Analog - Digital multimeters

RISH **Multi** ® **12S... 18S**

RISHABH INSTRUMENTS
Measure, Control & Record with a Difference

Analog - Digital multimeters
RISH **Multi** ® 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 store

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.

Root-mean-square value with distorted waveform (*RISH* multi 16S & 18S)

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.

Overload warning

A sound signal indication violation of the overload limits.

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.

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

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 measurment, 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 1010 - 1 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
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 and control equipment.
DIN EN 60529 DIN VDE 0470 part 1	Test equipment and test procedures -Degrees of protection provided by enclosures (IP Code).

Analog - Digital multimeters

RISH Multi® 12S... 16S

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

Meas. function	Measuring range (RISH*Multi*)	12S	13S	14S	15S	16S	Resolution	Input impedance			Inherent deviation of the digital display ± (...% of meas. val. + ...digits) for reference condition: 12S	13S	14S	15S	16S	Overload capacity[4]: Overload value	Overload duration	Measuring function
V⎓	30.00 mV	●	●	●	●	●	10 µV	> 10GΩ // < 40 pF			0.5 +3[5]				0.5 + 3[5]	1200 V DC AC effective sinusoidal	cont.	V⎓
	300.0mV	●	●	●	●	●	100 µV	> 10GΩ // < 40 pF			0.5 + 3				0.5 + 3			
	3.000 V	●	●	●	●	●	1 mV	11MΩ // < 40 pF			0.25 +1				0.1 + 1			
	30.00 V	●	●	●	●	●	10 mV	10MΩ // < 40 pF			0.25 + 1				0.1 + 1			
	300.0 V	●	●	●	●	●	100 mV	10MΩ // < 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	11MΩ // < 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	10MΩ // < 40 pF										
	300.0 V	●	●	●	●	●1)	100 mV	10MΩ // < 40 pF										
	1000 V	●	●	●	●	●1)	1 V	10MΩ // < 40 pF										
V≂	3.000 V					●1)	1 mV	11MΩ // < 40 pF			---	---	---	---	0.75 + 3 (> 10 D)			V≂
	30.00 V					●1)	10 mV	10MΩ // < 40 pF			---	---	---	---				
	300.0 V					●1)	100 mV	10MΩ // < 40 pF			---	---	---	---				
	1000 V					●1)	1 V	10MΩ // < 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)				---	7)	7)	
	10.00 A		16A	●	●		10 mA	---	300/270mV	270 mV	---	1.5 + 2 (> 10 D)			---			
A~ (clip-on)	30.00 A[2]	●					10 mA	150 mV	---	---	1.5 + 2 (> 10 D)	---	---	---	---	0.36 A	cont.	A~ (clip-on)
	300.0 A[2]	●					100 mA	1 V	---	---		---	---	---	---			
A≂	3.000 mA					●1)	1 µA	---	---	150 mV	---	---	---	---	1.5 + 4 (> 10 D)	12 A	5 min	A≂
	300.0 mA					●1)	100µA	---	---	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 mΩ	max. 3.2 V			0.5 + 3[5]				0.4 + 3[5]	500 V DC AC effective sinusoidal	10 min	Ω
	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			
⊳|(diode)	2.000 V	●	●	●	●	●	1 mV	max. 3.2 V			0.25 + 1				0.1 + 1			⊳|(diode)
									Discharge resistance	$U_{0\,max}$								
F	30.00 nF				●	●	10 pF		250 kΩ	2.5 V	---	---	---	1.0 + 3[6]		500 V DC / AC effective sinusoidal	10 min	F
	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	F_{min} V⎓	F_{min} V~								
Hz	300.0 Hz				●	●	0.1 Hz		1 Hz	45 Hz	---	---	---	0.5 + 1[8]		≤ 3 kHz: 1200V ≤ 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]					500 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) Direct display with clip-on transformer 1000:1
4) At 0°C... + 40°C
5) With zero setting; w/o zero setting + 35 digits
6) With zero setting; w/o zero setting + 50 digits
7) 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 ≃ : U_E= 1.5 V_{rms}... 100 V_{rms}
30 V ≃ : U_E= 15 V_{rms} ... 300 V_{rms}
300 V ≃ : U_E= 150 V_{rms}... 1000 V_{rms}

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

Specifications RISH *multi* 18S

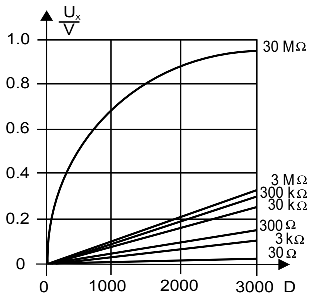
Meas. function	Measuring range Rishmulti 18 S	Resolution	Input impedence ⎓	Input impedence ~ 1) ⎓ 1)	Inherent deviation of the digital display ± (...% of meas. val. +... digits for ref. conditions ⎓	Inherent deviation ~ 1) ⎓ 1)	Overload capacity 2) Overload value	Overload capacity 2) Overload duration	Meas. function
V	300.00 mV	10 µV	>10 GΩ	5 MΩ// < 40 pF	0.05 + 3; 0.05 + 20 3)	0.5 + 30 (> 500 D)	1200 V DC AC RMS sinusoidal	cont.	**V**
	3.0000 V	100 µV	11 MΩ	1 MΩ// < 40 pF	0.05 + 3	0.3 + 30 (> 300 D)			
	30.000 V	1 mV	10 MΩ	1 MΩ// < 40 pF	0.05 + 3	0.3 + 30 (> 300 D)			
	300.00 V	10 mV	10 MΩ	1 MΩ// < 40 pF	0.05 + 3	0.3 + 30 (> 300 D)			
	1000.0 V	100 mV	10 MΩ	1 MΩ// < 40 pF	0.05 + 3	0.3 + 30 (> 300 D)			
dB	See table below		—	Same as with V~	—	± 0.5 dB 4)			**dB**
			Voltage drop. approx. ⎓	Voltage drop. approx. ⎓ 1)	⎓	⎓ 1)			
mA	300.00 µA	10 nA	15 mV	15 mV	0.2 + 20	0.5 + 30 (> 300 D)	0.36 A	cont.	**mA**
	3.0000 mA	100 nA	150 mV	150 mV	0.2 + 10	0.5 + 30 (> 300 D)			
	30.000 mA	1 µA	30 mV	30 mV	0.05 + 10	0.5 + 30 (> 300 D)			
	300.00 mA	10 µA	300 mV	300 mV	0.2 + 10	0.5 + 30 (> 300 D)			
A	3.0000 A	100 µA	150 mV	150 mV	0.5 + 10	0.75 + 30 (> 300 D)	12A 5)	5 min	**A**
	10.000 A	1 mA	400 mV	400 mV	0.5 + 10	0.75 + 30 (> 300 D)			
			No-load voltage	Short circuit current					
Ω	300.00 Ω	10 mΩ	max. 4.00 V	max. 1 mA	0.1 + 6; 0.1 + 30 3)		500 V DC AC RMS sinusoidal	10 min	**Ω**
	3.0000 kΩ	100 mΩ	max. 1.25 V	max. 100 µA	0.1 + 6				
	30.000 kΩ	1Ω	max. 1.25 V	max. 10 µA	0.1 + 6				
	300.00 kΩ	10Ω	max. 1.25 V	max. 1 µA	0.1 + 6				
	3.0000 MΩ	100Ω	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				
⏵|	3.0000 V-	1mV	max. 4.00 V	---	0.2 + 6				⏵|
			Discharge resist.	U_{0max}					
F	3.000 nF	1 pF	1.5 MΩ	4 V	1.0 + 8; 1.0 + 60 3)		500 V DC AC RMS sinusoidal	10 min	**F**
	30.00 nF	10 pF	1.5 MΩ	4 V	1.0 + 8; 1.0 + 30 3)				
	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_{min} 6)						
Hz	300.00 Hz	0.01 Hz	10 Hz		0.1 + 3 7)		≤ 3 kHz; 1200 V	cont.	**Hz**
	3.0000 kHz	0.1 Hz	10 Hz				≤ 30 kHz; 300 V		
	30.000 kHz	1 Hz	10 Hz						
	100.00 kHz	10 Hz	100 Hz				≤ 100 kHz 30 V		
°C	Pt 100: - 200.0... + 100.0 °C	0.1 °C	---	---	0.5 Kelvin + 3 8)		500 V DC AC eff sinus	10 min.	**°C**
	Pt 100: + 100.0... + 850.0 °C	0.1 °C			0.5 + 3 8)				
	Pt 1000: - 100.0... + 100.0 °C	0.1 °C	---	---	0.5 Kelvin + 3 8)				
	Pt 1000: + 100.0... + 850.0 °C	0.1 °C	---	---	0.5 + 3 8)				

dB ranges

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

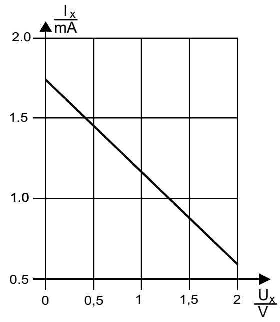
1) TRMS measurement
2) At - 10 °C... + 40 °C
3) With zero setting; w/o zero setting
4) At a resolution of 0.01 dB
5) 16 A for 30s
6) Lowest measurable frequency with sinusoidal measuring signal symmetrical to zero
7) Range
3 V≃ : U_E = 1V_{rms}... 10 V_{rms}
30 V≃ : U_E = 10V_{rms}... 100 V_{rms}
300 V≃ : U_E = 100V_{rms}... 1000 V_{rms}
8) Without sensor

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



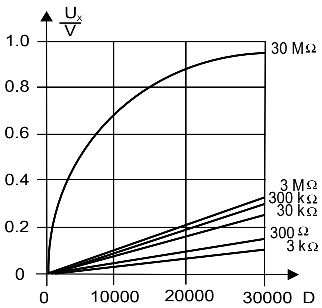
Voltage U_x across the resistance R_x to be measured as a function of measuring range and display.

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



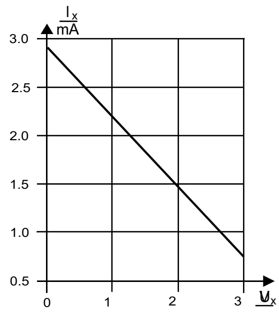
Measuring current I_x as a function of the displayed voltage U_x on the device under test.

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

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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.

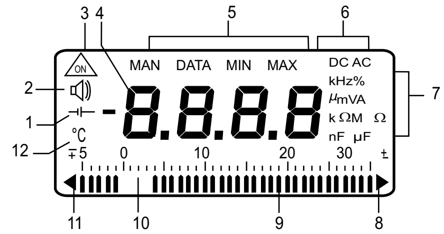
Analog

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

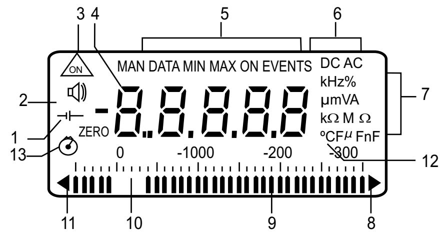
Digital

Display/ height of numerals	Rish multi 12S… 16S, 7 segment numerals / 15mm Rish multi 18S: 7-segment numerals/12 mm
Number of counts	Rish multi 12S…16S, 3 ¾ digit ≙ 3100 counts Rish multi 18S: 4 ¾ digit ≙ 31000 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



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 °C when measuring temperature
13. Display with time counter switched on

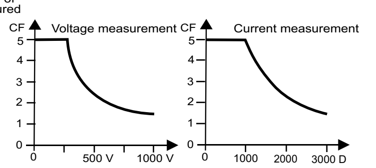
Analog - Digital multimeters
RISH Multi® 12S... 18S

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 µ A[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		
		300Ω	0.25 + 2		0.15 + 2
		3 kΩ ... 3 MΩ	0.15 + 1		0.1 + 1
		30 MΩ	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.**
	Crest factor CF > 3 ...5		---	---	**± 3 % of rdg.**

Waveform of the measured quantity[3]

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

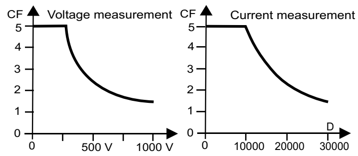


Influence quantities and variations for 18S

Influence quantity	Influence range	Measured quantity / measuring range[1]	Variation[2] ± (...% of meas. val. +... digits)
Temperature	- 10 °C...+ 21 °C and +25 °C... + 40 °C	V ⎓	0.05 + 3
		V ~, V ≃	0.2 + 30
		300 µA / 3 mA	0.2 + 3
		30 mA ⎓	0.1 + 3
		300 mA... 10 A ⎓	0.2 + 3
		300 µA... 300 mA ≃	0.3 + 30
		3A / 10 A ≃	0.5 + 30
		300 Ω	0.1 + 5
		3 kΩ ... 3 MΩ	0.1 + 3
		30 MΩ	0.6 + 3
		30 nF... 3 µF	0.5 + 3
		30 µF	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	300 mV ~	1.0 + 20
	65 Hz... < 200 Hz		1.0 + 20
	> 15 Hz...< 30 Hz	3... 300 V~	1.0 + 20
	> 30 Hz... < 45Hz		0.5 + 20
	> 65 Hz... 400 Hz		0.5 + 20
	> 400 Hz... 1 kHz		1.0 + 20
	> 1 k Hz... 20 kHz		2.0 + 20
	15 Hz... < 30 Hz	1000 V ~	1.0 + 20
	30 Hz... < 45 Hz		0.5 + 20
	> 65 Hz... 1 kHz		2.0 + 20
	15 Hz... < 45 Hz	A~	1.0 + 20
	> 65 Hz... 1kHz		1.0 + 20
	Crest factor CF 1 ...3	V ~[4], A~[4]	± 1% of rdg.
	Crest factor CF > 3 ...5		± 3 % of rdg.

Waveform of the measured quantity[3]

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



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

Influence quantity	Influence range	Measured quantity / measuring range	Variation
Battery voltage	⊣⊢ 5) ... < 7.9 V > 8.1 V... 10.0 V	V ⎓	± 6 D
		V ~	± 30 D
		A ⎓	± 10 D
		A~	± 30 D
		Ω	± 10 D
		3 nF... 30 µF	± 5 D
		Hz	± 6 D
		°C	± 5 D
Relative humidity	75 % 3 days Meter off	V, dB, A, Ω, F, Hz °C	1x inherent deviation
DATA		V, dB, A, Ω, Hz	± 10 D
		F	± 1 D
MIN / MAX		V, dB, A, Ω, Hz	± 20 D
		°C, F	± 2 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 "⊣⊢" appears.

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 ~ 30 V ~	> 80 dB
		300 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 ⎓	> 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 30 V ~	> 80 dB
		300 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	Response time of digital display	Leap function of the measured quantity
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	
▶|	0.7 S	1.5 S	from 0 to 50% of the upper range limit
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	Response time of digital display	Leap function of the measured quantity
V ⎓ V ~ A ⎓ A ~	0.7 S	1.5 S 300 mV ⎓: 8S	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	
▶|	0.7 S	1.5 S	
3 nF... 300 µF	max. 2 S	max. 2S	from 0 to 50% of the upper range limit
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. 750 hours on V⎓ , A⎓ Approx. 200 hours on V ~, A~ (12S…15S) approx. 150 hours on V~, A~ (16S) with interface operation times x 0.7 RISH multi 18S: approx. 300 hours on V⎓ approx. 150 hours on V~, A~ A⎓
Battery test	Automatic display of the "⊣⊢" symbol, when the battery voltage drops below approximately 7 V.

Fuses

Fuse link for the ranges up to 300 mA	FF 1.6A/500V 6.3 mm x 32 mm; Switching capacity 20 kA on 500 V ~ 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 / 600 V or 15 A / 600 V 10 mm X 38 mm, Switching capacity 100 kA on 600 V ~ and ohmic load; protects the 3 A and 10 A ranges up to 600 V

Electrical Safety

Protection class	II according to IEC 348/DIN VDE 0411 and IEC 1010-1/EN 61010-1/VDE 0411-1	
Overvoltage category	II	III
Nominal voltage	1000 V	600V
Degree of pollution	2	2
Nominal Insulation voltage	1000 V acc. to IEC 348/DIN VDE 0411	
Test Voltage	6kV~ acc. To IEC 348/DIN VDE 0411	

Electromagnetic compatibility EMC

Emission	EN 50081-1:1992/ EN 55022:1987 class B
Immunity	EN 50082-1: 1992 /IEC 801-2:1991 8 kV air discharge /IEC 801-3:1984 3 V/m /IEC 801-4:1988 0.5 kV

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 ® 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 Climatic class	-25°C... + 70 °C (excl. batteries) 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

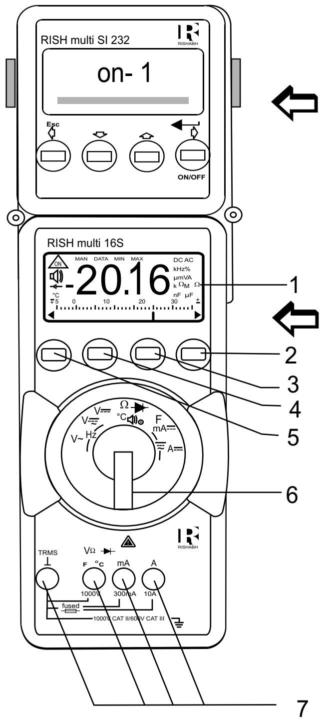
Scope of delivery

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



Option storage adapter RISHmulti SI232

Analog-to-digital multimeter RISHmulti S

1 LC display
2 ON/OFF push-button
3 Push-button for data hold and MIN/MAX storage
4 Push-button for manual range selection
5 Multi-function push-button
6 Switch for measurement functions
7 Connection sockets with automatic blocking system

RISH Multi SI 232
Data Storage adapter

Storage adapter SI232

The storage adapter RISH multi SI 232 which is attachable to the hand-held Rishmulti series multimeters permits direct transmission of measured data of a single or several RISH multi to a PC as well as on-site data storage without PC and their later transmission to the PC. The data is synchronized by a integrated clock.
Memory : 128kB (corresponds to approx. 100000 meas. Values)

Sampling

Sampling is dependent upon the selected signal hysteresis setting. This sampling method results in an expansion of virtual memory, which is dependent upon measurement signal dynamics and the selected signal hysteresis. Thus storage capacity can be substantially increased (10 to 100-fold)
With a selected sampling rate of upto maximum 500 ms. an arithmetic mean value is ascertained for the measurement values which are received at a pulse rate of 50 ms. Within a range of 1 s to 60 s, the signal sampling rate remains at a constant 500 ms (10 measurement values). The integrated closed-circuit system causes the storage module to enter the standby mode for the remainder of the sampling cycle after signal acquisition is complete, and thus lengthens battery service life. Signal acquisition is interrupted during the rest period for this reason. Thus the functional principal can be compared to that of point recorder.
Sampling rate adjustable from: 50ms…1 min

Sampling period	operational life (battery service life)
0.05…0.5s	> 30days
10 s	9 months
20 s	12 months
60 s	18 months

Interface packs

An interface pack can connect one or more RISH multi S with a PC. It contains all hardware and software components required to configure a PC measurement system.

Single channel storage pack

1 Storage adapter SI 232
1 RS-232 bus cable, 1.5 m long
1 Rishcom 100 program disk 3 ½ “ 1.44 Mbyte
1 copy of instruction manual of Rishcom 100

Four-channel storage pack

4 Storage adapters SI 232
1 RS-232 bus cable , 2 m long
1 Rishcom 100 program disk 3 ½ “ 1.44 Mbyte
1 copy of instruction manual of Rishcom 100

Configuration of a multi-measurement system (on-line and off-line)

To configure a powerful multi-measurement system up to six RISHmulti SI 232 can be interconnected and connected to a PC on-line via a standard interface cable (RS-232C) and/or up to ten devices can be operated off-line.
Each adapter can manually be provided with a specific contact address.

1) Four Rishmulti multimeters with storage adapters are cascaded

2) Each of the measurement values is transmitted via infrared light to the SI 232 storage adapter through the closed, electrically isolated RISH multi housing.

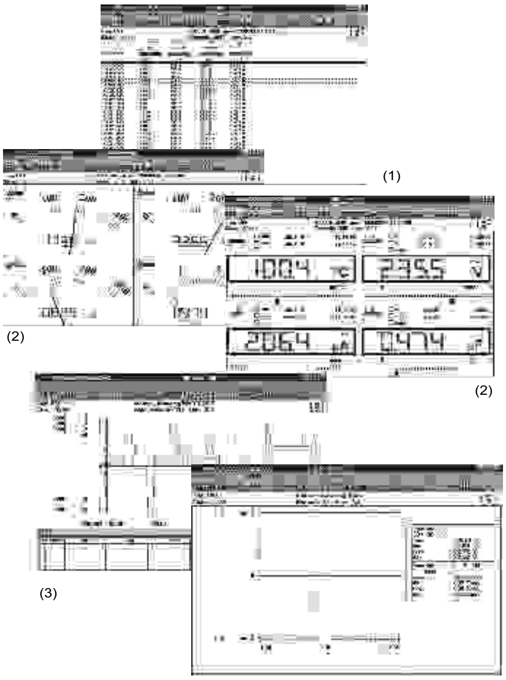
3) This pack can be connected to a PC through RS 232 interface.

4) The Rishcom 100 software then comprise a multiple measurement system on PC.

Software
Rishcom 100

Rishcom 100 software

Rishcom 100 software (can be run with DOS or WINDOWS) is used for the processing and representation of measurement data on a PC. Sampling in the on-line mode can be performed manually with an adjustable sampling interval, or dependent upon signal dynamics (with adjustable signal hysteresis). Storage in the ASCII format is controlled with two trigger thresholds per measurement channel, as well as with the internal clock.



Data logger (1)

The acquired data is continuously shown on the screen in the form of clear table.

Multimeter (2)

Transmitted measurement values from a maximum of 4 freely selectable channels are digitally displayed at the monitor, and represented in an analog /digital or analog + digital Format during on-line operation.

Y(t)recorder (3)

The acquired measured values are shown on the screen as time diagram with horizontal time axis and measured with a cursor. Stored signals can be zoomed in amplitude and the time axis and/or compressed ("zoom"). The time scale can be presented in absolute time or relative measuring time.

X-Y recorder (4)

The acquired data are shown on the screen on-line as X-Y diagram and measured with the cursor. Same as in all other form of presentation, all scales can be freely selected.

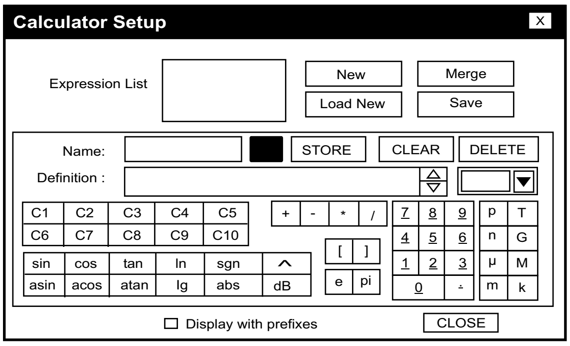
Math function with powerful arithmetics can analyze, link and display measured data on-line and off-line.

Scanning

Scanning can optionally be performed manually (mouse click), automatically with selectable interval (50 ms…1 min) or signal depending with settable signal hysteresis (0…500 digits). The data can be controlled by time and window trigger and stored automatically as multiple files.

Data processing

The measured data can further be processed by means of a powerful computer function and by linearization functions.



Thus it is possible, for example, to present mA signals from sensors or transformers directly in print values as active power, and many more.

Parameterization of the SI232 storage adapters

The storage adapters can be set manually via the front keys or via the serial interface of the PC. By transmission, of the time from the computer, as many as ten memories can acquire measured values synchronous with time. Values for minimum and maximum trigerring, recording time and post-trigger time can easily be set. Also the beginning of the measurement is controlled via the crystal clock of the memory, just as is scanning rate and signal hysteresis.

Ordering Information
RISH **Multi** ® **12S... 18S**

Order Code

Designation	Type	Order code
Multimeter	RISH multi 12s RISH multi 13s RISH multi 14s RISH multi 15s RISH multi 16s RISH multi 18s	33001 33002 33003 33005 33006 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