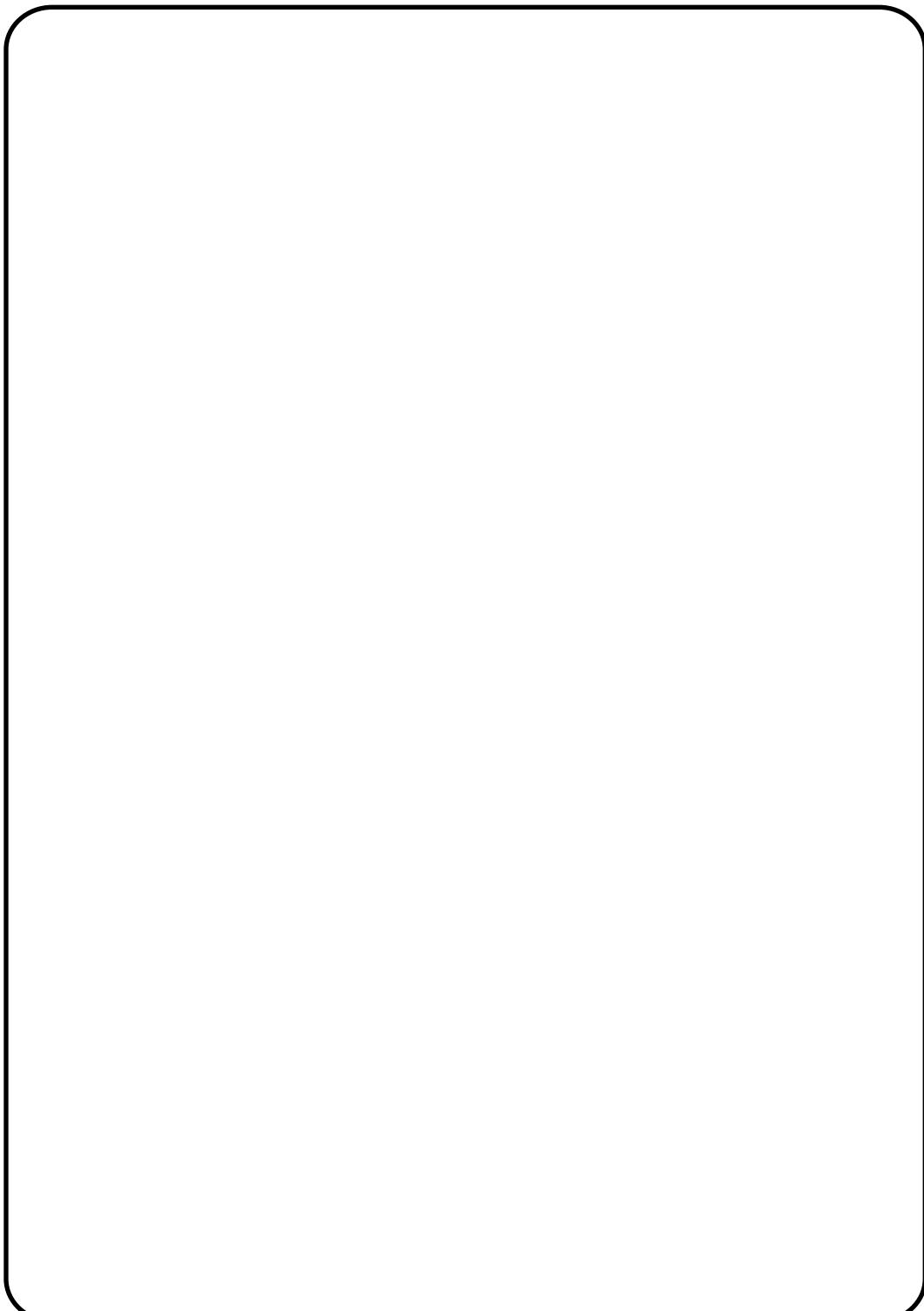


## NOTES



In technical collaboration with.  
**GOSSEN METRAWATT**  
CAMILLE BAUER  
Germany / Switzerland

# 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 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.

### 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 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 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<sup>®</sup> 12S... 16S

# Ordering Information

## RISH Multi<sup>®</sup> 12S... 18S

### Specifications RISH multi 12S... 16S

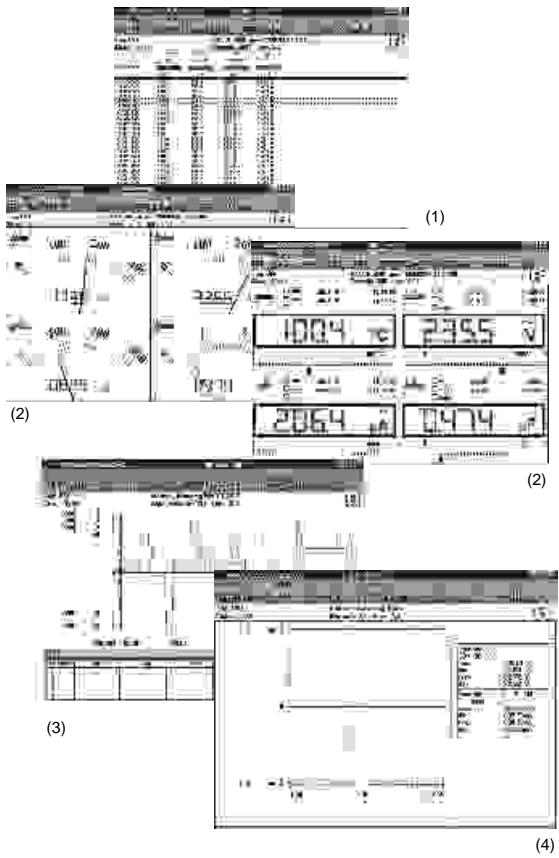
Meas. function	Measuring range					Resolution	Input impedance	Inherent deviation of the digital display ±(...% of meas. val. + ...digits) for reference condition					Overload capacity <sup>4)</sup>	Measuring function
	12S	13S	14S	15S	16S			12S	13S	14S	15S	16S		
V---	30.00 mV	● ● ● ● ●	10 µV	> 10GΩ // < 40 pF		0.5 +3 <sup>5)</sup>		0.5 +3 <sup>5)</sup>					1200 V DC cont.	V---
	300.0 mV	● ● ● ● ●	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						
V~	1000 V	● ● ● ● ●	1 V	10MΩ // < 40 pF		0.35 +1		0.1 +1					0.75 + 3 (> 10 D)	V~
	3.000 V	● ● ● ● ●	1 mV	11MΩ // < 40 pF		0.75 + 2(10... 300 D) 0.75 + 1 (> 300 D)								
	30.0 V	● ● ● ● ●	10 mV	10MΩ // < 40 pF		0.75 + 2(10... 300 D) 0.75 + 1 (> 300 D)								
	300.0 V	● ● ● ● ●	100 mV	10MΩ // < 40 pF		0.75 + 2(10... 300 D) 0.75 + 1 (> 300 D)								
	1000 V	● ● ● ● ●	1 V	10MΩ // < 40 pF		0.75 + 2(10... 300 D) 0.75 + 1 (> 300 D)								
V $\tilde{z}$	3.000 V	● ● ● ● ●	1 mV	11MΩ // < 40 pF		---	---	---	---	---	---	---	0.75 + 3 (> 10 D)	V $\tilde{z}$
	30.00 V	● ● ● ● ●	10 mV	10MΩ // < 40 pF		---	---	---	---	---	---	---		
	300.0 V	● ● ● ● ●	100 mV	10MΩ // < 40 pF		---	---	---	---	---	---	---		
	1000 V	● ● ● ● ●	1 V	10MΩ // < 40 pF		---	---	---	---	---	---	---		
				Voltage drop, approx.		12S	13S	14S	15S/16S					
A--	300.0 $\mu$ A	● ● ● ● ●	100 nA	---	---	15 mV	---	---	1.0 + 5 (> 10 D)	0.5 + 5 (> 10 D)			0.36 A cont.	A--
	3.000 mA	● ● ● ● ●	1 kA	15 mV	15 mV	180 mV	1.0 + 5 (> 10 D)	1.0 + 2		0.5 + 2				
	30.00 mA	● ● ● ● ●	10 $\mu$ A	150 mV	150 mV	650 mV	0.25 + 2	1.0 + 5 (< 10 D)	0.5 + 5 (> 10 D)					
	300.0 mA	● ● ● ● ●	100 $\mu$ A	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)	1.0 + 2				
A~	10.00 A	● ● ● ● ●	10 mA	---	300/270mV	270 mV	---	1.0 + 2	1.0 + 2	1.0 + 2			0.36 A cont.	A~
	3.000 mA	● ● ● ● ●	1 $\mu$ A	---	---	150 mV	---	---	1.5 + 2 (> 10 D)	---	---	---		
	30.00 mA	● ● ● ● ●	10 $\mu$ A	150 mV	150 mV	---	1.5 + 2 (> 10 D)	---	---	---	---	---		
	300.0 mA	● ● ● ● ●	100 $\mu$ A	1 V	1 V	1 V		1.5 + 2 (> 10 D)	---	---	---	---		
	10.00 A	● ● ● ● ●	10 mA	---	300/270mV	270 mV	---	1.5 + 2 (> 10 D)	---	---	---	---		
A $\tilde{z}$	30.00 A <sup>2)</sup>	● ● ● ● ●	10 mA	150 mV	---	---	---	1.5 + 2	---	---	---	---	0.36 A cont.	A $\tilde{z}$
	300.0 A <sup>2)</sup>	● ● ● ● ●	100 mA	1 V	---	---	---	1.5 + 2	---	---	---	---		
	3.000 A <sup>2)</sup>	● ● ● ● ●	1 $\mu$ A	---	---	150 mV	---	---	---	---	---	---		
	300.0 mA <sup>2)</sup>	● ● ● ● ●	100 $\mu$ A	---	---	1 V	---	---	---	---	---	---		
	10.00 A <sup>2)</sup>	● ● ● ● ●	10 mA	---	270 mV	---	---	1.5 + 2	1.5 + 2	1.5 + 2	1.5 + 2	1.5 + 2		
$\Omega$	30.00 $\Omega$	● ● ● ● ●	10 m $\Omega$	max. 3.2 V		0.5 + 3 <sup>5)</sup>		0.4 + 3 <sup>5)</sup>					500 V DC AC 10 min	$\Omega$
	300.0 $\Omega$	● ● ● ● ●	100 m $\Omega$	max. 3.2 V		0.5 + 3		0.4 + 3						
	3.000 k $\Omega$	● ● ● ● ●	1 k $\Omega$	max. 1.25 V		0.4 + 1		0.2 + 1						
	30.00 k $\Omega$	● ● ● ● ●	10 k $\Omega$	max. 1.25 V		0.4 + 1		0.2 + 1						
	300.0 k $\Omega$	● ● ● ● ●	100 k $\Omega$	max. 1.25 V		0.4 + 1		0.2 + 1						
→	3.000 M $\Omega$	● ● ● ● ●	1 k $\Omega$	max. 1.25 V		0.6 + 1		0.4 + 1					500 V DC AC 10 min	→
	30.00 M $\Omega$	● ● ● ● ●	10 k $\Omega$	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 $\Omega$	2.5 V	---	---	1.0 + 3 <sup>6)</sup>				500 V DC / AC effective sinusoidal 10 min	F
	300.0 nF	● ● ●	100 pF		250 k $\Omega$	2.5 V	---	---	1.0 + 3					
	3.000 $\mu$ F	● ● ●	1 nF		25 k $\Omega$	2.5 V	---	---	1.0 + 3					
	30.00 $\mu$ F	● ● ●	10 nF		25 k $\Omega$	2.5 V	---	---	3.0 + 3					
Hz	300.0 Hz			Sensor	$F_{\min}$	$V_{\max}$							≤ 3 kHz: 1200V ≤ 30 kHz: 300V ≤ 100 kHz: 30 V	Hz
	3.000 kHz				0.1 Hz		1 Hz	45 Hz	---	---				
	30.00 kHz				1 Hz		1 Hz	45 Hz	---	---				
	100.0 kHz				10 Hz		10 Hz	45 Hz	---	---				
%	2.0... 98.0 %				0.1 %		1 Hz	---	---	---			≤ 1 Hz...1kHz: + 5 D <sup>9)</sup> 1Hz...10kHz: + 5 D/kHz <sup>9)</sup>	%
°C	- 200.0... + 200.0 °C	● ● ● ● ●	0.1 °C	Pt 100	---	---	2 Kelvin + 5 D <sup>10)</sup>							

# 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.

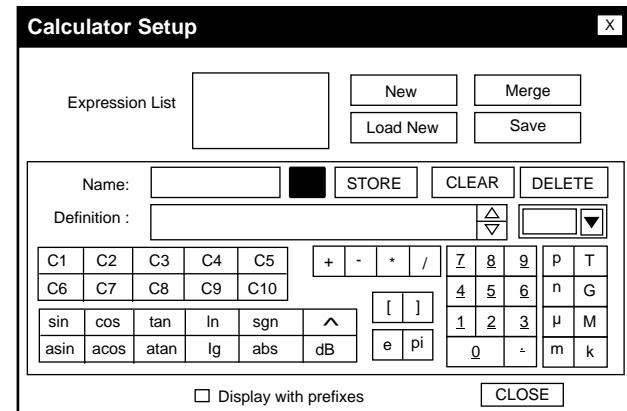
Math function with powerful arithmetics can analyze, link and display measured data on-line and off-line.

### 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 triggering, 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.

# Analog - Digital Multimeters

## RISH Multi® 18S

### Specifications RISH multi 18S

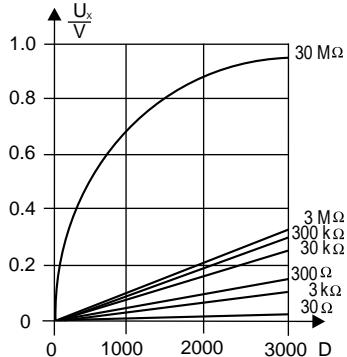
Meas. function	Measuring range Rishmulti 18 S	Resolution	Input impedance		Inherent deviation of the digital display ± (% of meas. val. ... digits for ref. conditions)		Overload capacity <sup>2)</sup>	Meas. function	
			=	= <sup>1)</sup>	=	= <sup>1)</sup>			
V	300.00 mV	10 $\mu$ V	>10 G $\Omega$	5 M $\Omega$ // <40 pF	0.05 + 3; 0.05 + 20 <sup>3)</sup>	0.5 + 30 (>500 D)	1200 V DC AC RMS sinusoidal	V	
	3.0000 V	100 $\mu$ V	11 M $\Omega$	1 M $\Omega$ // <40 pF	0.05 + 3	0.3 + 30 (>300 D)			
	30.000 V	1 mV	10 M $\Omega$	1 M $\Omega$ // <40 pF	0.05 + 3	0.3 + 30 (>300 D)			
	300.00 V	10 mV	10 M $\Omega$	1 M $\Omega$ // <40 pF	0.05 + 3	0.3 + 30 (>300 D)			
	1000.0 V	100 mV	10 M $\Omega$	1 M $\Omega$ // <40 pF	0.05 + 3	0.3 + 30 (>300 D)			
dB	See table below		—	Same as with V-	—	± 0.5 dB <sup>4)</sup>	cont.	dB	
				Voltage drop, approx.					
mA			=	= <sup>1)</sup>	=	= <sup>1)</sup>	0.36 A 12A <sup>5)</sup>	mA	
	300.00 $\mu$ A	10 nA	15 mV	15 mV	0.2 + 20	0.5 + 30 (>300 D)			
	3.0000 mA	100 nA	150 mV	150 mV	0.2 + 10	0.5 + 30 (>300 D)			
	30.000 mA	1 $\mu$ A	30 mV	30 mV	0.05 + 10	0.5 + 30 (>300 D)			
	300.00 mA	10 $\mu$ A	300 mV	300 mV	0.2 + 10	0.5 + 30 (>300 D)			
A	3.0000 A	100 $\mu$ A	150 mV	150 mV	0.5 + 10	0.75 + 30 (>300 D)	5 min	A	
	10.0000 A	1 mA	400 mV	400 mV	0.5 + 10	0.75 + 30 (>300 D)			
$\Omega$	No-load voltage		Short circuit current				500 V DC AC RMS sinusoidal	$\Omega$	
	300.00 $\Omega$	10 m $\Omega$	max. 4.00 V	max. 1 mA	0.1 + 6; 0.1 + 30 <sup>3)</sup>				
	3.0000 k $\Omega$	100 m $\Omega$	max. 1.25 V	max. 100 $\mu$ A	0.1 + 6				
	30.000 k $\Omega$	1 $\Omega$	max. 1.25 V	max. 10 $\mu$ A	0.1 + 6				
	300.00 k $\Omega$	10 $\Omega$	max. 1.25 V	max. 1 $\mu$ A	0.1 + 6				
$\rightarrow$	3.0000 M $\Omega$	100 $\Omega$	max. 1.25 V	max. 0.1 $\mu$ A	0.1 + 6		10 min	$\rightarrow$	
	30.000 M $\Omega$	1k $\Omega$	max. 1.25 V	max. 0.1 $\mu$ A	1.0 + 6				
F	3.0000 V-	1mV	max. 4.00 V	...	0.2 + 6		500 V DC AC RMS sinusoidal	F	
	Discharge resist.		U <sub>0max</sub>						
	3.000 nF	1 pF	1.5 M $\Omega$	4 V	1.0 + 8; 1.0 + 60 <sup>3)</sup>				
	30.000 nF	10 pF	1.5 M $\Omega$	4 V	1.0 + 8; 1.0 + 30 <sup>3)</sup>				
	300.00 nF	100 pF	150 k $\Omega$	4 V	1.0 + 3				
Hz	3.000 $\mu$ F	1 nF	150 k $\Omega$	4 V	1.0 + 3		10 min	Hz	
	30.000 $\mu$ F	10 nF	15 k $\Omega$	2 V	5.0 + 6				
	300.00 $\mu$ F	100 nF	1.5 k $\Omega$	2 V	5.0 + 6				
	3000.0 $\mu$ F	1 $\mu$ F	1.5 k $\Omega$	2 V	5.0 + 6				
	10000.0 $\mu$ F	10 $\mu$ F	1.5 k $\Omega$	2 V	5.0 + 6				
$^{\circ}$ C	f <sub>min</sub> <sup>6)</sup>						≤ 3 kHz; 1200 V ≤ 30 kHz; 300 V ≤ 100 kHz; 30 V	$^{\circ}$ C	
	300.00 Hz	0.01 Hz	10 Hz		0.1 + 3 <sup>7)</sup>				
	3.0000 kHz	0.1 Hz	10 Hz						
	30.000 kHz	1 Hz	10 Hz						
	100.00 kHz	10 Hz	100 Hz						
dB ranges	Measuring ranges		Display span at reference voltage U = 0.775 V		Display span at reference voltage U <sub>ref</sub> (V)		500 V DC AC eff sinus	10 min.	
	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						
Pt	100	+ 200.0... + 100.0 $^{\circ}$ C	+ 22 dB... + 63 dB	- 110 dB... + 40 dB	0.5 Kelvin + 3 <sup>8)</sup>		≤ 3 kHz; 1200 V	$^{\circ}$ C	
	1000	+ 85.0... + 85.0 $^{\circ}$ C		Display (dB) = 20 lg U <sub>x</sub> (V) / 0.775 V	0.5 + 3 <sup>8)</sup>				
Pt	1000	+ 100.0... + 100.0 $^{\circ}$ C	+ 0.1 $^{\circ}$ C	Display (dB) = 20 lg U <sub>x</sub> (V) / U <sub>ref</sub> (V)	0.5 Kelvin + 3 <sup>8)</sup>		30 V ≈ : U <sub>E</sub> = 1V <sub>ms</sub> ... 10 V <sub>ms</sub>	$^{\circ}$ C	
	1000	+ 85.0... + 85.0 $^{\circ}$ C	+ 0.1 $^{\circ}$ C		0.5 + 3 <sup>8)</sup>				

- 1) TRMS measurement
- 2) At -10  $^{\circ}$ C... +40  $^{\circ}$ 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<sub>E</sub> = 1V<sub>ms</sub>... 10 V<sub>ms</sub>
- 30 V ≈ : U<sub>E</sub> = 10V<sub>ms</sub>... 100 V<sub>ms</sub>
- 300 V ≈ : U<sub>E</sub> = 100V<sub>ms</sub>... 1000 V<sub>ms</sub>
- 8) Without sensor

# Analog - Digital multimeters

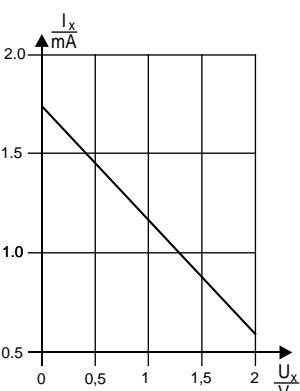
## RISH Multi<sup>®</sup> 12S... 18S

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



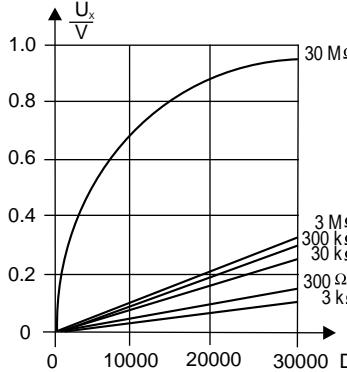
Voltage  $U_x$  across the resistance  $R_x$  to be measured as a function of measuring range and display.

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



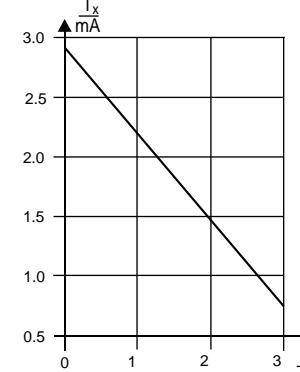
Measuring current  $I_x$  as a function of the displayed voltage  $U_x$  on the device under test.

### 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	$+23^\circ\text{C} \pm 2\text{K}$
Relative humidity	45%... 55%
Frequency of the measured quantity	45 Hz... 65 Hz
Waveform of the measured quantity	Sinusoidal
Battery voltage	$8\text{V} \pm 0.1\text{ V}$

# 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.

# 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 $\text{---}$ and A $\text{---}$ ; 47 mm on all other ranges
Scaling	$\pm 5 \dots \pm 30$ with 35 scale divisions on $\text{---}$ , $0 \dots 30$ 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

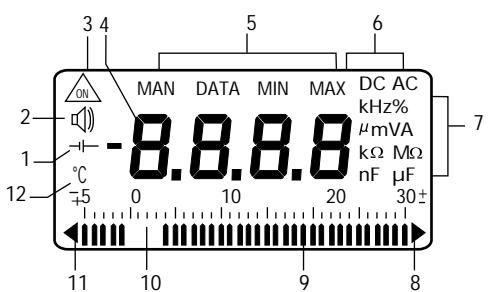
Display/ height of numerals	Rish multi 12S... 16S, 7 segment numerals / 15mm
	Rish multi 18S: 7-segment numerals/12 mm

Number of counts	Rish multi 12S...16S, 3 1/4 digit $\triangleq$ 3100 counts
	Rish multi 18S: 4 1/4 digit $\triangleq$ 31000 counts

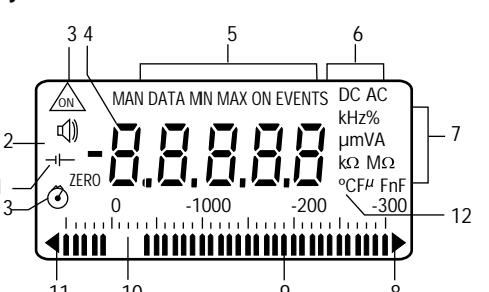
Overrange display Polarity display	"OL" is shown "." sign is shown, When positive pole to " $\perp$ "
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Sampling rate	2 readings/s, On $\Omega$ and $^{\circ}\text{C}$ :1 reading/s
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Display RISH multi 12S... 16S



Display RISH multi 18S



# Analog - Digital multimeters

## RISH Multi<sup>®</sup> 12S... 18S

### Environmental conditions

Working temperature range	RISH multi 12S... 16S: $-10^{\circ}\text{C} \dots +50^{\circ}\text{C}$ RISH multi 18S, $-20^{\circ}\text{C} \dots +50^{\circ}\text{C}$
Storage temperature range	$-25^{\circ}\text{C} \dots +70^{\circ}\text{C}$ (excl. batteries)
Climatic class	2z/10/50/70/75% with reference to VDI/VDE 3540

Altitude above sea level	up to 2000m
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### 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

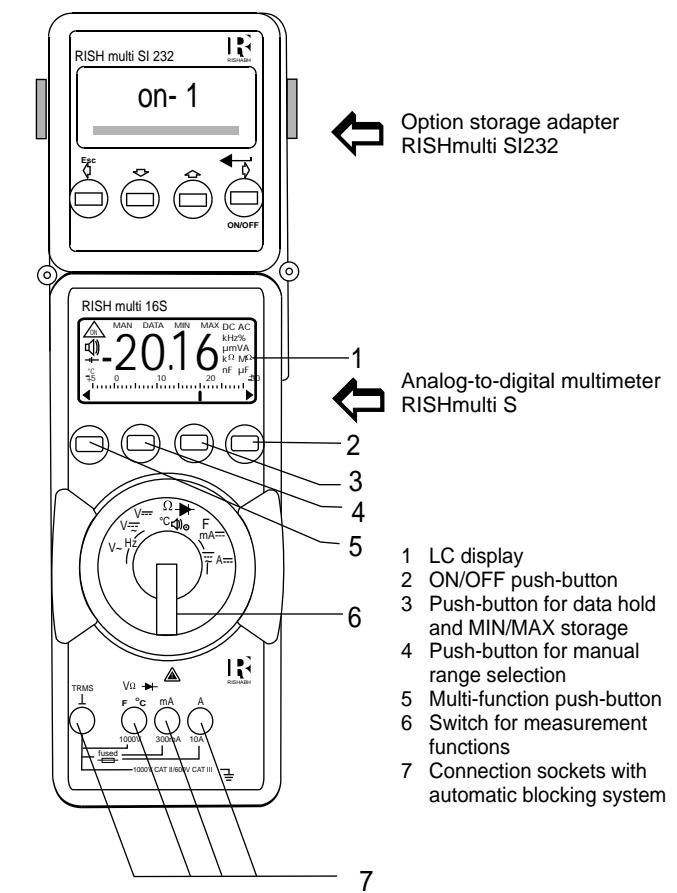
### Scope of delivery

- 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



# Analog - Digital multimeters

## RISH Multi® 12S... 18S

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

Influence quantity	Influence range	Measured quantity / measuring range	Variation <sup>1)</sup> $\pm (\dots\% \text{ of meas. val.} + \dots \text{ digits})$	
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 <sup>2)</sup> ... 300 mA =	0.5 + 1    0.15 + 1	
		3A / 10 (16) A =	0.5 + 1	
		A ~	0.75 + 1    0.75 + 3	
		30 Ω ... 21 °C and +25 °C... + 40 °C	0.15 + 1    0.15 + 2	
		300 Ω	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 <sup>3)</sup> ... 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	
		15 Hz... < 30 Hz	---	
		30 Hz... < 45 Hz	---	
		> 65 Hz... 400 Hz	---	
		> 400 Hz... 1 kHz	---	
		> 1 kHz... 20 kHz	---	
Frequency of the measured quantity	3... 300 V ~	15 Hz... < 30 Hz	1.0 + 3	
		30 Hz... < 45 Hz	0.5 + 3	
		> 65 Hz... 1 kHz	2.0 + 3    0.5 + 3	
		> 400 Hz... 20 kHz	2.0 + 3    1.0 + 3	
		15 Hz... < 30 Hz	---	
		30 Hz... < 45 Hz	---	
		> 65 Hz... 1 kHz	---	
		> 400 Hz... 20 kHz	---	
		15 Hz... < 45 Hz	---	
		30 Hz... < 45 Hz	---	
Waveform of the measured quantity	A~	15 Hz... < 30 Hz	1.0 + 3	
		30 Hz... < 45 Hz	0.5 + 3	
		> 65 Hz... 1 kHz	3.0 + 3    2.0 + 3	
		> 400 Hz... 20 kHz	2.0 + 3    1.0 + 3	
		15 Hz... < 45 Hz	---	
Crest factor CF	V ~ <sup>4)</sup> , A~ <sup>4)</sup> CF > 3...5	15 Hz... < 30 Hz	1.0 + 3	
		30 Hz... < 45 Hz	0.5 + 3	
		> 65 Hz... 1 kHz	2.0 + 3    1.0 + 3	
		> 400 Hz... 20 kHz	2.0 + 3    1.0 + 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	Variation <sup>1)</sup> $\pm (\dots\% \text{ of meas. val.} + \dots \text{ digits})$	
Temperature	-10 °C... + 21 °C and +25 °C... + 40 °C	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	
		V ~ <sup>4)</sup> , A~ <sup>4)</sup>	± 1% of rdg.	
		CF > 3...5	± 3 % of rdg.	
		15 Hz... < 30 Hz	---	
		30 Hz... < 45 Hz	---	
		> 65 Hz... 400 Hz	---	
		> 400 Hz... 1 kHz	---	
		> 1 kHz... 20 kHz	---	
		15 Hz... < 45 Hz	---	
		30 Hz... < 45 Hz	---	
		> 65 Hz... 1 kHz	---	
Frequency of the measured quantity	3... 300 V ~	15 Hz... < 30 Hz	1.0 + 3	
		30 Hz... < 45 Hz	0.5 + 3	
		> 65 Hz... 1 kHz	2.0 + 3    0.5 + 3	
		> 400 Hz... 20 kHz	2.0 + 3    1.0 + 3	
		15 Hz... < 45 Hz	---	
Waveform of the measured quantity	A~	15 Hz... < 30 Hz	1.0 + 3	
		30 Hz... < 45 Hz	0.5 + 3	
		> 65 Hz... 1 kHz	3.0 + 3    2.0 + 3	
		> 400 Hz... 20 kHz	2.0 + 3    1.0 + 3	
		15 Hz... < 45 Hz	---	
		30 Hz... < 45 Hz	---	
		> 65 Hz... 1 kHz	---	
		> 400 Hz... 20 kHz	---	
		15 Hz... < 45 Hz	---	
		30 Hz... < 45 Hz	---	
The permissible crest factor CF of the AC quantity to be measured is a function of the displayed value :				

# Analog - Digital multimeters

## RISH Multi® 12S... 18S

Influence quantity	Influence range	Measured quantity / measuring range	Variation <sup>1)</sup> $\pm (\dots\% \text{ of meas. val.} + \dots \text{ digits})$	
Temperature	-10 °C... + 21 °C and +25 °C... + 40 °C	V =	0.05 + 3	
		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	
		15 Hz... < 30 Hz	---	
		30 Hz... < 45 Hz	---	
		> 65 Hz... 400 Hz	---	
		> 400 Hz... 1 kHz	---	
		> 1 kHz... 20 kHz	---	
		15 Hz... < 45 Hz	---	
		30 Hz... < 45 Hz	---	
Frequency of the measured quantity	1000 V ~	15 Hz... < 30 Hz	1.0 + 20	
		30 Hz... < 45 Hz	1.0 + 20	
		> 65 Hz... 1 kHz	2.0 + 20	
		> 400 Hz... 20 kHz	2.0 + 20	
		15 Hz... < 45 Hz	---	
Waveform of the measured quantity	A~	15 Hz... < 30 Hz	1.0 + 20	
		30 Hz... < 45 Hz	1.0 + 20	
		> 65 Hz... 1 kHz	3.0 + 3    2.0 + 3	
		> 400 Hz... 20 kHz	2.0 + 3    1.0 + 3	
		15 Hz... < 45 Hz	---	
The permissible crest factor CF of the AC quantity to be measured is a function of the displayed value :				

### 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	from ∞ to 50% of the upper range limit
nF, µF, °C	0.7 s	1.5 s	max. 3 S
300 Hz, 3kHz		max. 2 S	
30, 100kHz		max. 0.7 S	
% (1 Hz)		max. 0.9 S	
% (>10 Hz)		max. 2.5 S	

Measured quantity measuring range	Response time of analog indication	Response time of digital display	Leap function of the measured quantity


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