

## RISH Max 12 and 14 Analog-Digital Multimeters

- Input resistance can be selected for voltage measurements
- Direct and alternating voltages from 100  $\mu$ V ... 600 V
- Direct and alternating currents from 10  $\mu$ A ... 10.00 A
- Resistance from 10 m $\Omega$  ... 40.00 M $\Omega$
- Capacitance from 1 pF ... 40.00  $\mu$ F with relative operation
- Frequencies from 10.00 Hz ... 400.0 KHz
- Diode measurement and continuity testing
- MIN, MAX and Hold measurement storage



### Applications

RISH max digital multimeters are suited for universal, general applications in the electrical and electronics fields, as well as in radio and television service, training and education.

They are of especially flat design, and thus fit into any bag. The protective cover, which is provided as standard accessory, can be opened at an angle for convenient reading from the workbench, and provides for easy transport.

### Selection of input resistance for voltage measurement

In addition to the usual voltage input with one resistance value of 10 M $\Omega$ , which is selected via  $\sim$  or  $V_{\infty}$ , this measuring instrument provides the electrician with an additional selector switch position for  $V_{400k\Omega}$  with an input resistance of approx. 400 k $\Omega$ . This allows for the avoidance of negative influences from capacitive coupling during voltage measurements in power supply systems.

### Effective value for distorted waveform (RISH max 14)

The built-in effective value transducer allows for effective value measurement (TRMS) independent of waveform for alternating magnitudes (AC).

### Hold

By pressing the HOLD/ON key, the currently displayed measurement value can be held. 'Hold' is simultaneously displayed.

### Min/Max

The minimum and maximum values which were present at the input of the measuring instrument after activation of the MIN MAX mode can be selectively "retained" with the MIN MAX function. The most important application is the determination of the minimum or maximum value during long-term observation of measurement quantities. MIN/MAX has no effect on the analog display; it continues to display the current measurement value.

### Automatic/manual measuring range selection

The measurement quantities are chosen with the rotary selector switch. The measuring range is automatically adjusted to the measurement value. The measuring range can also be manually selected with the AUTO/MAN button.

### 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, resistances of less than 40  $\Omega$  are indicated with an acoustic signal.

### Overload warning

An acoustic signal occurs, if the range limit value is exceeded.

### Energy saving circuit

The instrument is switched off automatically, if none of the operating elements have been activated for about 30 minutes.

### Protective cover for rough operating conditions

A protective cover of ABS with a built-in stand protects the instrument against jolts and falls. It also secures the test probes for one-hand operations, and allows for winding of the measurement cable which provides protection during transport.

### Calibration

Rish max series multimeters are calibrated using Fluke 5500 & Wavetek 9100. These sources are calibrated at regular intervals.

### Theft protection

Company name and name of the user can be entered into the field next to the display with an indelible etching needle for identification of the owner.

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Characteristic values RISH max 12 and 14

Meas. function	Measuring range			Resolution	Input impedance 100 pF// XΩ		Digital display inherent deviation at reference conditions ±(... % of rdg. +... digits)	Overload capacity <sup>1)</sup>		
	RISH max	12	14		V <sub>∞</sub> / ~	V <sub>400kΩ</sub>		Overload value	Overload duration	
V <sub>∞</sub>	400.0 mV	• •	• •	100 μV	>20 MΩ	~400 kΩ	0.75 + 2	720 V <sub>∞</sub>	Continuous	
	4.000 V	• •	• •	1 mV	11 MΩ	~400 kΩ	0.5 + 2			
	40.00 V	• •	• •	10 mV	10 MΩ	~400 kΩ				
	400.0 V	• •	• •	100 mV	10 MΩ	~400 kΩ				
V <sub>∞</sub> 400kΩ	600 V	• •	• •	1 V	10 MΩ	~400 kΩ				
	400.0 mV	• •	• 2)	100 μV	>20 MΩ	~400 kΩ	1.5 + 5 <sup>3)</sup>	720 V~ effective sine	Continuous	
	4.000 V	• •	• 2)	1 mV	11 MΩ	~400 kΩ	1 + 5 <sup>3)</sup>			
	40.00 V	• •	• 2)	10 mV	10 MΩ	~400 kΩ				
400.0 V	• •	• 2)	100 mV	10 MΩ	~400 kΩ					
V~ 400kΩ	600 V	• •	• 2)	1 V	10 MΩ	~400 kΩ	1 + 10 <sup>3)</sup>			
	Approx. voltage drop at max. meas.current									
	A <sub>∞</sub>	40.00 mA	• •	• •	10 μA	450 mV		0,8 + 2	480 mA	Continuous
		400.0 mA	• •	• •	100 μA	1.5 V				
10.00 A <sup>6)</sup>		• •	• •	10 mA	750 mV		1,5 + 5	<sup>6)</sup>	<sup>6)</sup>	
A~	40.00 mA	• •	• 2)	10 μA	450 mV		1 + 5 <sup>3)</sup>	480 mA	Continuous	
	400.0 mA	• •	• 2)	100 μA	1.5 V					
	10.00 A <sup>6)</sup>	• •	• 2)	10 mA	750 mV		2 + 5 <sup>3)</sup>	<sup>6)</sup>	<sup>6)</sup>	
Open-circuit voltage										
Ω	400.00 Ω	• •	• •	100 mΩ	approx. 0.5 V		0.8 + 5	420 V DC AC effective sine	10 min	
	4.000 kΩ	• •	• •	1 Ω		0.8 + 2				
	40.00 kΩ	• •	• •	10 Ω		1 + 5				
	400.0 kΩ	• •	• •	100 Ω		2 + 5				
	4000 kΩ	• •	• •	1 kΩ						
	40.00 MΩ	• •	• •	10 kΩ						
Ω <sub>⊥</sub> )	400.0 Ω	• •	• •	100 mΩ			Acoustic signal for 0... <40Ω			
→+	3.000 V	• •	• •	1 mV	approx. 3V		2 + 10			
F	4.000 nF	• •	• •	1 pF			3 + 40 <sup>4)</sup>	420 V DC / AC effective sine	10 min	
	40.00 nF	• •	• •	10 pF			3 + 10 <sup>4)</sup>			
	400.00 nF	• •	• •	100 pF						
	4.000 μF	• •	• •	1 nF			3 + 10			
	40.00 μF	• •	• •	10 nF			5 + 10			
f <sub>min</sub>										
Hz <sup>5)</sup>	100.00 Hz	• •	• •	0.01 Hz	10 Hz		0.2 + 2	≤ 1 kHz: 600 V ≤ 10 kHz: 400 V ≤ 400 kHz: 40 V	Continuous	
	1.0000 kHz	• •	• •	0.1 Hz	10 Hz					
	10.000 kHz	• •	• •	1 Hz	10 Hz					
	100.00 kHz	• •	• •	10 Hz	10 Hz					
	400.00 kHz	• •	• •	100 Hz	100 Hz					

- 1) At 0 °C ... + 40 °C
- 2) Effective value measurement (TRMS) for RISH Max 14  
TRMS measurement is independent of waveform.
- 3) The specified inherent deviation is valid for the RISH Max 14  
from an indication of '0200'
- 4) With zero adjustment 'REL'; without zero adjustment  
+ 300 digits in 4 nF range  
+ 30 digits in 40 nF range
- 5) Indication of the frequency measurement expanded to up to 9999 digits
- 6) max. 10 A/30 min  
12 A/5 min  
16 A/30 s

## Applicable regulations and standards

IEC 1010-1 DIN EN 61010 part 1 VDE 0411-1	Safety regulations for electric measuring, control, regulation and lab devices
DIN 43751 IS 13875	Digital measuring instruments Digital measuring instruments
DIN EN 50081 Part 1	Generic emission standard residential, commercial and light industry
DIN EN 50082 Part 1	Generic immunity standard residential, commercial and light industry
VDI/VDE 3540	Reliability of measuring, control and regulation instruments
DIN EN 60529 DIN VDE 0470 Part 1	Test instruments and test procedures - Degree of protection provided by enclosures (IP code)

# RISH Max12 and 14 Analog-Digital Multimeters

## Reference conditions

Ambient temperature	+ 23°C ± 2 K
Relative humidity	45 % ... 55%
Frequency of meas. quantity	Sine 50 Hz
Operating voltage	<i>RISH max 12:</i> 3 V ± 0.1 V <i>RISH max 14:</i> 8 V ± 0.1 V

## Display

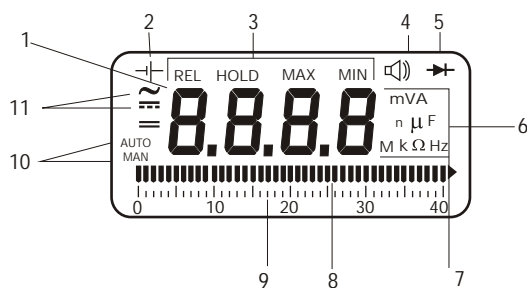
LCD display field (50 mm x 30 mm) with analog and digital display, and with display of measurement unit, type of current and various special functions.

## Analog

Display	LCD scale with bar graph display
Scale length	40 mm
Scaling	0...40 with 40 scale division
Polarity display	with automatic reversal
Overflow display	Bar with triangle
Measuring rate	20 measurements/s

## Digital

Display	7 segment
Character height	10 mm
Number of digits	3 3/4 digit ≈ 3999 steps
Overflow display	,4000' with blinking ,4'
Polarity display	,-' sign is displayed when plus pole at ,-'
Measurement rate	2 measurements/s for U, I and Ω 1 measurements/s for capacitive and frequency measurements



## RISH Max display

- Digital display with comma and polarity display
- Low Battery Indication
- Display for REL and HOLD as well as MIN MAX storage
- Continuity test display :  
speaker symbol appears when acoustic signal is switched on
- Display for diode measurement
- Measurement unit display
- Display for exceeding of measuring range
- Indicator for analog display
- Scale for analog display
- Display for automatic or manual measuring range selection
- Display for selected type of current (AC or DC)

## Influence variables and effects

Influence Variable	Influence Range	Meas. Quantity / Meas. Range	Influence Effect	
Temperature	0 °C... +21 °C and +25 °C... +40 °C	V $\overline{\sim}$	0.1 x intrinsic error/k	
		V $\sim$		
		A $\overline{\sim}$		
		A $\sim$		
		Ω		
		F HZ		
Waveform <i>RISH max 14</i>	Crest factor CF	1... 1.4	4,40,40 V, mA, A <sup>2)</sup>	± 1% of rdg.
		> 1.4... 5		± 5% of rdg.
Measuring Magnitude Waveform 1)	The allowable crest factor CF of the alternating magnitude to be measured is dependent upon the displayed value :			

- For unknown waveform (crest factor CF > 2) measurement to be made with manual range selection
- Except for sine waveform

Influence Variable	Influence Range (max. Resolution)	Frequency	Inherent Error at Ref. (...% Rdg. +... Digits)
Frequency V <sub>AC</sub>	4, 40, 400 V	20 Hz ... <50 Hz >50 Hz ... 500 Hz	2 + 3
	400 mV, 600 V	20 Hz ... <50 Hz >50 Hz ... 100 Hz	2 + 3

Influence Variable	Influence Range	Meas. Quantity / Measuring range	Influence Effect
Relative humidity	55... 75 %	V $\approx$ A $\approx$ Ω F Hz	1 x Inherent Error

Influence Variable	Interference Magnitude	Measuring ranges	Attenuation
Common Mode Interference Voltage	600 V DC / AC 50 Hz sinusoidal	All V DC	> 100 dB
	600 V DC	All V AC	> 100 dB
	600 V AC 50 Hz sinus	400 mV / 4 V AC	> 80 dB
		40 V AC	> 63 dB
Series-Mode interference Voltage	Max. 600 V DC	400 V ACV	> 43 dB
		600 V AC	> 23dB
		V DC	- > 43 dB
		V AC	> 55 dB

Aux. Voltage Influence  
(without +- display) all ranges except AC: ±5 D  
AC range: ±20D

# RISH Max 12 and 14

## Analog-Digital Multimeters

### Power supply

Battery	<i>RISH max 12</i> : 2 ea. 1.5 V mignon cell Zinc-carbon cell per IEC R6 Alkaline manganese dry cell per IEC LR 6 <i>RISH max 14</i> : 9 V flat cell battery; Zinc-carbon cell per IEC 6 F 22, Alkaline mang. Dry cell per IEC 6 LR 61
Service life	<i>RISH max 12</i> : Zinc-carbon cell: approx. 300 hours Alkaline mang. Dry cell: approx. 600 hours <i>Rish max 14</i> : Zinc-carbon cell: approx. 150 hours Alkaline mang. dry cell approx. 300 hours Automatic display of „-“ symbol when battery voltage falls below following values: <i>Rish max 12</i> : approx. 2.3 V <i>Rish max 14</i> : approx. 7 V
Battery Test	

### Electromagnetic compatibility

Interference emission	EN 50081 -1: 1992 EN 55022: 1987 class B
Interference immunity	EN 50082-1 : 1992 EN 61000-4-2:8kV air discharge EN 61000-4-3: 3 V/m EN 61000-4-4; 0.5 kV

### Ambient conditions

Operating temperature range	-10°C ... + 50 °C
Storage temperature range	-25°C... + 70 °C (without batteries)
Climate classification	2z/-10/50/70/75% in correspondence with VDI/VDE 3540
Relative humidity	45 ... 75%
Elevation	up to 2000 m

### Fusing

Fuse for ranges up to 400 mA	FF 1.6 / 500 V; 6.3 mm x 32mm; Breaking capacity 50 kA at 500 V ~ and non-reactive load, $\cos \varphi < 0,2$ ; protects all current measuring ranges up to 400 mA in connection with power diodes
Fuse for 10 A range	FF 16 A / 500 V; 6.3 mm x 32 mm breaking capacity 50 kA at 500 V ~ and non-reactive load, $\cos \varphi < 0.2$

### Mechanical design

Protection	Instruments: IP 50 Connector sockets : IP 20
Dimensions	W x H x D: 92 mm x 154 mm x 25 mm
Weight	Approx., 0.2 kg with battery

### Included equipment

- 1 Multimeter
- 1 Probe Set
- 1 copy operating instructions
- 1 protective case with tilt stand

### Electrical safety

Protection class	II per IEC 1010-1/EN 61010-1/VDE 0411-1	
Overvoltage classification	II	III
Nominal voltage	600 V	300 V
Contamination level	2	2
Test voltage	3.7 kV ~IEC 1010-1/EN 61010-1 VDE 0411-1	

### Order information

Designation	Type	Product code
Analog-digital multimeter	RISHmax 12	33040
Analog-digital multimeter with TRMS	RISHmax 14	33050
Rishmax Fuse 1.6A		42124
Rishmax Fuse 16A		42198
Rishmax Probe Set		42199
Safety Cover Rishmax 12/14		42200



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