sine wave | 10Sec.            |
|                   | 66.00nF                 |     |     | ●   | ●        | 10pF             |                  | 2.0+10   |  |                   |
|                   | 660.0nF                 |     |     | ●   | ●        | 100pF            |                  | 2.0+10   |  |                   |
|                   | 6.600μF                 |     |     | ●   | ●        | 1nF              |                  | 2.0+10   |  |                   |
|                   | 66.00μF                 |     |     | ●   | ●        | 10nF             |                  | 2.0+10   |  |                   |
|                   | 660.0μF                 |     |     | ●   | ●        | 100nF            |                  | 5.0+10   |  |                   |
|                   | 6.600mF                 |     |     | ●   | ●        | 1μF              |                  | 5.0+10   |  |                   |
|                   | 40.00mF                 |     |     | ●   | ●        | 10μF             |                  | 5.0+10   |  |                   |
| Hz                | 66.00Hz                 |     |     | ●   | ●        | 0.01Hz           | 10 Hz(Fmin)      | 0.2 + 2 <sup>2)</sup>  |  |                   |
|                   | 660.0Hz                 |     |     | ●   | ●        | 0.1Hz            |                  |  |  |                   |
|                   | 6.600KHz                |     |     | ●   | ●        | 1Hz              |                  |  |  |                   |
|                   | 66.00KHz                |     |     | ●   | ●        | 10Hz             | —                |  |  |                   |
|                   | 660.0KHz                |     |     | ●   | ●        | 100Hz            |                  |  |  |                   |
|                   | 6.600MHz                |     |     | ●   | ●        | 1KHz             |                  |  |  |                   |
|                   | 10.00MHz                |     |     | ●   | ●        | 10KHz            |                  |  |  |                   |
| %                 | 1.0...98.90%            |     |     | ●   | ●        | 0.01%            |                  | 10 Hz... 1kHz ± 5 Digit <sup>3)</sup><br>1 kHz ... 10 kHz; ± 5 Digit / kHz <sup>3)</sup> |  |                   |
| C / F             | 0...1300 <sup>0</sup> C | ●   | ●   | ●   | ●        | 1 <sup>0</sup> C | —                | 2.0+3 <sup>4)</sup>  |  |                   |
| Peak (VAC / A AC) |                         | ●   | ●   | ●   | ●        |                  |                  | 3.0+300  | -  | -                 |

1) At 0°C ... + 40 °C

3) For <10 KHz , Square wave, Bipolar inputs

2) At input ≥3.5Vrms , Square wave, Bipolar inputs. 4) Without sensor



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
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### Influence Quantities


| Influence Quantity                              | Range of Influence   | Measured Quantity/<br>Measuring Range | Variation <sup>1)</sup><br>± (...% of rdg. + ....digits) |
|---|--|---------------------------------------|--|
| Temperature                                     | 0 °C<br>+21 °C<br>and<br>+25 °C...+40°C  | VDC                                   | 1 X Intrinsic error / K                                  |
|   |  | VAC                                   |  |
|   |  | ADC                                   |  |
|   |  | AAC                                   |  |
|   |  | Ω                                     |  |
|   |  | Diode                                 |  |
|   |  | F                                     |  |
|   |  | Hz                                    |  |
|   |  | %                                     |  |
| Frequency of the Measured quantity              | 20 Hz...< 50 Hz  | 660mV~                                | 1.0+3  |
|   | > 50Hz... 200 Hz   |                                       | 5.0+3  |
|   | 20 Hz...< 50 Hz  | 6.6.....1000V~                        | 1.0+3  |
|   | > 50Hz... 2 Khz  |                                       | 5.0+7  |
|   | 20 Hz...< 50 Hz  | A~                                    | 1.0+3  |
|   | > 50Hz... 2 KHz  |                                       | 5.0+7  |
| Waveform of the Measured quantity <sup>2)</sup> | Crest Factor<br>CF   | V <sup>~3)</sup> , A <sup>~3)</sup>   | ± 1 % of rdg   |
|   |  |                                       | ± 5 % of rdg   |
| Battery Voltage                                 |  ...< 2.49 V<br>> 2.49 V ...3 V | VDC                                   | 5 Digit  |
|   |  | V~,ADC                                | 10 Digit   |
|   |  | AAC                                   | 6 Digit  |
|   |  | 600 Ω                                 | 4 Digit  |
|   |  | 6.600 kΩ - 66 MΩ                      | 3 Digit  |
|   |  | nF,μF,mF                              | 5 Digit  |
|   |  | Hz                                    | 5 Digit  |
|   |  | %                                     | 5 Digit  |
| Relative Humidity                               | 75%  | V~,VDC                                | 1 x intrinsic error                                      |
|   | 3 Days   | A~,ADC                                |  |
|   |  | Ω                                     |  |
|   | Meter off  | F                                     |  |
|   |  | Hz                                    |  |
|   |  | °C                                    |  |
|   |  |                                       |  |

1) With temperature: Error data apply per 10 K change in temperature.

With frequency: Error data apply to a display from 300 digits onwards.

2) With unknown waveform (crest factor CF > 2), measure with manual range selection

3) With the exception of sinusoidal waveform.

4) After the "" symbol is displayed.



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### Influence quantities

| Influence Quantity               | Range of Influence  | Measured Quantity/<br>Measuring Range | Attenuation |
|----------------------------------|---|---------------------------------------|-------------|
| Common Mode interference voltage | Noise quantity max. 1000 V dc   | VDC                                   | > 100 dB    |
|                                  |   | V~                                    | > 100 dB    |
|                                  | Noise quantity max. 1000 V ~<br>50 Hz, 60 Hz sinusoidal   | VDC                                   | >100 dB     |
|                                  |   | V~                                    | > 50 dB     |
| Normal Mode interference voltage | Noise quantity V ~<br>Value of the measuring range at a time<br>Max. 1000V~ ,50Hz, 60Hz<br>Sinusoidal | 660mVDC, 6.6VDC, 660VDC,1000VDC       | > 43 dB     |
|                                  |   | 66 VDC                                | > 35 dB     |
|                                  | Noise quantity max. 1000 V dc   | V~                                    | > 45 dB     |

### Response time (After manual range selection)

| Measured Quantity/<br>Measured range | Response Time        |                       | Attenuation                          |
|--------------------------------------|----------------------|-----------------------|--------------------------------------|
|                                      | Of Analog indication | Of digital indication |                                      |
| VDC ,VAC, °C                         | 0.1S                 | 1.0S                  | From 0 to 80 % of upper range limit. |
| A~, ADC                              | 0.1S                 | 1.0S                  | From 0 to 50 % of upper range limit. |
| 660Ω...6.6 MΩ                        | 0.1S                 | 1.0S                  |                                      |
| 66 MΩ                                | 0.2S                 | 2.0S                  |                                      |
| Diode                                | 0.1S                 | 1.0S                  | From 0 to 80 % of upper range limit. |
| 6.6nF... 66μF                        | 0.7S                 | Max.1S                |                                      |
| 660μF...6.6 mF                       | 1.4S                 | Max.3S                |                                      |
| 66 mF                                | 7.0S                 | Max.15S               |                                      |
| 660 Hz,6.6KHz                        | 2.0S                 | Max.2S                |                                      |
| 66 KHz,660 KHz,1MHz                  | 0.5S                 | Max.1S                |                                      |
| % ( 10 Hz)                           | 0.7S                 | Max.2.5S              |                                      |



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### Display

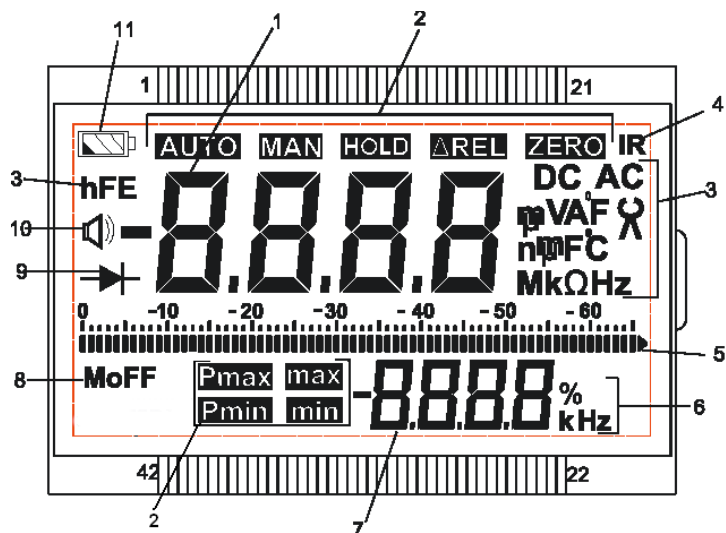
LCD display field 58 mm X 31.4 mm with digital display ,analog scale and with display of measurement unit, and Various special functions.

### Digital

|                         |  |
|-------------------------|--|
| Display                 | 7 segment  |
| Character height        | Main Display Character : 12mm<br>Sub Display Character : 7mm |
| Number of digits/Counts | 4 digits 6600 steps  |
| Overrange display       | "OL" is displayed.   |
| Polarity display        | "-" sign is displayed when positive pole at "⊥"              |
| Sampling rate           | 2.8 times /sec   |

### Analog

|                       |                                 |
|-----------------------|---------------------------------|
| Indication            | LCD scale Analog Bar graph      |
| Scale length          | 55 mm                           |
| Scaling               | 0 to 60 with 66 scale divisions |
| Polarity Indication   | "-" sign on scale digits.       |
| Over range indication | By triangle                     |
| Sampling rate         | 28 times/sec                    |



### Multimeter display :

- 1 Digital Main display with decimal point and polarity
- 2 Display for Automatic ,manual range Selection ,HOLD ,Relative ,Zero Peak ,Max ,Min.
- 3 Measurement unit of main display.
- 4 Display for IR mode indication.
- 5 Display for Analog scale.
- 6 Measurement unit of Sub display.
- 7 Digital Sub display with decimal point and polarity
- 8 Display for Auto off indication (After 15 Min meter will turn OFF)
- 9 Diode test Display.  
Speaker symbol appears when acoustic signal is switched on
- 10 Continuity test display.
- 11 Low battery indication.



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### Fuse

|                              |                               |
|------------------------------|-------------------------------|
| Fuse for ranges up to 660 mA | 1.6 A / 1000V; 6.3 mm x 32 mm |
| Fuse for 10 A range          | 16 A / 1000V; 10 mm x 38 mm   |

### Ambient Conditions

|                             |                                       |
|-----------------------------|---------------------------------------|
| Operating temperature range | 0°C ... + 50°C                        |
| Storage temperature range   | - 25°C ... + 70°C (without batteries) |
| Relative humidity           | 45 ... 75 %                           |
| Elevation                   | up to 2000 m                          |

### Mechanical Design

|                 |  |
|-----------------|--|
| Protection      | Instruments: IP 50<br>Connector sockets: IP 20 |
| Dimensions      | W x H x D:                                     |
| With Holster    | 86 mm x 188 mm x 53 mm                         |
| Without Holster | 79 mm x 174 mm x 38 mm                         |
| Weight          | Approx. 0.480 Kg with battery                  |

### Standard Scope Of Supply

- 1 Multimeter
- 1 Cable set
- 1 Copy Operating Instructions
- 1 Protective Case (Holster).

Subject to change without notice

