RISHABH

Data Sheet

RISH Multi 12S...16S
Digital multimeters

CE

Measure Control Record Analyze Optimize

Application

It is Analog Digital Multimeter which measures VAC, VDC, VAC+DC,Frequency, mA DC, mA (AC+DC), Resistance, continuity, Diode, Farad, AC current measurement.

Features

Automatic Terminal Blocking System (ABS)

The automatic Terminal blocking system prevents incorrect connection of the test leads and incorrect selection of the measured quantity. This reduces danger to the user, the meter and the system to a remarkable extent

MIN/MAX Value Storage

In addition to the display of the actual measured value, the minimum or maximum value can constantly be updated and stored.

Indication Of Negative Values On The Analog Scale

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

Indication Of Negative Values On The Analog Scale

The measuring principle employed permits the measurement of the root-mean-square value (TRMS) of AC quantities and mixed quantities (AC and DC) regardless of the waveform.

Automatic Data Hold*

The DATA HOLD function makes it possible to hold the digitally displayed measured value. According to a patented method, it is ensured that no freak value but the actual measured value is held in the case of rapid changes in measured quantities. The held measured value appears on the digital display. The actual measured value continues to be shown on the analog scale.

Autoranging / Manual Range Selection

The measured values are selected with rotary switch.The measuring range is automatically matched to the measured value. The measuring range can also be selected manually via the AUTO/MAN push button.

Continuity Test

This permits testing for short circuit and open circuit. In addition to the display, a facility of sound signal is available.

Temperature Measurement

It is possible to use all models of RISH multi series, in direct connection of temperature sensor Pt 100 / Pt 1000. The meters automatically detects the type of sensors connected to it & displays directlymeasured temperature.

Signalling in the case of a blown fuse

The display FUSE points to a blown fuse.

Power economizing circuit

The meter disconnects automatically when the measured value remains
unchanged for about 10 minutes and no operating control was operated
during this time. The disconnection facility can be disabled.

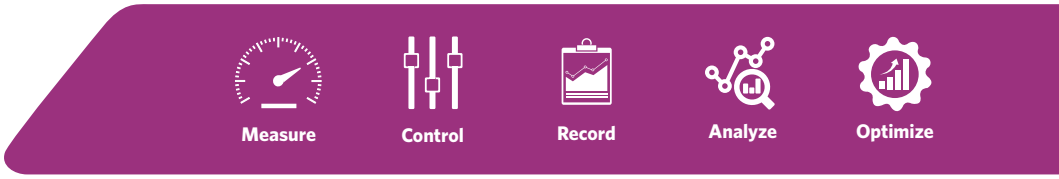
Overload Warning

A sound signal indication violation of the overload limits.

Protective holster for rough duty

A holster of soft rubber with tilt stand protects the meter against damage in the case of shock and drop. The rubber material makes for the meter to stand firmly even on vibrating surface.

* Protected by patent rights



Specifications RISH *multi* 12S... 16S

Meas. function	Measuring range						Resolution	Input impedance			Inherent deviation of the digital display ± (...% of meas. val. + ...digits) for reference condition					4) Overload capacity		Measuring function
	RISH*Multi*	12S	13S	14S	15S	16S					12S	13S	14S	15S	16S	Overload value	Overload duration	
V⎓	30.00 mV	●	●	●	●	●	10 µV	> 10G Ω // < 40 pF			0.5 +3 [5]				0.5 + 3 [5]	1000 V DC AC effective sinusoidal	cont.	V⎓
	300.0mV	●	●	●	●	●	100 µV	> 10G Ω// < 40 pF			0.5 + 3				0.5 + 3			
	3.000 V	●	●	●	●	●	1 mV	11M Ω // < 40 pF			0.25 +1				0.1 + 1			
	30.00 V	●	●	●	●	●	10 mV	10M Ω // < 40 pF			0.25 + 1				0.1 + 1			
	300.0 V	●	●	●	●	●	100 mV	10M Ω // < 40 pF			0.25 + 1				0.1 + 1			
	1000 V	●	●	●	●	●	1 V	10M Ω// < 40 pF			0.35 + 1				0.1 + 1			
V~	3.000 V	●	●	●	●	●1)	1 mV	11M Ω // < 40 pF			0.75 + 2(10... 300 D) 0.75 + 1 (> 300 D)				0.75 + 3 (> 10 D)			V~
	30.0 V	●	●	●	●	●1)	10 mV	10M Ω // < 40 pF										
	300.0 V	●	●	●	●	●1)	100 mV	10M Ω // < 40 pF										
	1000 V	●	●	●	●	●1)	1 V	10M Ω // < 40 pF										
V≂	3.000 V					●1)	1 mV	11M Ω // < 40 pF			---	---	---	---	0.75 + 3 (> 10 D)			V≂
	30.00 V					●1)	10 mV	10M Ω // < 40 pF			---	---	---	---				
	300.0 V					●1)	100 mV	10M Ω // < 40 pF			---	---	---	---				
	1000 V					●1)	1 V	10M Ω // < 40 pF			---	---	---	---				
								Voltage drop. approx.										
								12S	13S	14S / 15S/16S								
A⎓	300.0 µA			●	●	●	100 nA	---	---	15 mV	---	---	1.0 + 5 (> 10D)		0.5 + 5 (> 10 D)	0.36 A	cont.	A⎓
	3.000 mA	●	●	●	●	●	1 µA	15 mV	15 mV	150 mV	1.0 + 5 (> 10D)		1.0 + 2		0.5 + 2			
	30.00 mA	●	●	●	●	●	10 µA	150 mV	150 mV	650 mV	0.25 + 2		1.0 + 5 (<10 D)		0.5 + 5 (> 10 D)			
	300.0 mA	●	●	●	●	●	100 µA	1 V	1 V	1 V	1.0 + 2				0.5 + 2			
	3.000 A		●	●	●	●	1 mA	---	100 mV	100 mV	---	1.0 + 5 (> 10 D)			1.0 + 5 (> 10 D)	7)	7)	
	10.00 A		16A	●	●	●	10 mA	---	300/270mV	270 mV	---	1.0 + 2			1.0 + 2			
A~	3.000 mA			●	●		1 µA	---	---	150 mV	---	---	1.5 + 2 (> 10 D)		---	0.36 A	cont.	A~
	30.00 mA	●	●				10 µA	150 mV	150 mV	---	1.5 + 2 (> 10 D)		---	---	---			
	300.0 mA	●	●	●	●		100 µA	1 V	1 V	1 V	1.5 + 2 (> 10D)				---			
	10.00 A		16A	●	●		10 mA	---	300/270mV	270 mV	---	1.5 + 2 (> 10 D)			---	7)	7)	
A~	30.00 A [2]	●					10 mA	150 mV	---	---	1.5 + 2 (> 10 D)	---	---	---	---	0.36 A	cont.	A~
	300.0 A [2]	●					100 mA	1 V	---	---		---	---	---	---			
A≂	3.000 mA					●1)	1 µA	---	---	150 mV	---	---	---	---	1.5 + 4 (> 10 D)	12 A	10 min	A≂
	300.0 mA					●1)	100 µA	---	---	1 V	---	---	---	---	1.5 + 4 (> 10 D)			
	10.00 A					●1)	10 mA	---	---	270 mV	---	---	---	---	1.75 + 4 (> 10 D)			
								No-load voltage										
Ω	30.00 Ω	●	●	●	●	●	10 m Ω	max. 3.2 V			0.5 + 3 [5]				0.4 + 3 [5]	1000 V DC AC effective sinusoidal	10 min	Ω
	300.0 Ω	●	●	●	●	●	100 m Ω	max. 3.2 V			0.5 + 3				0.4 + 3			
	3.000 k Ω	●	●	●	●	●	1 Ω	max. 1.25 V			0.4 + 1				0.2 + 1			
	30.00 k Ω	●	●	●	●	●	10 Ω	max. 1.25 V			0.4 + 1				0.2 + 1			
	300.0 k Ω	●	●	●	●	●	100 Ω	max. 1.25 V			0.4 + 1				0.2 + 1			
	3.000 M Ω	●	●	●	●	●	1 k Ω	max. 1.25 V			0.6 + 1				0.4 + 1			
	30.00 M Ω	●	●	●	●	●	10 k Ω	max. 1.25 V			2.0 + 1				2.0 + 1			
→|←	2.000 V	●	●	●	●	●	1 mV	max. 3.2 V			0.25 + 1				0.1 + 1			→|←
									Discharge resistance	$U_{0\ max}$								
F	30.00 nF				●	●	10 pF		250 k Ω	2.5 V	---	---	---	1.0 + 3 [6]		1000 V DC / AC effective sinusoidal	10 min	F
	300.0 nF				●	●	100 pF		250 k Ω	2.5 V	---	---	---	1.0 + 3				
	3.000 µF				●	●	1 nF		25 k Ω	2.5 V	---	---	---	1.0 + 3				
	30.00 µF				●	●	10 nF		25 k Ω	2.5 V	---	---	---	3.0 + 3				
								Sensor	F_{min} V ⎓	F_{min} V ~								
Hz	300.0 Hz				●	●	0.1 Hz		1 Hz	45 Hz	---	---	---	0.5 + 1 [8]		≤ 3 kHz: 1000V ≤ 30 kHz: 300V ≤100 kHz: 30 V	cont.	Hz
	3.000 kHz				●	●	1 Hz		1 Hz	45 Hz	---	---	---					
	30.00 kHz				●	●	10 Hz		10 Hz	45 Hz	---	---	---					
	100.0 kHz				●	●	100 Hz		100 Hz	100 Hz	---	---	---					
%	2.0... 98.0 %				●	●	0.1 %		1 Hz	---	---	---	---	1 Hz.....1kHz: ± 5 D [9] 1Hz.....10kHz:±5 D/kHz [9]				%
°C	- 200.0... + 200.0°C	●	●	●	●	●	0.1°C	Pt 100	---	---	2 Kelvin + 5 D [10]					1000 V DC AC effective sinusoidal	10 min	°C
	+ 200.0... + 850.0°C	●	●	●	●	●	0.1°C		---	---	1.0 + 5 [10]							
	-100.0... + 200.0°C	●	●	●	●	●	0.1°C	Pt 1000	---	---	2 Kelvin + 2 D [10]							
	+ 200.0 ... + 850.0°C	●	●	●	●	●	0.1°C		---	---	1.0 + 2 [10]							

1) TRMS measurement
2) At 0°C... + 40°C
3) With zero setting; w/o zero setting + 35 digits
4) With zero setting; w/o zero setting + 50 digits
5) RISH multi 13S (w/o 16A fuse!) : 16A cont., 20A for 5 min; RISH multi 14S... 16S: 12Afor 5 min, 16A for 30s

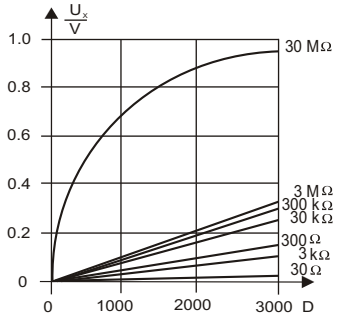
6) Range 3 V ≂ U_E = 1.5 V_{rms} ... 100 V_{rms}
30 V ≂ U_E = 15 V_{rms} ... 300V_{rms}
300 V ≂ U_E = 150 V_{rms} ... 1000V_{rms}

7) On the range 3V⎓ rectangular signal positive at one end 5 ... 15 V, f = const., not 163.84 Hz or integer multiple.
8) Without sensor

Reference conditionsMeasuring current with diode test and / or continuity test

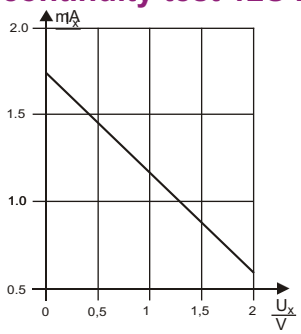
Ambient temperature	+23Co + 2K
Relative humidity	45%... 55%
Frequency of the measured quantity	45 Hz... 65 Hz
Waveform of the measured quantity	Sinusoidal
Battery voltage	8V + 0.1 V

Measuring voltage with resistance measurement 12S ... 16S



Voltage U_x across the resistance R_x to be measured as a function of measuring range and display.

Measuring current with diode test and / or continuity test 12S ... 16S



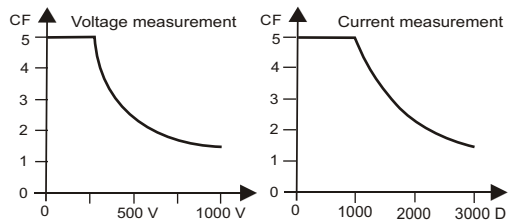
Measuring current I_x as a function of the displayed voltage U_x on the device under test.

Influence quantities and variations for 12S..16S

Influence quantity	Influence range	Measured quantity / measuring range	Variation 1) ± (...% of meas. val. +... digits) 12S... 14S	15S	16S
Temperature	0 °C... + 21 °C and +25 °C... + 40 °C	30/300 mV ⎓	1.0 + 3		1.0 + 1
		3... 300 V ⎓	0.15 + 1		0.1 + 1
		1000 V ⎓	0.2 + 1		0.1 + 1
		V ~	0.4 + 2		0.3 + 2
		300 µA 2) ... 300 mA ⎓	0.5 + 1		0.15 + 1
		3A / 10 (16) A ⎓	0.5 + 1		
		A ~	0.75 + 1		0.75 + 3
		30 Ω 2)	0.15 + 2		
		300 Ω	0.25 + 2		0.15 + 2
		3 kΩ... 3 M Ω	0.15 + 1		0.1 + 1
		30 M Ω	1.0 + 1		0.6 + 1
		30 nF 2) ... 3 µF	---		0.5 + 2
		30 µF	---		2.0 + 2
		Hz	---		0.5 + 1
		%	---		± 5 D
		-200... + 200 °C	0.5 K + 2		
		+ 200... + 850 °C	0.5 + 2		
Frequency of the measured quantity	15 Hz... < 30 Hz	3 ... 300 V ~	---	---	1.0 + 3
	30 Hz... < 45 Hz		---	---	0.5 + 3
	> 65 Hz... 400Hz		2.0 + 3		0.5 + 3
	> 400 Hz... 1 kHz		2.0 + 3		1.0 + 3
	> 1kHz... 20 kHz		---	---	2.0 + 3
	15 Hz... < 30 Hz	1000 V ~	---	---	1.0 + 3
	30 Hz... < 45 Hz		---	---	0.5 + 3
	> 65 Hz... 1kHz		3.0 + 3		2.0 + 3
	15 Hz... < 30 Hz	A~	---		1.0 + 3
	30 Hz... <45 Hz		---		0.5 + 3
	> 65 Hz... 1kHz		2.0 + 3		3.0 + 3
	Crest factor CF 1 ...3	V ~ 4), A~ 4)	---	---	± 1% of rdg.
	> 3 ...5		---	---	± 3 % of rdg.

The permissible crest factor CF of the AC quantity to be measured is a function of the displayed value :

Waveform of the measured quantity 3)



Influence quantity	Influence range	Measured quantity / measuring range	Variation 12S... 16S
Battery voltage	⊣⊢ 5) ... < 7.9 V	V ⎓	± 2 D
	> 8.1 V... 10.0 V	V ~	± 4 D
		A ⎓	± 4 D
		A~	± 6 D
		30 Ω / 300 Ω / °C	± 4 D
		3 kΩ... 30 M Ω	± 3 D
		nF, µF	± 1 D
		Hz	± 1 D
		%	± 1 D
Relative humidity	75 % 3 days Meter off	V ⎓ A ⎓ Ω F Hz % °C	1x Intrinsic error
DATA			± 1 D
MIN / MAX		V ⎓, A ⎓	± 2 D

(1) With temperature; Error data is per 10 K change in temperature. With frequency; Error data is valid from a display of 300 digits.
(2) With zero setting (3) With unknown waveform (crest factor CF > 2), the measurement must be made with manual range selection.
(4) Except for sinusoidal waveform (5) From the time the symbol "⊣⊢" appears.

Display

LCD field (65 mm x 30 mm) with analog indication and digital display and with annunciators for unit of measurement, function and various special functions.

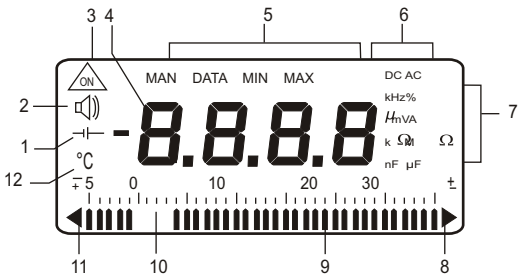
Analog

Indication	LCD scale with pointer
Scale length	55 mm on V ⎓ and A ⎓ ; 47 mm on all other ranges
Scaling	+ 5…0…± 30 with 35 scale divisions on ⎓, 0…30 with 30 scale divisions on all other ranges
Polarity indication	With automatic reversal
Overrange indication	By triangle
Sampling rate	20 readings/s, On Ω 10 readings/s

Digital

Display/ height of numerals	Rish multi 12S… 16S, 7 segment numerals / 15mm
Number of counts	Rish multi 12S…16S, 3 ¾ digit ⏢ 3100 counts
Overange display	"**OL**" is shown
Polarity display	"-" sign is shown, When positive pole to "⊥"
Sampling rate	2 readings/s, On Ω and °C:1 reading/s

Display RISH multi 12S... 16S



Applied rules and standards

IEC 61010-1:2001 DIN EN 61010 part 1 VDE 0411 -1	Safety requirements for electrical equipment for measurement, control and laboratory use.
DIN 43751 IS 13875	Digital measuring instruments
EN 61326:2002	Generic emission standard; Residential, commercial and light industry.
EN 61326:2002	Generic immunity standard; residential, commercial and light industry.
VDI/VDE 3540	Reliability of measuring and control equipment.
DIN EN 60529 DIN VDE 0470 part 1	Test equipment and test procedures -Degrees of protection provided by enclosures (IP Code).

Environmental conditions

Working temperature range	RISH multi 12S... 16S -10 °C... + 50 0 C
Storage temperature range	RISH multi 12S... 16S
Climatic class	2z/-10/50/70/75% with reference to VDI/VDE 3540
Altitude above sea level	up to 2000m

Warranty

3 year against defects in materials and workmanship & calibration from the date of purchase.

Mechanical configuration

Protection type	For meters; IP 50, for connection sockets: IP 20
Dimensions	84 mm x 195 mm x 35 mm
Weight	0.35 kg, approx., incl. battery

Scope of delivery

1 multimeter
1 Probe Set
1 copy of operating instructions
1 test certificate
1 rubber holster with tilt stand and carrying strap warranty card

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