

# Analog - Digital multimeters

RISH Multi<sup>®</sup> 12S...18S

CAT-IV



**RISHABH**  
INSTRUMENTS  
Measure, Control & Record with a Difference

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# Analog - Digital multimeters

## RISH Multi<sup>®</sup> 12S...18S

### 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.

### Interface And Software RISH com 100

The multimeters are fitted with a serial RS-232 C interface via which the measured values can be transmitted to a PC. These values, electrically isolated, are transmitted to the attachable interface adaptor with infrared light through the case\*

### 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 directly measured 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.

\* Protected by patent rights



### 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.

### Top model RISH *multi* 18S

The top model Rish *multi* 18S features a 4 3/4 digit display (31 000 digits) as well as the following additional functions : Event counter, measurement of the duration of the event, time counter (stop watch), data compare, dB measurement, wide-range capacitance measurement.

### Calibration

RISH *multi* is automatically calibrated with respect to Fluke 5500 / Wavetek 9100. Automatic calibration is done through a developed calibration software with RS232 connection to the multimeter. Every multimeter is provided with the Test Certificate which is traceable to National / International standards. All the meters can be recalibrated at the Rishabh Instruments.

### 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).

1



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### 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				Overload capacity <sup>4)</sup>		Measuring function		
	RISHMulti	12S	13S	14S	15S			16S	12S	13S	14S	15S	16S		Overload value	Overload duration
<b>V<sub>DC</sub></b>	30.00 mV	●	●	●	●	●	10 μV	> 10GΩ // < 40 pF	0.5 + 3 <sup>5)</sup>				1000 V	cont.	<b>V<sub>DC</sub></b>	
	300.0mV	●	●	●	●	●	100 μV	> 10GΩ // < 40 pF	0.5 + 3							
	3.000 V	●	●	●	●	●	1 mV	11MΩ // < 40 pF	0.25 + 1							
	30.00 V	●	●	●	●	●	10 mV	10MΩ // < 40 pF	0.25 + 1							
	300.0 V	●	●	●	●	●	100 mV	10MΩ // < 40 pF	0.25 + 1							
1000 V	●	●	●	●	●	1 V	10MΩ // < 40 pF	0.35 + 1				0.1 + 1				
<b>V<sub>AC</sub></b>	3.000 V	●	●	●	●	● <sup>1)</sup>	1 mV	11MΩ // < 40 pF	0.75 + 2(10... 300 D) 0.75 + 1 (> 300 D)				0.75 + 3 (> 10 D)	AC effective sinusoidal	<b>V<sub>AC</sub></b>	
	30.0 V	●	●	●	●	● <sup>1)</sup>	10 mV	10MΩ // < 40 pF								
	300.0 V	●	●	●	●	● <sup>1)</sup>	100 mV	10MΩ // < 40 pF								
	1000 V	●	●	●	●	● <sup>1)</sup>	1 V	10MΩ // < 40 pF								
<b>V<sub>DC</sub></b>	3.000 V					● <sup>1)</sup>	1 mV	11MΩ // < 40 pF	---				0.75 + 3 (> 10 D)	<b>V<sub>DC</sub></b>		
	30.00 V					● <sup>1)</sup>	10 mV	10MΩ // < 40 pF	---							
	300.0 V					● <sup>1)</sup>	100 mV	10MΩ // < 40 pF	---							
	1000 V					● <sup>1)</sup>	1 V	10MΩ // < 40 pF	---							
							Voltage drop. approx.									
							12S	13S	14S / 15S/16S							
<b>A<sub>DC</sub></b>	300.0 μA	●	●	●	●	●	100 nA	---	15 mV	---	---	1.0 + 5 (> 10D)	0.5 + 5 (> 10 D)	0.36 A	cont.	<b>A<sub>DC</sub></b>
	3.000 mA	●	●	●	●	●	1 μA	15 mV	150 mV	150 mV	1.0 + 2	0.5 + 2				
	30.00 mA	●	●	●	●	●	10 μA	150 mV	150 mV	650 mV	0.25 + 2	0.5 + 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)				
10.00 A		16A	●	●	●	10 mA	---	300/270mV	270 mV	---	1.0 + 2	1.0 + 2	7)	7)		
<b>A<sub>AC</sub></b>	3.000 mA		●	●	●	●	1 μA	---	150 mV	---	---	1.5 + 2 (> 10 D)	---	0.36 A	cont.	<b>A<sub>AC</sub></b>
	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 (> 10 D)	---				
10.00 A		16A	●	●	●	10 mA	---	300/270mV	270 mV	---	1.5 + 2 (> 10 D)	---	7)	7)		
<b>A<sub>DC</sub></b>	30.00 A <sup>2)</sup>	●	●	●	●	●	10 mA	---	150 mV	---	1.5 + 2 (> 10 D)	---	---	0.36 A	cont.	<b>A<sub>DC</sub></b>
	300.0 A <sup>2)</sup>	●	●	●	●	●	100 mA	1 V	---	---	---	---	---			
<b>A<sub>AC</sub></b>	3.000 mA					● <sup>1)</sup>	1 μA	---	150 mV	---	---	---	1.5 + 4 (> 10 D)	12 A	10 min	<b>A<sub>AC</sub></b>
	30.00 mA					● <sup>1)</sup>	100 μA	---	1 V	---	---	---	1.5 + 4 (> 10 D)			
	10.00 A					● <sup>1)</sup>	10 mA	---	270 mV	---	---	---	1.75 + 4 (> 10 D)			
							No-load voltage									
<b>Ω</b>	30.00 Ω	●	●	●	●	●	10 mΩ	max. 3.2 V	---	---	0.5 + 3 <sup>5)</sup>	0.4 + 3 <sup>5)</sup>	1000 V	10 min	<b>Ω</b>	
	300.0 Ω	●	●	●	●	●	100 mΩ	max. 3.2 V	---	---	0.5 + 3	0.4 + 3				
	3.000 kΩ	●	●	●	●	●	1 Ω	max. 1.25 V	---	---	0.4 + 1	0.2 + 1				
	30.00 kΩ	●	●	●	●	●	10 Ω	max. 1.25 V	---	---	0.4 + 1	0.2 + 1				
	300.0 kΩ	●	●	●	●	●	100 Ω	max. 1.25 V	---	---	0.4 + 1	0.2 + 1				
	3.000 MΩ	●	●	●	●	●	1 kΩ	max. 1.25 V	---	---	0.6 + 1	0.4 + 1				
30.00 MΩ	●	●	●	●	●	10 kΩ	max. 1.25 V	---	---	2.0 + 1	2.0 + 1	AC effective sinusoidal				
<b>+</b>	2.000 V	●	●	●	●	●	1 mV	max. 3.2 V	---	---	0.25 + 1	0.1 + 1				
<b>F</b>	30.00 nF					●	10 pF	Discharge resistance	U <sub>0 max</sub>	---	---	---	1.0 + 3 <sup>6)</sup>	1000 V	10 min	<b>F</b>
	300.0 nF					●	100 pF	250 kΩ	2.5 V	---	---	---	1.0 + 3			
	3.000 μF					●	1 nF	25 kΩ	2.5 V	---	---	---	1.0 + 3			
	30.00 μF					●	10 nF	25 kΩ	2.5 V	---	---	---	3.0 + 3			
							Sensor									
<b>Hz</b>	300.0 Hz					●	0.1 Hz	F <sub>min</sub> V <sub>DC</sub>	F <sub>min</sub> V <sub>AC</sub>	---	---	---	0.5 + 1 <sup>8)</sup>	1000 V	cont.	<b>Hz</b>
	3.000 kHz					●	1 Hz	1 Hz	45 Hz	---	---	---	≤ 3 kHz: 1000V			
	30.00 kHz					●	10 Hz	1 Hz	45 Hz	---	---	---	≤ 30 kHz: 300V			
	100.0 kHz					●	100 Hz	10 Hz	100 Hz	---	---	---	≤ 100 kHz: 30 V			
<b>%</b>	2.0... 98.0 %					●	0.1 %	1 Hz	---	---	---	1 Hz...1kHz: ± 5 D <sup>9)</sup> 1Hz...10kHz: ± 5 D/kHz <sup>9)</sup>				
<b>°C</b>	- 200.0... + 200.0°C	●	●	●	●	●	0.1 °C	Pt 100	---	---	2 Kelvin + 5 D <sup>10)</sup>		1000 V	10 min	<b>°C</b>	
	+ 200.0... + 850.0°C	●	●	●	●	●	0.1 °C	Pt 100	---	---	1.0 + 5 <sup>10)</sup>					
	- 100.0... + 200.0°C	●	●	●	●	●	0.1 °C	Pt 1000	---	---	2 Kelvin + 2 D <sup>10)</sup>					
	+ 200.0... + 850.0°C	●	●	●	●	●	0.1 °C	Pt 1000	---	---	1.0 + 2 <sup>10)</sup>					

- 1) TRMS measurement
- 2) Direct display with clip-on transformer 1000:1
- 3) At 0°C... + 40°C
- 4) With zero setting; w/o zero setting + 35 digits
- 5) With zero setting; w/o zero setting + 50 digits
- 6) RISH multi 13S (w/o 16 A fuse!): 16A cont., 20A for 5 min; RISH multi 14S... 16S: 12A for 5 min, 16A for 30s

- 8) Range  $3 V_{DC} \approx$ :  $U_E = 1.5 V_{rms} \dots 100 V_{rms}$   
 $30 V_{DC} \approx$ :  $U_E = 15 V_{rms} \dots 300 V_{rms}$   
 $300 V_{DC} \approx$ :  $U_E = 150 V_{rms} \dots 1000 V_{rms}$
- 9) On the range  $3 V_{DC} \approx$  rectangular signal positive at one end 5 ... 15 V, f = const., not 163.84 Hz or integer multiple.
- 10) Without sensor



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### Specifications RISH multi 18S

Meas. function	Measuring range	Resolution	Input impedance		Inherent error of the digital display ± (...% of rdg.+... digits) at reference conditions		Overload capacity <sup>2)</sup>		Meas. function				
			≡	1) ≡ 1)	≡	1) ≡ 1)	Overload value	Overload duration					
<b>V</b>	300.00 mV	10 μV	>10 GΩ	5 MΩ// < 40 pF	0.05 + 3; 0.05 + 20 <sup>3)</sup>	1.0 + 30 (> 600 Digit)	1000 V DC AC RMS sinusoidal	cont.	<b>V</b>				
	3.0000 V	100 μV	11 MΩ	5 MΩ// < 40 pF	0.05 + 3	0.5 + 30 (> 300 Digit)							
	30.000 V	1 mV	10 MΩ	5 MΩ// < 40 pF	0.05 + 3	0.5 + 30 (> 300 Digit)							
	300.00 V	10 mV	10 MΩ	5 MΩ// < 40 pF	0.05 + 3	0.5 + 30 (> 300 Digit)							
	1000.0 V	100 mV	10 MΩ	5 MΩ// < 40 pF	0.05 + 3	0.5 + 30 (> 300 Digit)							
<b>dB</b>	See table below		—	as at V-	—	± 0.5 dB <sup>4)</sup>			<b>dB</b>				
			Voltage drop. approx.										
			≡	≡ <sup>1)</sup>	≡	≡ <sup>1)</sup>							
<b>mA</b>	300.00 μA	10 nA	15 mV	15 mV	0.2 + 20	1.2 + 30 (> 300 Digit)	0.36 A	cont.	<b>mA</b>				
	3.0000 mA	100 nA	150 mV	150 mV	0.2 + 10	1.2 + 30 (> 300 Digit)							
	30.000 mA	1 μA	30 mV	30 mV	0.05 + 10	1.2 + 50 (> 300 Digit)							
<b>A</b>	300.00 mA	10 μA	300 mV	300 mV	0.2 + 10	1.2 + 30 (> 300 Digit)	12A <sup>5)</sup>	5 min	<b>A</b>				
	3.0000 A	100 μA	150 mV	150 mV	0.5 + 10	1.2 + 50 (> 300 Digit)							
	10.000 A	1 mA	400 mV	400 mV	0.5 + 10	1.2 + 30 (> 300 Digit)							
			No-load voltage	Short circuit current									
<b>Ω</b>	300.00 Ω	10 mΩ	max. 4.00 V	max. 1 mA	0.1 + 6; 0.1 + 30 <sup>3)</sup>		1000 V DC AC RMS sinusoidal	1 min	<b>Ω</b>				
	3.0000 kΩ	100 mΩ	max. 1.25 V	max. 100 μA	0.1 + 6								
	30.000 kΩ	1 Ω	max. 1.25 V	max. 10 μA	0.1 + 6								
	300.00 kΩ	10 Ω	max. 1.25 V	max. 1 μA	0.1 + 6								
	3.0000 MΩ	100 Ω	max. 1.25 V	max. 0.1 μA	0.1 + 6								
	30.000 MΩ	1kΩ	max. 1.25 V	max. 0.1 μA	1.0 + 6								
<b>→ </b>	3.0000 V-	1mV	max. 4.00 V	—	0.2 + 3				<b>→ </b>				
			Discharge resist.	U <sub>0max</sub>									
<b>F</b>	3.000 nF	1 pF	1.5 MΩ	4 V	1.0 + 8; 1.0 + 60 <sup>3)</sup>		1000 V DC AC RMS sinusoidal	1 min	<b>F</b>				
	30.00 nF	10 pF	1.5 MΩ	4 V	1.0 + 8; 1.0 + 30 <sup>3)</sup>								
	300.0 nF	100 pF	150 kΩ	4 V	1.0 + 3								
	3.000 μF	1 nF	150 kΩ	4 V	1.0 + 3								
	30.00 μF	10 nF	15 kΩ	2 V	1.0 + 3								
	300.0 μF	100 nF	1.5 kΩ	2 V	5.0 + 6								
	3000 μF	1 μF	1.5 kΩ	2 V	5.0 + 6								
	10000 μF	10 μF	1.5 kΩ	2 V	5.0 + 6								
			f <sub>min</sub> <sup>6)</sup>										
<b>Hz</b>	300.00 Hz	0.01 Hz	10 Hz		0.1 + 3 <sup>7)</sup>		≤ 3 kHz; 1000 V	cont.	<b>Hz</b>				
	3.0000 kHz	0.1 Hz	10 Hz										
	30.000 kHz	1 Hz	10 Hz										
	100.00 kHz	10 Hz	10 Hz										
<b>°C</b>	Pt - 200.0... + 100.0 °C	0.1 °C	—	—	0.5 Kelvin + 3 <sup>8)</sup>		1000 V DC AC rms sine	1 min.	<b>°C</b>				
	Pt + 100.0... + 850.0 °C	0.1 °C	—	—	0.5 + 3 <sup>8)</sup>								
	Pt - 100.0... + 100.0 °C	0.1 °C	—	—	0.5 Kelvin + 3 <sup>8)</sup>								
	Pt + 100.0... + 850.0 °C	0.1 °C	—	—	0.5 + 3 <sup>8)</sup>								

#### dB ranges

Measuring ranges	Display span at reference voltage U = 0.775 V	Display span at reference voltage U <sub>ref</sub> (V)
300 mV ~ 3 V~	- 48 dB... - 8 dB	- 40 dB... + 110 dB
30 V~	- 38 dB... + 12 dB	- 60 dB... + 100 dB
300 V~	- 18 dB... + 32 dB	- 80 dB... + 80 dB
1000 V~	+ 2dB... + 52 dB	- 100 dB... + 60 dB
	+ 22 dB... + 63 dB	- 110 dB... + 40 dB
	Display (dB) = 20 lg U <sub>x</sub> (V) / 0.775 V	Display (dB) = 20 lg U <sub>x</sub> (V) / U <sub>ref</sub> (V)

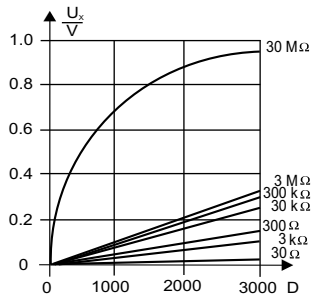
- 1) TRMS measurement  
values < 100 digit (<500 digit for measuring range 300mV)  
will be suppressed
- 2) At - 10 °C... + 40 °C
- 3) With zero adjuster; without zero adjuster
- 4) At a resolution of 0.01 dB
- 5) 16 A for 30s
- 6) Lowest measurable frequency with a sinusoidal measuring signal which is symmetrical to zero
- 7) Range  
 $3\text{ V} \equiv U_0 = 1V_{\text{eff/rms}} \dots 10 V_{\text{eff/rms}}$   
 $30\text{ V} \equiv U_0 = 10V_{\text{eff/rms}} \dots 100 V_{\text{eff/rms}}$   
 $300\text{ V} \equiv U_0 = 100V_{\text{eff/rms}} \dots 1000 V_{\text{eff/rms}}$
- 8) Without sensor



# Analog - Digital multimeters

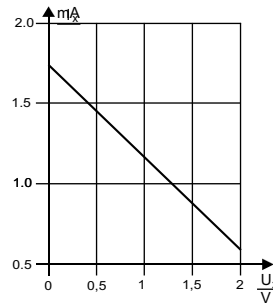
## RISH Multi<sup>®</sup> 12S...18S

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



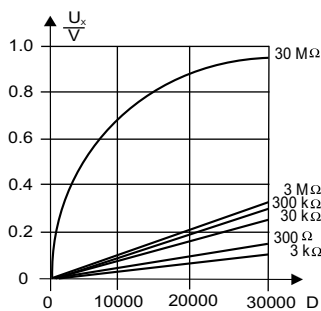
Voltage  $U_x$  across the resistance  $R_x$  to be measured as a function of measuring range and display.

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



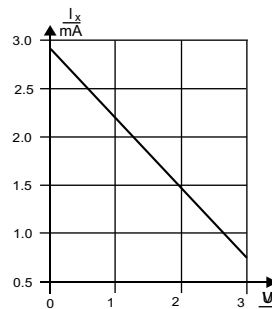
Measuring current  $I_x$  as a function of the displayed voltage  $U_x$  on the device under test.

### Measuring voltage with resistance measurement 18S



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 18S



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

### Reference conditions

Ambient temperature	+23°C ± 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



# Analog - Digital multimeters

## RISH Multi<sup>®</sup> 12S...18S

### 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.

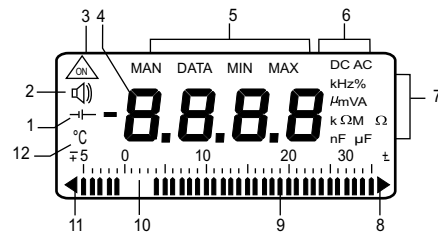
### Analog

Indication	LCD scale with pointer
Scale length	55 mm on V $\overline{=}$ and A $\overline{=}$ , 47 mm on all other ranges
Scaling	$\mp 5 \dots 0 \dots \pm 30$ with 35 scale divisions on $\overline{=}$ , 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 $\Omega$ 10 readings/s

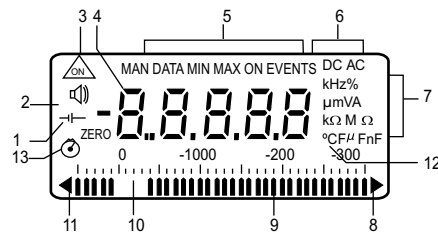
### Digital

Display/ height of numerals	Rish multi 12S... 16S, 7 segment numerals / 15mm  Rish multi 18S: 7-segment numerals/12 mm
Number of counts	Rish multi 12S...16S, 3 $\frac{3}{4}$ digit $\triangleq$ 3100 counts  Rish multi 18S: 4 $\frac{3}{4}$ digit $\triangleq$ 31000 counts
Overrange display	"OL" is shown
Polarity display	"-" sign is shown, When positive pole to " $\perp$ "
Sampling rate	2 readings/s, On $\Omega$ and $^{\circ}\text{C}$ :1 reading/s

### Display RISH multi 12S... 16S



### Display RISH multi 18S



1. Display with low battery voltage
2. Display with sound signal on
3. Symbol for "CONTINUOUSLY ON"
4. Digital display with indication of decimal point and polarity
5. Display with manual range selection as well as with data and MIN/MAX hold
6. Display of the selected function
7. Display of the unit of measurement
8. Display with overrange
9. Pointer for analog indication
10. Scale for analog indication
11. Indication that negative analog range is exceeded
12. Display of the unit  $^{\circ}\text{C}$  when measuring temperature
13. Display with time counter switched on



# Analog - Digital multimeters

## RISH Multi<sup>®</sup> 12S...18S

### Influence quantities and variations for 12S... 16S

Influence quantity	Influence range	Measured quantity / measuring range	Variation <sup>1)</sup>	
			± (...% of meas. val. + ... digits) 12S... 14S	15S 16S
Temperature	0 °C... + 21 °C and +25 °C... + 40 °C	30/300 mV $\overline{=}$	1.0 + 3	1.0 + 1
		3... 300 V $\overline{=}$	0.15 + 1	0.1 + 1
		1000 V $\overline{=}$	0.2 + 1	0.1 + 1
		V $\overline{-}$	0.4 + 2	0.3 + 2
		300 $\mu$ A ... 300 mA $\overline{=}$	0.5 + 1	0.15 + 1
		3A / 10 (16) A $\overline{=}$	0.5 + 1	
		A $\overline{-}$	0.75 + 1	0.75 + 3
		30 $\Omega$ <sup>2)</sup>	0.15 + 2	
		300 $\Omega$	0.25 + 2	0.15 + 2
		3 k $\Omega$ ... 3 M $\Omega$	0.15 + 1	0.1 + 1
		30 M $\Omega$	1.0 + 1	0.6 + 1
		30 nF <sup>2)</sup> ... 3 $\mu$ F	---	0.5 + 2
		30 $\mu$ F	---	2.0 + 2
		Hz	---	0.5 + 1
		%	---	± 5 D
Frequency of the measured quantity	15 Hz... < 30 Hz 30 Hz... < 45 Hz > 65 Hz... < 400 Hz > 400 Hz... 1 kHz > 1 kHz... 20 kHz	3 ... 300 V $\overline{-}$	---	1.0 + 3
		1000 V $\overline{-}$	---	0.5 + 3
Crest factor CF	1 ... 3 > 3 ... 5	V $\overline{-}$ <sup>4)</sup> , A $\overline{-}$ <sup>4)</sup>	---	± 1% of rdg.
		V $\overline{-}$ <sup>4)</sup> , A $\overline{-}$ <sup>4)</sup>	---	± 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

Voltage measurement

Waveform of the measured quantity

Current measurement

### Influence quantities and variations for 18S

Influence quantity	Influence range	Measured quantity / measuring range	Variation <sup>2)</sup>	
			± (...% of meas. val. + ... digits)	
Temperature	- 10 °C... + 21 °C and +25 °C... + 40 °C	V $\overline{=}$	0.05 + 3	
		V $\overline{-}$ , V $\overline{=}$	0.2 + 30	
		300 $\mu$ A / 3 mA	0.2 + 3	
		30 mA $\overline{=}$	0.1 + 3	
		300 mA... 10 A $\overline{=}$	0.2 + 3	
		300 $\mu$ A... 300 mA $\overline{-}$	0.3 + 30	
		3A / 10 A $\overline{-}$	0.5 + 30	
		300 $\Omega$	0.1 + 5	
		3 k $\Omega$ ... 3 M $\Omega$	0.1 + 3	
		30 M $\Omega$	0.6 + 3	
		30 nF... 3 $\mu$ F	0.5 + 3	
		30 $\mu$ F	2.0 + 3	
		Hz	0.1 + 3	
		-200... + 100 °C	0.5 Kelvin + 2 D	
		+ 100... + 850 °C	0.5 + 2	
Frequency of the measured quantity	15 Hz... < 45 Hz 65 Hz... < 200 Hz > 15 Hz... < 30 Hz > 30 Hz... < 45 Hz > 65 Hz... < 400 Hz > 400 Hz... 1 kHz > 1 kHz... 20 kHz	300 mV $\overline{-}$	1.0 + 20	
		1000 V $\overline{-}$	1.4 + 20	
		3... 300 V $\overline{-}$	1.0 + 20	
		1000 V $\overline{-}$	0.5 + 20	
		1000 V $\overline{-}$	0.5 + 20	
		1000 V $\overline{-}$	1.0 + 20	
		1000 V $\overline{-}$	2.0 + 20	
		1000 V $\overline{-}$	1.0 + 20	
		1000 V $\overline{-}$	0.5 + 20	
		1000 V $\overline{-}$	2.0 + 20	
		1000 V $\overline{-}$	1.0 + 20	
		1000 V $\overline{-}$	0.5 + 20	
		1000 V $\overline{-}$	2.0 + 20	
		1000 V $\overline{-}$	1.0 + 20	
		Crest factor CF	1 ... 3 > 3 ... 5	V $\overline{-}$ <sup>4)</sup> , A $\overline{-}$ <sup>4)</sup>
V $\overline{-}$ <sup>4)</sup> , A $\overline{-}$ <sup>4)</sup>	± 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

Voltage measurement

Waveform of the measured quantity

Current measurement

Influence quantity	Influence range	Measured quantity / measuring range	Variation 12S... 16S
Battery voltage	4 <sup>5)</sup> ... < 7.9 V > 8.1 V... 10.0 V	V $\overline{=}$	± 2 D
		V $\overline{-}$	± 4 D
		A $\overline{=}$	± 4 D
		A $\overline{-}$	± 6 D
		30 $\Omega$ / 300 $\Omega$ / °C	± 4 D
		3 k $\Omega$ ... 30 M $\Omega$	± 3 D
		3 nF... 30 $\mu$ F	± 1 D
		Hz	± 1 D
		%	± 1 D
Relative humidity	75 % 3 days Meter off	V $\overline{-}$	1x Intrinsic error
		A $\overline{-}$	
		$\Omega$	
		F	
		Hz	
DATA		°C	± 1 D
MIN / MAX		V $\overline{-}$ , A $\overline{-}$	± 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 "4<sup>5)</sup>" appears.

Influence quantity	Influence range	Measured quantity / measuring range	Variation
Battery voltage	4 <sup>5)</sup> ... < 7.9 V > 8.1 V... 10.0 V	V $\overline{=}$	± 6 D
		V $\overline{-}$	± 30 D
		A $\overline{=}$	± 30 D
		A $\overline{-}$	± (1% of rdg. + 10D)
		$\Omega$	± 10 D
		3 nF... 30 $\mu$ F	± 10 D
		Hz	± 6 D
		°C	± 5 D
		Relative humidity	75 % 3 days Meter off
DATA		V, dB, A, $\Omega$ , Hz	± 20 D
MIN / MAX		F	± 2 D
		V, dB, A, $\Omega$ , Hz	± 10 D
		°C, F	± 1 D

- 1) With zero setting
- 2) With temperature; Error data is per 10 K change in temperature. With frequency; Error data is valid from a display of 10% of the measuring range.
- 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 "4<sup>5)</sup>" appears.



# Analog - Digital multimeters

## RISH Multi<sup>®</sup> 12S...18S

Influence quantity	Influence range	Meas. range 12S... 16S	Damping
Common mode voltage	Disturbance variable max. 1000 V ~	V =	> 120 dB
	Disturbance variable max. 1000 V ~ 50 Hz, 60 Hz sinusoidal	3 V ~	> 70 dB
		30 V ~	> 70 dB
		300 V ~	> 70 dB
Normal mode voltage	Disturbance variable V ~, nom. value of meas. range at a time, max. 1000 V ~ 50 Hz, 60 Hz sinusoidal	V =	> 50 dB
	Disturbance variable max. 1000 V ~	V ~	> 110 dB

Influence quantity	Influence range	Meas. range 18S	Damping
Common mode voltage	Disturbance variable max. 1000 V ~	V =	> 120 dB
	Disturbance variable max. 1000 V ~ 50 Hz, 60 Hz sinusoidal	300 mV ~	> 80 dB
		30 V ~	> 70 dB
		1000 V ~	> 60 dB
Normal mode voltage	Disturbance variable V ~, nom. value of meas. range at a time, max. 1000 V ~ 50 Hz, 60 Hz sinusoidal	V =	> 48 dB
	Disturbance variable max. 1000 V ~	V ~	> 110 dB

### Response time

Response time for 12S... 16S (after manual range selection)

Measured quantity measuring range	Response time of analog indication		Leap function of the measured quantity
	of analog indication	of digital display	
V = V ~ A = A ~	0.7 s	1.5 S	from 0 to 80% of the upper range limit
30Ω...3MΩ	1.5 S	2 S	from ∞ to 50% of the upper range limit
30MΩ	4 S	5 S	from 0 to 50% of the upper range limit
→	0.7 S	1.5 S	
nF, μF, °C		max. 1... 3S	
300 Hz, 3kHz		max. 2 S	
30, 100kHz		max. 0.7 S	
% (1 Hz)		max. 9 S	
% (≥10 Hz)		max. 2.5 S	

### Response time for 18S (after manual range selection)

Measured quantity measuring range	Response time of analog indication		Leap function of the measured quantity
	of analog indication	of digital display	
V = V ~ A = A ~	0.7 S	1.5 S	from 0 to 80% of the upper range limit
30Ω...3MΩ	1.5 S	2 S	from ∞ to 50% of the upper range limit
30MΩ	4 S	5 S	from 0 to 50% of the upper range limit
→	0.7 S	1.5 S	
3 nF... 300 μF	max. 2 S	max. 2S	
3 000 μF	max. 7 S	max. 7 S	
10 000 μF	max. 14 S	max. 14 S	
> 10 Hz	max. 1.5 S	max. 1.5 S	
°C		max. 3 S	

### Power supply

Battery	9-V flat cell battery: manganese-dioxide cell according to IEC 6 F 22. alkaline Manganese cell according to IEC 6 LR 61 or corresponding NiCd storage battery
Operating time	With alkaline-manganese cell: RISH multi 12...16S Approx. 220 hours on V =, A = Approx. 80 hours on V ~, A ~ (12S...15S) approx. 60 hours on V ~, A ~ (16S) with interface operation times x 0.7 RISH multi 18S: approx. 120 hours on V = approx. 90 hours on V ~, A ~ A = Automatic display of the " -  - " symbol, when the battery voltage drops below approximately 7 V.
Battery test	

### Electrical Safety

(Except 13S)

Protection class	As per IEC 61010-1:2001 IEC 1010-1/EN 61010-1/VDE 0411-1
Overvoltage category	III IV
Nominal voltage	1000 V 600V
Degree of pollution	2 2
Nominal	
Test Voltage	6.7KV~ acc. To IEC 348/DIN VDE 0411

### Electromagnetic compatibility EMC

Emission	EN 61326: 2002 class B
Immunity	EN 50082-1: 1992 EN 61326: 2002 IEC 61000-4-2 8 KV atmospheric discharge 4 KV contact discharge IEC 61000-4-3 3 V/m

### Fuses

Fuse link for the ranges up to 300 mA	FF 1.6A/1000V 6.3 mm x 32 mm; Switching capacity 10 kA on 1000 VAC/DC and ohmic load; in connection with power diodes protects all current measuring ranges up to 300 mA
Fuse link for ranges up to 10A	16 A / 1000 V or 15 A / 1000 V 10 mm X 38 mm, Switching capacity 30 kA on 600 V ~ and ohmic load; protects the 3 A and 10 A ranges up to 1000 V

### Date interface

Type	RS-232C, serial, according to DIN 19241
Data transmission	Optical, with infrared light through the case
Baud rate	8192 bit/s





# Analog - Digital multimeters

## RISH Multi<sup>®</sup> 12S...18S

### Environmental conditions

Working temperature range	RISH multi 12S... 16S: -10 °C... + 50 °C RISH multi 18S, -20 °C... + 50 °C
Storage temperature range	-25 °C... + 70 °C (excl. batteries)
Climatic class	RISH multi 12S... 16S: 2z/-10/50/70/75% with reference to VDI/VDE 3540 RISH multi 18S: 2z/-20/50/70/75% with reference to VDI/VDE 3540
Altitude above sea level	up to 2000m

### 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

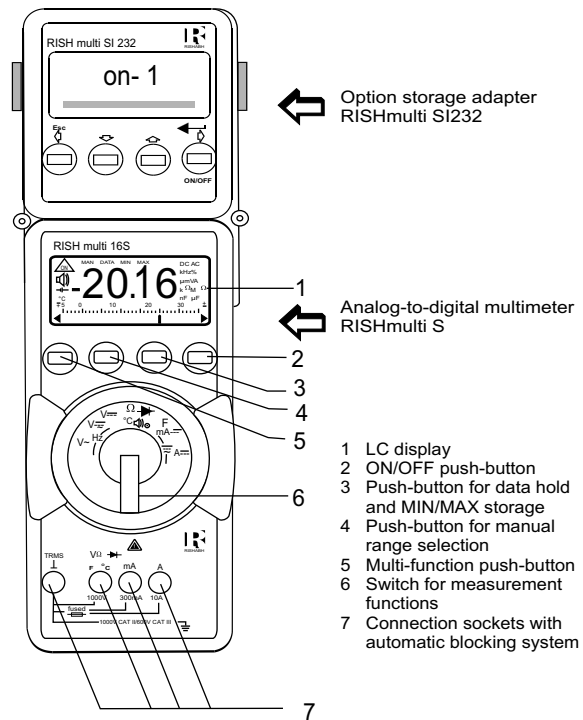
### Scope of delivery

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

### Warranty

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

### Operating controls 12S... 18S



## Analog - Digital multimeters

### RISH Multi<sup>®</sup> 12S...18S

#### Ordering Information

##### Order Code

Designation	Type	Order Code
Multimeter	RISH multi 12s	33001
	RISH multi 13s	33002
	RISH multi 14s	33003
	RISH multi 15s	33005
	RISH multi 16s	33006
	RISH multi 18s	33007
Cable set	KS 17	42126
Carrying Bag	F 389	42179
Voltage probe upto 3 KV	HV 3	42115
Voltage probe upto 30 KV	HV 30	42123
Clip on current transformer 1000A, 1mA/A	Z3512	42119
Shunt 100 A / 100mV	GE 4277	42178
Temperature sensor pt 100	Z 3409	42116
Temperature sensor pt 1000	Z 3408	42122
Single channel storage pack including memory adapter SI 232, Cable & Software RISHcom 100	1 CH pack	33021
Four channel storage pack including 4 nos memory adapter SI 232, Cable & Software RISHcom 100	4 CH pack	33023

