

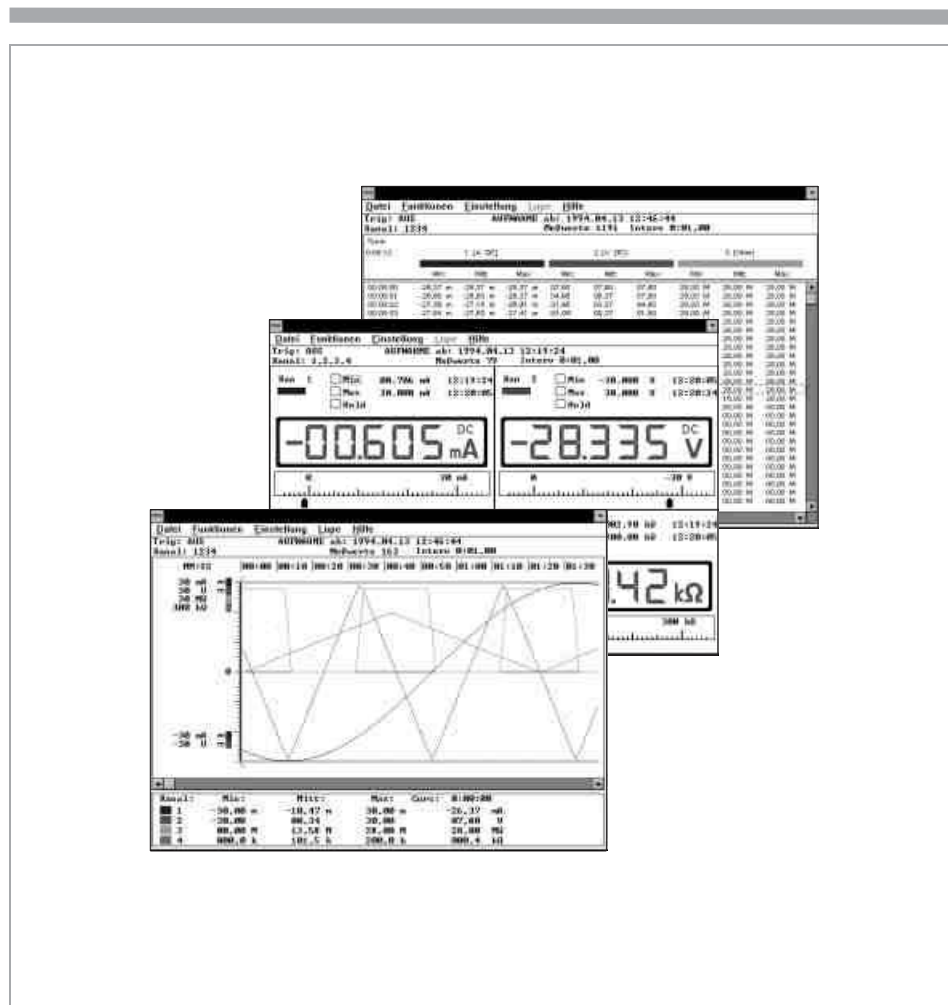
# Operating Instructions



## RISHCom 100

Data Logging and Analyzing Software

Code : 15030895  
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## 1 Introduction

**RISHCom100** is a powerful software product for use under WINDOWS 3.1 or higher.

The software offers a user-friendly method for recording, saving, displaying and documenting data from up to 10 multimeters.

The display of the data is in multimeter, chart recorder or data logger format.

The measurement data are saved for further processing in ASCII format.

The memory interface allows the direct transmission of measuring data to the PC as well as the storing of data on site and the subsequent transmission of the data to the PC.

The software can be run in different languages.

Device drivers and sample programs are also supplied to enable the user to program his own applications.

These drivers are automatically matched to your hardware when the particular software package is installed.

## 2 System Requirements

- IBM AT-compatible 80386 PC with at least 4 MB main memory
- Hard disk with at least 10 MB available storage
- VGA monitor or better
- MS WINDOWS 3.x / 95 / NT / 98
- 1 serial interface COM1 / COM2 / COM3 / COM4
- Multimeter with adapter, up to 10 multimeters, as required
- Memory adapter SI232

### 3 Connection and initial start-up

#### 3.1 Connection

The screw connection between interconnected memory adapters merely secures the mechanical connection between memory adapters. In order to prevent damage, disconnect the memory adapters before transporting them.

- ⇨ Connect the nine-pin D-SUB interconnecting cable to a free COM interface (Com1-Com4) of your PC.
- ⇨ Plug the other end of the cable into the **left** side of the interface memory adapter. Plug the **other** memory adapters into the **right** side.
- ⇨ Secure the connection between the separate adapters by tightening the screws on the connectors.
- ⇨ Attach the interface adapter to your multimeter.



#### Attention

The housing of the memory adapter consists of electrically conductive material. Do not touch it with live parts.

#### 3.2 Initial start-up

Before anything is transmitted to the PC the address of the memory adapter has to be set and the memory adapter has to be adjusted to the transmission mode (PC or online). (refer to manual operation of the memory adapter).

If more than one memory adapter is used, the same transmission speed must be selected for all devices.

If **more than 4** memory adapters are used in the **online mode**, a transmission speed of **19200 Baud** must be selected, in order to assure interference-free data transfer.

- ⇨ Before starting a measurement switch the multimeters to data transmission mode by pressing the **DATA** and **ON** buttons simultaneously.
- ⇨ Check the set addresses of the memory adapters.
- ⇨ Start the PC and the **RISHCom 100** program.  
All connected memory adapters are addressed via the serial interface, and a bidirectional connection is automatically established with the PC (see function **PC** Chapter 4.6.1, page 9 and Chapter 4.8.18, page 17).

- ⇒ Within the menu "**Setup / Channels**" inside the field "**Input Setup**" click onto "**Adapters**" and select the appropriate interface and transmission speed for your system.
- ⇒ This menu allows you to select more setup choices for the display, like number of active channels, colors and display mode.
- ⇒ The menu "**Setup / Device...**" allows you to set the parameters of the individual memory adapters and synchronize the time and the baud rate.
- ⇒ For performing a measurement click "**Setup / Device...**" Click on "**Set mode to online.**" thereby switching Adapter to **online** mode.
- ⇒ Test the data transmission by clicking onto the command button "**TEST**" (menu: **setup/channels**).
- ⇒ Save the setup by clicking onto "**Setup / Save Setup**".  
This command saves all of the settings selected in the "Settings" menu. Now you can perform measurements with the options selected within the setup.
- ⇒ After selecting "**File / Start Measuring**" the measurement values are transmitted to the PC and displayed as selected in the "**Setup**" menu.

## 4 Manual Operation of the Memory Adapter

### 4.1 Operating Elements

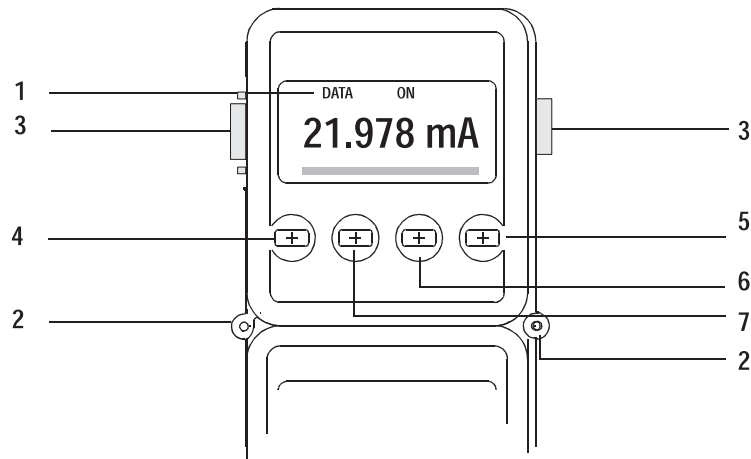


Figure 4.1 Operating Elements of the Memory Adapter

- 1 **LCD Display**  
Display of the respective item on the menu during manual operation of the memory adapter.
- 2 **Connection between two memory adapters** with screw fastening.
- 3 **RS 232-Interface**  
The RS 232-data interface links the memory adapters with each other and also serves as a link to the PC.
- 4 **ESC-Key**  
For escaping from the respective menu level used at the time and returning to the next highest menu level.
- 5 **ON/OFF Key; ENTER-Key**  
Key for switching on/off and for input acknowledgement of a menu item. **Also it can be switched on by pressing any key.**
- 6 **UP-Key**  
Key for choosing single menu items in the direction of flow and for increasing values.
- 7 **DOWN-Key**  
Key for choosing single menu items against the direction of flow and for decreasing values.



#### Note

By means of a double-key short cut operation it is possible to choose different functions (Chapter 4.6.1, page 9 "Short cut Functions").

## 4.2 Display

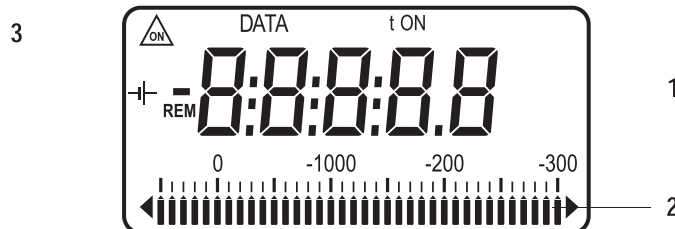


Figure 4.2 **LCD** displays of the memory adapter

### 1 Digital Display

The 7 segment liquid crystal-display indicates the current menu item when the memory adapter is operated manually.

When the saved data are viewed, the digital display records the measured values (menu item "**reCALL**", Chapter 4.8.16, page 16).

### 2 Analog Display

The filled space in the memory and the actual writing position in the memory at the time are represented on the analog display.

When the PC is still in operation the memory space still available can be estimated by means of the analog display.

As long as an indicator arrow shows up on the left side of the analog display it is possible to save data.

When the saved data is viewed the analog display records the measured values (menu item "**reCALL**", Chapter 4.8.16, page 16).

### 3 Additional Characters

The additional characters appearing on the display indicator signify the following:

- **DATA** flashes when data is received from the multimeter.
- **REM** flashes when data is received from the PC.
- The **ON-triangle appears** when data is transferred from the multimeter to the memory.
- The **ON-symbol** appears when the trigger condition (level) has been met. If no trigger has been set, the ON-symbol appears as soon as data are received.
- The **left overflow arrow** always flashes when data is transferred to the memory.
- The **t-symbol** appears when a time trigger is expected.
- The **battery symbol** appears when the batteries have relinquished two thirds of their capacity. The remaining capacity is sufficient to store data for another 24 hours or more, depending on the selected sample interval.

### 4.3 Switching on the memory adapter

To switch on the memory adapter briefly press the right **ON/OFF** key. The analog scale with the current status of "**Memory filled**" (pointers indicate the memory occupied) and the last menu appear on the LCD display. The memory adapter is ready for operation.

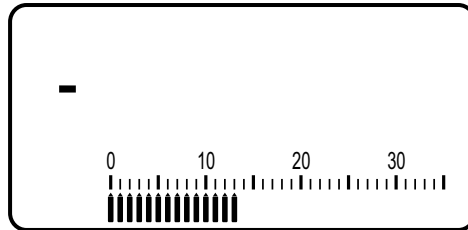


Figure 4.3 Basic display

### 4.4 Switching off the memory adapter

To switch off the memory adapter press the yellow ESC-key until the basic display appears (see above). Then press the right **ON/OFF** key for longer than one second in order to switch off the memory adapter. The memory adapter switches off automatically when it has not been attended to or without data reception for longer than 10 minutes (exception: time display menu).

### 4.5 Changing batteries

The memory adapter is equipped with two 1.5 Mignon cells according to IEC R 6. To change batteries loosen both screws at the bottom of the Base. The batteries are situated in a holder more or less in the middle of the adapter card. Remove the complete set of used batteries and put in two 1.5 V Mignon cells, the poles fitted with the correct ends to the corresponding symbols. Place back the bottom of the Base and screw it on again.



#### Attention

If you don't want to lose the saved data when changing batteries, connect the memory adapter to a PC and start **RISHCom 100**. In this way the memory adapter is supplied with power via the RS 232 data interface while the batteries are being changed.



## 4.6 Operation

The memory adapter can be put into operation by means of the input keys on the unit, or, more conveniently, via the **RISHCom 100** software.

When the adapter is operated via its key pad the respective operating point of the operating menu is shown on the LCD display.


The most important functions of the operating menu can also be called up directly via a double key short cut operation.

### 4.6.1 Short cut Functions

Three important functions are obtainable via a double key operation.

For this keep the **yellow** key **ESC** pressed and at the same time **one** of the three respective other keys.

#### Starting local data recording (without PC) (Function "StorE")

**Short cut operation:** Keep yellow **ESC** key pressed +  key for each data recording

**Display:** *nn.n*

nn.n = percentage of memory used.

#### Bi-directional Connection to PC (Function PC)

**Short cut operation:** Keep yellow **ESC** key pressed +  key additionally

**Display:** *PC-nn*

nn = Set address of the memory adapter.

With this type of operation the memory adapter's parameters can be set via the interface of the PC. Furthermore the stored measuring data can be transferred to the PC.



#### Attention:

Different addresses have to be set for all connected memory adapters (Chapter 4.8.11, page 14).



#### Note:

If memory adapters are connected to a PC via the serial interface they are addressed while the PC is turned on and an automatic bi-directional connection to the PC is established.

Within **RISHCom 100** the adapters can be synchronized with the menu item "**Setup / Device...**" or they can be addressed individually via the respective address.

#### Connection to PC without intermediate saving (Function Online)

**Short cut operation:** Keep yellow **ESC** key pressed +  key additionally

**Display:** *on-nn*

nn = Set address of the memory adapter.  
During this type of operation data is transmitted to the PC without activating by the PC (unidirectional).



**Attention:**


Different addresses have to be set for all connected memory adapters (Chapter 4.8.11, page 14).






**Attention:**

In on-line mode, do not leave the adapter-multimeter system unconnected to PC and also ensure that **RISHCom 100** is receiving data. Failing to do this will result in lesser battery life.


#### 4.6.2 Menu Operation



The  key confirms a menu item and opens the operating level beneath it.

The same key with the symbol  also moves the cursor to the right, e.g. in the case of time settings.

The  and  keys are used for selecting a menu item in the direction of flow or for numerical decrementing or incrementing.

The yellow **ESC** key leaves the current menu level and returns to the next highest level.

The same key with the symbol  also moves the cursor to the left, e.g. in the case of time settings.

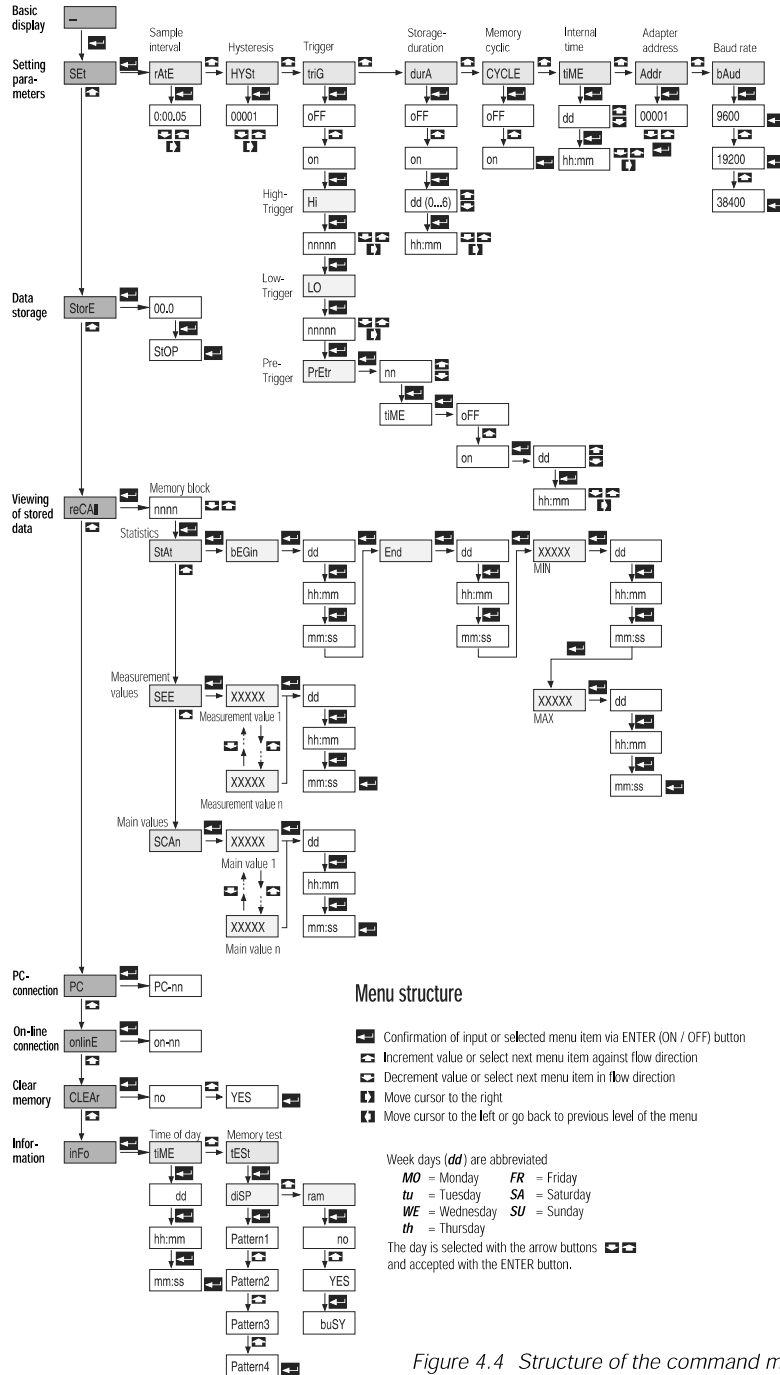
Regarding numerical settings such as trigger levels and time, the  and  keys are used for selecting the digit to be entered.



**Note:**

If a menu item has been completed, the basic display appears automatically.

## 4.7 Structure of the command menu



### Menu structure

- Confirmation of input or selected menu item via ENTER (ON / OFF) button
- Increment value or select next menu item against flow direction
- Decrement value or select next menu item in flow direction
- Move cursor to the right
- Move cursor to the left or go back to previous level of the menu

Week days (**dd**) are abbreviated

**MO** = Monday    **FR** = Friday  
**tu** = Tuesday    **SA** = Saturday  
**WE** = Wednesday    **SU** = Sunday  
**th** = Thursday

The day is selected with the arrow buttons and accepted with the ENTER button.

Figure 4.4 Structure of the command menu

## 4.8 Description of the Menu Items

### 4.8.1 Setting the Sampling Interval

Operating Order: **SEt**  **rAtE**  **m:ss.hh**  

Setting: m = minutes  
ss = seconds  
hh = hundredths of a second

Description: The sampling interval sets how frequently data is stored in the memory adapter.



#### Note:

With a long sampling you can record for a longer time than with a short one, which, however, is disadvantageous for the resolution in time of the data. As only differences are saved, it is recommendable to select a relatively short interval for an optimal data representation and to set the sensitivity (hysteresis) as large as possible.

### 4.8.2 Setting the Hysteresis

Operating Order: **SEt**  **rAtE**  **HYSt**  **nnnn**  

Setting: nnnn = Hysteresis in digits

Description: The hysteresis setting allows an optimally efficient memory usage. The memory adapter saves new measuring data in a new memory number only when they differ from the previously saved data by more than the set hysteresis.



#### Recommendation:

With a sampling interval of less than 0.5 seconds it is recommendable to chose the hysteresis greater than approximately 5 digits at constant input signal due to the noise of the measuring data. In the case of longer sampling intervals averaging takes place in the memory adapter whereby the noise is eliminated to a great extent. The hysteresis should therefore be selected with a value greater than 2.



#### Note:

The hysteresis is independent of the measuring range. If the expected range of the measuring data is known, it is recommended to set the range of the multimeter appropriately. This also prevents the data to be lost or saved incorrectly through the automatic ranging in the multimeter.

#### 4.8.3 Switching off the internal trigger

Operating Order: **SEt** **rAtE** **trIG** **on** **oFF**

Setting: oFF= Trigger Off

Description: The internal trigger is switched off.

#### 4.8.4 Activating the internal trigger immediately

Operating Order: **SEt** **rAtE** **trIG** **oFF** **on**

**HI** **nnnn** **LO** **nnnn**

**PrEtr** **nn** **tiME** **oFF**

Setting: nnnn = Upper / lower trigger level in digits

nn = Pre trigger memory in percent

Description: The internal trigger is switched on. After commencement of the recording (**StorE** command) data is recorded immediately. A trigger event takes place when the HI-level has been exceeded or readings have fallen below the LO-level. After the trigger event (100 - PrEtr) % of the memory are still filled. Then the data recording ends automatically.

#### 4.8.5 Commencement of recording at set time, switching on trigger subsequently

Operating Order: **SEt** **rAtE** **trIG** **oFF** **on**

**HI** **nnnn** **LO** **nnnn**

**PrEtr** **nn** **tiME** **oFF** **on**

**dd** **hh:mm**

Setting: dd = day of the week of recording commencement

hh:mm = set time in hours and minutes for commencement of the recording

nnnn = Upper / lower trigger level in digits

nn = Pre-trigger memory in percent

Description: The recording commences at the set time. Subsequently the internal trigger is activated.

A trigger event takes place when the HI-level has been exceeded or readings have fallen below the LO-level. After the trigger event, (100 - PrEtr) % of the memory are still filled. The data recording ends automatically.

#### 4.8.6 Recording without time limit

Operating Order: **SEt** **rAtE** **durA** **on** **oFF**

Setting: oFF= Time limit switched off

Description: No time limit is set on Recording.

Conditions: 1) If Cyclic = OFF  
Recording will stop when memory is filled.  
2) If Cyclic = ON  
Recording will not stop when memory is filled, but will continue to overwrite cyclically. i.e. The old data will be overwritten

#### 4.8.7 Recording with time limit

Operating Order: **SEt** **rAtE** . . . **dUrA** **ON**   
**dd** **hh:mm**

Setting: d = Number of days (adjustable: 0 ... 6)  
hh = Number of hours  
mm = Number of minutes

Description: The recording stops after the set time has passed.

#### 4.8.8 Cyclic Recording

Operating Order: **SEt** **rAtE** . . . **CYCLE** **OFF** **on**

Setting: on = Cyclic storage on

Description: When the memory is full, the oldest data is overwritten with new data.

#### 4.8.9 Recording only until memory is full

Operating Order: **SEt** **rAtE** . . . **CYCLE** **on** **OFF**

Setting: OFF = Cyclic storage off

Description: When the memory is full, the recording of data stops.

#### 4.8.10 Setting the current day and time

Operating Order: **SEt** **rAtE** . . . **tiME** **dd** **hh:mm**

Setting: dd = Day of the week  
hh:mm = time in hours and minutes

Description: The current day of the week and the current time can be set.

#### 4.8.11 Setting the address of the memory adapter

Operating Order: **SEt** **rAtE** . . . **Addr** **nn**

Setting: nn = 1 ... 15

Description: If several memory adapters are connected to the PC, every adapter requires its own address.  
Address 1 should be set for the first adapter, address 2 for the second adapter etc.



**Note:**

If only one adapter has been connected, always set Address as "1"

#### 4.8.12 Baud rate

Operating Order: **SEt** **rAtE** . . . **bAud** **19200**

Setting: 9600= baud rate: 9600 baud (default setting)  
19200= baud rate: 19200 baud  
38400= baud rate: 38400 baud

Description: Transmission speed between the memory adapter and the PC can be selected.



#### Note:

If more than one memory adapter is used, the same transmission speed must be selected for all devices.

If **more than 4** memory adapters are used in the **online mode**, a transmission speed of **19200** Baud must be selected, in order to assure interference-free data transfer.

#### 4.8.13 Starting and interrupting the manual data recording (without PC)

##### Starting the manual data recording

Preparation: Pressing simultaneously **DATA** and **ON** the transmission of the measured data is activated with the multimeter switched off.  
Setting the manual data recording via the function **SEt** and **rAtE** and the following display appears: **--:--:--**. After switching on press **ESC** and **ON** simultaneously. The percentage of used memory is displayed, e.g. **00.0** with empty memory and **DATA** and **ON** is displayed briefly.

Operating Order: **StorE** **00.0**, **ESC StorE** **00.1**, **ESC StorE** **nn.n**

Setting: nn.n = percentage of used memory, 00.1 ... 99.9 = 0.1 % ... 99.9 %

Description: Starting the manual data recording. Activation of the memory block to store the data. New memory blocks get continuous numbers. Pressing the **ESC** key the memory function **StorE** is activated and the measured data is taken in the actual memory block with the key. Also the percentage **nn.n** of the used memory is displayed.

**Short cut operation:** Keep yellow **ESC** key pressed + key for each data recording.

##### Interrupting the manual data recording

⇨ Press twice the **ESC** key.

The measured data can be requested via the functions **reCAll** and **SEE**.

The data recording is continued by pressing simultaneously the **ESC** key and the key.

#### 4.8.14 Terminating manual data recording (without PC)

Operating Order: **StorE** **nn.n** **StOP**

Setting: StOP = End of data recording

Description: Local data recording terminates, the percentage of the memory used is displayed.

#### 4.8.15 Overview of the saved data

Operating Order: *rECall* [↩] *bbbb* [↓] [↑] [↩] *Stat* [↩]

*bEGin* [↩] *dd* [↩] *hh:mm* [↩] *mm:ss* [↩] *End* [↩] *dd* [↩] *hh:mm* [↩] *mm:ss* [↩]

*MIN xxxxx* [↩] *dd* [↩] *hh:mm* [↩] *mm:ss* [↩]

*MAX xxxxx* [↩] *dd* [↩] *hh:mm* [↩] *mm:ss*

Setting: *bbbb* = Block number of the data in the memory  
*bEGin* = Starting time of the recording of the block  
*End* = Ending time of the recording of the block  
*dd* = day of the week  
*hh:mm* = time in hours and minutes  
*mm:ss* = time in minutes and seconds  
*MIN* = minimum value (display indication)  
*MAX* = maximum value (display indication)

Description: An statistical overview is given of a selectable data block. The following are given in the order: block number, time of commencement and termination of recording, minimum and maximum values with date and time

#### 4.8.16 Viewing of the recorded data

Operating Order: *rECall* [↩] *bbbb* [↓] [↑] [↩] *Stat* [↑] *SEE* [↩]

*(bEGin) ... nnnnn<sub>1</sub> ... nnnnn<sub>m</sub> ... (End)* [↓] [↑] [↩]

*dd* [↩] *hh:mm* [↩] *mm:ss*

Setting: *bbbb* = Block number of the data in the memory  
*SEE* = Viewing of every value  
*bEGin* = marker of the initial value in the memory block  
*End* = marker of the end of recording in memory block  
*nnnnn<sub>1</sub>...<sub>m</sub>* = measuring value 1 ... m  
*dd* = day of the week  
*hh:mm* = time in hours and minutes  
*mm:ss* = time in minutes and seconds

Description: Individually stored measurement data are displayed from a selected memory block with this function.  
The individual values within the block can be selected with the [↓] [↑] keys, either in the forward or the reverse direction.  
The displays *bEGin* and *End* identify the beginning and the end of the memory block.  
The time of recording (week day with corresponding time of day) is displayed when the [↩] key is pressed repeatedly.
















#### Note:




Pressing the [↑] or [↓] key for a longer period speeds up the display in the forward direction and against the storage direction, however at a slower speed than in the forward direction.



#### 4.8.17 Viewing of the main values of a memory block



Operating Order: **rECall**  **bbbb**    (Select memory block)  
**StAt**  **SEE**  **SCAN**   
**(bEGin)** ... **xxxxx<sub>1</sub>** ... **xxxxx<sub>m</sub>** ... **(End)**    (Select main value)  
**dd**  **hh:mm**  **mm:ss**  (Select recording time)

Setting: **bbbb** = Block number of the data in the memory  
**SCAN** = Skipping intermediate values (short cut examination)  
**bEGin** = marker of the initial value in the memory block  
**End** = marker of the end of recording in memory block  
**nnnnn<sub>1</sub>...<sub>m</sub>** = measuring value 1 ... m  
**dd** = day of the week  
**hh:mm** = time in hours and minutes  
**mm:ss** = time in minutes and seconds

Description: The main recorded values of a memory block are displayed. The values in-between are omitted. This function allows a rapid scanning of the complete memory block.  
The individual values stored in the memory block can be selected with the  and  keys, in either the forward or the reverse direction.  
The displays **bEGin** and **End** identify the beginning and the end of the memory block.  
The time of recording (week day with corresponding time of day) is displayed when the  key is pressed repeatedly.



#### Note:

Pressing the  or  key for a longer period speeds up the display in the forward direction and against the storage direction, however at a slower speed than in the forward direction.

#### 4.8.18 Bi-directional connection to the PC

Operating Order: **PC**  **PC-nn**

Setting: **nn** = set address of the memory adapter

Description: In this mode the memory adapter parameters can be set via the interface of the PC. Additionally the recorded measuring data can be transferred to the PC.


**High-Speed Operation:** Keep the yellow **ESC** key pressed + the key  additionally



#### Note:

Different addresses have to be set on all connected memory adapters (Chapter 4.8.11, page 14).

#### 4.8.19 Connection to the PC without intermediate saving

Operating Order: **onlinE**  **on-nn**

Setting: nn = set address of the memory adapter

Description: In this mode data is transmitted to the PC without activating the PC (unidirectional).

**High-Speed Operation:** Keep the yellow **ESC** key pressed + the  key additionally



##### Note:

Different addresses have to be set for all connected memory adapters (Chapter 4.8.11, page 14).  
Up to 2 adapters can be used in this operating mode without batteries installed.

#### 4.8.20 Clearing memory

Operating Order: **CLEAR**  **no**  **YES** 

Setting: no = Memory remains unchanged.  
YES = Memory is cleared **without additional** safety check.

Description: This function deletes all of the contents of the memory adapter.



##### Attention:

Please ensure that all saved measuring data you will still need in future have been transferred to a PC and put on file **before** you delete the entire memory of the adapter.

#### 4.8.21 Display of the current day of the week and time

Operating Order: **Info**  **tiME**  **dd**  **hh:mm**  **mm:ss**

hh:mm = current time in hours and minutes

mm:ss = current time in minutes and seconds

Setting: dd = Current day of the week

**MO** = Monday

**tu** = Tuesday

**We** = Wednesday

**th** = Thursday

**Fr** = Friday

**SA** = Saturday

**SU** = Sunday

hh:mm = Current time in hours and minutes

mm:ss = Current time in minutes and seconds

Description: The current day of the week and the current time is displayed.

#### 4.8.22 LCD Test

Operating Order: **Info** **tiME** **tEst** **diSP** **Muster 1** **Muster 2** ...

Description: All possible characters and symbols are displayed at the LCD during LCD testing after the display test has been acknowledged.  
With the or key several displays can be selected.

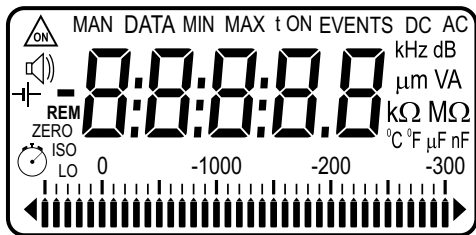


Figure 4.5 Display LCD Test



#### Note

The software version number is displayed in the display test as a numerical value.

#### 4.8.23 Testing the Internal Memory

Operating Order: **Info** **tiME** **tEst** **diSP** **rAM** **no** **YES** **buSY**

Setting: **no** = Memory is not tested  
**YES** = The memory test is started without a renewed safety question

Description: After the "**YES**" confirmation with the **ENTER** key the entire memory of the adapter is tested automatically. The duration of the memory test is approximately 3 minutes.

During the memory test **all** backed-up data in the memory is deleted.

During the memory test "**busy**" appears on the display.

The end of the test is indicated by "**PASS**".

By pressing the **ENTER** key the test display reappears



#### Attention:

Please make sure that all saved measuring data you might still need is transferred to a PC and put on file **before** you do a memory test of the adapter.

## 5 RISHCom 100

### 5.1 Installation of RISHCom 100

**RISHCom 100** is installed automatically.

- ⇨ Insert the **PROGRAM CD** into **CD-Drive**
- ⇨ Change to the **ROOT** directory for the disk drive into which you inserted the **CD**
- ⇨ Read the **README** file which contains the most recent notes and corrections. Use therefore the MS-WINDOWS notebook.
- ⇨ Start installation by entering **INSTALL <ENTER>**
- ⇨ Now follow the instructions shown on the screen

### 5.2 Program documentation / Operating notes

Get "Help":


- ⇨ Within the program you can call up the documentation and the operating notes at any time via the **F1** key.

Print out "Help":

- ⇨ The program documentation can be read in the help texts (".HLP" files) or printed out via the ".WRI" files.  
To print out start the **WRITE** editor via the ".WRI" files.  
Open the file **MULTIENG.WRI** and print out the help texts.

### 5.3 Starting RISHCom 100

When you have successfully installed the software, you should switch at least one of the connected multimeters to data transmission before starting **RISHCom 100**. Set the multimeter to data transmission by simultaneously pressing the **DATA** and **ON** keys.

- If the multimeter is attached to a memory adapter, switch the adapter to online and connect it to a free COM port. The **online** mode is established by simultaneously pressing the **yellow ESC** key and the  key (Chapter 4.6.1, page 9).



#### Note:

On all connected memory adapters different addresses have to be set (Chapter 4.8.11, page 14).

## 6 Writing Your Own Programs

This chapter is intended only for experienced software programmers.

**RISHCom 100** is a simple program for displaying and recording measured values. You can write your own dedicated program for your measurement task under DOS or WINDOWS. The software interface to the multimeter is formed by the drivers supplied with the software. These can be addressed from any programming language (in a similar manner to the COM1:, COM2: and LPT1: drivers supplied with DOS).

### 6.1 Programs under DOS

Simple programs can be written more quickly under DOS than under WINDOWS. Sample programs have been written in source code in C and GWBASIC supplied together with DOS and these can be found in the directory under which you have installed

**RISHCom 100**.

Language	Source File	EXE-File
BASIC	MEXB.BAS	
C	MEXC.C	MEXC.EXE

Before a DOS program can be started, the driver must be installed.

The driver was configured for your hardware when **RISHCom 100** was installed and can be found on your directory. Copy the driver to your ROOT directory and alter your CONFIG.SYS file:

DEVICE = name.sys, for which

name.sys	Hardware terminal	In the program address with:
MC1DOS.SYS	Multimeter to COM1: or COM2:	CCM1 for COM1: and CCM2 for COM2
MC4_5DOS.SYS	Interface card installed on INT5	CXM1, CXM2, CXM3, CXM4
MC4_7DOS.SYS	Interface card installed on INT7	CXM1, CXM2, CXM3, CXM4

The multimeter data is coded (see below). The sample program shows how the data can be decoded into a character string.

### 6.2 Programs under WINDOWS

The driver for WINDOWS will have already been installed when **RISHCom 100** was installed. The drivers resemble those for the serial interface COM1: and COM2: and should be addressed in the same way.

### 6.3 Data Format for the Interface Signals

The multimeter sends out interface signals after every measurement. With current, voltage and resistance measurements 20 data packets are transmitted per second.

Most of the packets contain measured values, but some give information on the settings on the multimeter.

The data is transmitted at a baud rate of 8192 Hz in 6 bit lengths, no parity bit and one stop bit.

The data of the memory adapter is transmitted with 9600 baud, 8 bits, no parity bit, and one stop bit.

The multimeter data is preceded with the adapter address with bits 6 and 7 set to one.

#### 6.3.1 Data format *RISHMulti* 12S / 13S / 14S / 15S / 16S

##### 1. V, A, Ohm, Diode Functions

###### a) Measured data

Output each time the analog display is refreshed.

Byte-No.	Output Unit	Bit5	Bit4
1	Decimal point, sign, AC/DC	0	1 <sup>1)</sup>
2	5th digit (not in LCD)	1	1 <sup>2)</sup>
3	Units	1	1
4	Tens	1	1
5	Hundreds	1	1
6	Thousands	1	1

<sup>1)</sup> First value in a determination of ten: Bit4 = 1, Bit5 = 0

Following nine values: Bit4 = 0, Bit5 = 1

<sup>2)</sup> With an overrun the 5th digit = 0

###### b) Instrument Setting and Special Characters

With resistance measurements output is after every second measured value, with voltage, current and diode measurements it is after every 8th measured value.

Byte-No.	Output Unit	Bit5	Bit4
1	Device code	0	0
2	Type of current and measured variable	1	1
3	Special character 1	1	1
4	Special character 2	1	1
5	Decimal point, sign, AC/DC	1	1

## 2. Hz, %, F Functions (RISHMulti 15S and 16S)

Measured data, device setting and special characters. Output each time the digital display is refreshed.

Byte No.	Output Unit	Bit5	Bit4
1	Device code	0	0
2	Type of current and measured variable	1	1
3	Special character 1	1	1
4	Special character 2	1	1
5	Dec. point, sign, AC/DC	1	1
6	5th digit (always 0)	1	1
7	Units	1	1
8	Tens	1	1
9	Hundreds	1	1
10	Thousands	1	1

### Output Units (Bit 0 ... 3)

#### 1. Device code

Device	Code
RISHMulti 12S	0100
RISHMulti 13S	1000
RISHMulti 14S	1001
RISHMulti 15S	1010
RISHMulti 16S	1011

#### 2. Type of Current and Measured Variable

Variable	Code	Variable	Code
mV DC	0001	Ohm, °C	1001
V DC	0010	kOhm	1010
V(AC+DC) <sup>3)</sup>	0011	MOhm	1011
V AC	0100	nF <sup>3)</sup>	1100
Hz <sup>3)</sup>	0101	µF <sup>3)</sup>	1101
kHz <sup>3)</sup>	0110	mA, µA	1110
% <sup>3)</sup>	0111	A	1111
Diode	1000	Leer	0000

<sup>3)</sup> RISHMulti 15S and 16S

## 3. Special Characters 1

Display	Code			
	a	b	c	d
ON	1	0	0	0
Beeper	0	1	0	0
Low Bat	0	0	1	0
Fuse ruptured	0	0	0	1

## 4. Special Characters 2

Display	Code			
	a	b	c	d
MIN	1	0	0	0
MAN	0	1	0	0
DATA	0	0	1	0
MAX	0	0	0	1

## 5. Decimal Point, Sign, AC/DC with Curr., µA, °C

Device	Code
0 0 0 0 √	ab00
0 0 0.0 µA	ab00
0 0 0.0 °C	ab00
0.0 0 0	ab01
0 0.0 0	ab10
0 0 0.0	ab11
No sign	b = 0
- sign	b = 1
DC with current	a = 0
AC with current	a = 1

## 6. Numeric Characters

Code of Bits			
Display	Code	Display	Code
0	0000	6	0110
1	0001	7	0111
2	0010	8	1000
3	0011	9	1001
4	0100	L	1010
5	0101	Blank	1011
		-	1100

### 6.3.2 Data format *RISHMulti18S*

#### 1. V, A, Ohm, Diode, Events Functions

##### a) Measured data

Output each time the analog display is refreshed.

Byte No.	Output Unit	Bit5	Bit4
1	Sign and Range	0	1 <sup>1)</sup>
2	Units	1	1
3	Tens	1	1
4	Hundreds	1	1
5	Thousands	1	1
6	Tenthousands	1	1

<sup>1)</sup> First value in a determination of ten:  
Bit4 = 1, Bit5 = 0  
Following nine values: Bit4 = 0, Bit5 = 1

##### b) Instrument Setting and Special Characters

With resistance measurements output is after every measured value, with voltage, current and diode measurements it is after every 10th measured value. .

Byte No.	Output Unit	Bit5	Bit4
1	Device code	0	0
2	Type of current and measured variable	1	1
3	Special character 1	1	1
4	Special character 2	1	1
5	Sign and Range	1	1

#### 2. Hz, %, F, °C, dB, stop watch Functions

Measured data, device setting and special characters.

Output each time the digital display is refreshed.

Byte No.	Output Unit	Bit5	Bit4
1	Device code	0	0
2	Type of current and measured variable	1	1
3	Special character 1	1	1
4	Special character 2	1	1

Byte No.	Output Unit	Bit5	Bit4
5	Sign and Range	1	1
6	Units	1	1
7	Tens	1	1
8	Hundreds	1	1
9	Millar	1	1
10	Tenthousands	1	1

#### Output Units (Bit 0 ... 3)

##### 1. Device Code

Device	Code
<i>RISHMulti18S</i>	1101

##### 2. Type of Current and Measured Variable

Measured variable	Code	Measured variable	Code
V AC	0001	A DC	1001
V (AC+DC)	0010	mA (AC+DC)	1010
V DC	0011	A (AC+DC)	1011
Ω	0100	Hz	1100
Diode	0101	dB	1101
°C	0110	Events	1110
Farad	0111	Uhr	1111
mA DC	1000	Leer	0000

##### 3. Special Characters 1

Display	Code			
	a	b	c	d
ZERO	1	0	0	0
Beeper	0	1	0	0
Low Bat	0	0	1	0
Fuse ruptured	0	0	0	1



#### 4. Special Character 2 and sub-functions

##### a) All measuring except stop watch

Display	Code			
	a	b	c	d
MAN	1	0	0	0
MIN	0	1	0	0
MAX	0	0	1	0
DATA	0	0	0	1

##### b) Stop watch

Display	Code			
	a	b	c	d
Stop	0	0	0	0
watch ran	0	0	0	1

#### 5. Sign and Range

Measuring Range						Code
300 mV	300 $\Omega$	300 $\mu$ A	3 A	300 Hz	3 nF	a000
3 V	3 k $\Omega$	3 mA	10 A	3 kHz	30 nF	a001
30 V	30 k $\Omega$	30 mA	–	30 kHz	300 nF	a010
300 V	300 k $\Omega$	300 mA	–	100 kHz	3 $\mu$ F	a011
1000 V	3 M $\Omega$	–	–	–	30 $\mu$ F	a100
–	30 M $\Omega$	–	–	–	300 $\mu$ F	a101
–	–	–	–	–	3000 $\mu$ F	a110
–	–	–	–	–	10000 $\mu$ F	a111

Sign	Code
No sign	a = 0
– sign	a = 1

#### 6. Numeric Characters

Code of Byte			
Display	Code	Display	Code
0	0000	6	0110
1	0001	7	0111
2	0010	8	1000
3	0011	9	1001
4	0100	L	1010
5	0101	Blank	1011
		–	1100

With diode measuring identification range like 3 VDC.

With EVENTS, dB and stop watch output of the set voltage range and with  $^{\circ}$ C output of the resistor range.

With EVENTS always output of the current measuring value.

With stop watch output of space ( – – – , – ).

## 7 Technical Data of the Memory Adapter

### Supported Measuring Instruments

*RISHMulti* 12S ... 16S, 18S

### Operating Elements, Operation

LCD-segment-display unit, 4 keys.

Nearly all parameters can be set manually or by means of the interface via a PC.

### Memory Capacity

128 KB CMOS with battery backup. Measured values are stored according to the differential value method (compressed) with adjustable hysteresis. The number of values stored depends on the nature of input and the variations in the input. If more changes occur in the input, less readings are stored or vice-versa. Approximately, 2,00,000 measured values are stored if sample rate is less than or equal to 50 msec, if hysteresis is set to 0 and if the changes in input are minimum.

### Real-time Clock

Battery buffered real-time clock. Max. deviation: 1 min / month.

### Interface

To the multimeter	optically unidirectional receiver, wavelength 950 nm, 8192 baud, 8 bits, no parity, 1 stop bit
To the PC	normal, bi-directional, 9600 baud, 8 bits, no parity, 1 stop bit
Baud rate	adjustable (via interface command and keyboard to 19200 or 38400 Baud)
Number of Adapters	A maximum of 10 data memory adapters interlinkable With simultaneous data recording (online) the number depends on the set baud rate: a maximum of 6 adapters with a baudrate of 19200 baud; a maximum of 4 adapters with a baudrate of 9600 baud

RS 232 Serial port  
(9 pin connector)

**Pin 9** (of RS 232 interface) is used for synchronizing linked up adapters in the PC operation.

**Pin 4 and 7** have to be set on logic 1 by PC

**Pin 3** (PC-TXD) is used for the negative level generation of the RS 232 interface signal PC-RXD.

With exception of the **Pin 1** and the synchronization **Pin 9** all interface **Pins** are looped to further data memory adapters.

**Power Supply:**

Battery

2 x 1.5 V mignon cells;  
dry cells per IEC R6 Type 3006: 1100 mAh.  
Alkali-Manganese acc. to IEC LR6 Type 4006: 2300 mAh.

Operational duration

Alkaline-Manganese cells switched off  
13500 h = 1.5 years (without self discharge of the battery).

Alkaline-Manganese cells switched on

Sampling interval rate	Duration (Approx.)
5 s	500 hr
60 s	1300 hr

Battery test

Automatic indicator of the symbol  $\nabla$  if the serial battery voltage falls below approx. 2.5 V.



**Attention**

If you don't want to lose the saved data when changing batteries, connect the memory adapter to a PC and start **RISHCom 100**. In this way the memory adapter is supplied with power via the RS 232 data interface while the batteries are being changed.

### Electrical Safety

Device with safety extra-low voltage per DIN VDE 0411

Creepage paths and clearance between poles per IEC 61010/ DIN VDE 0411

### Temperature Range / Climate Category

Operating Temperature 0 °C ... + 50 °C

Storage Temperature -25 °C ... + 70 °C

Climate Category 2z/0/50/70/75% in compliance with DIN VDE 3540

### Mechanical Design

Housing made of electrically conductive plastic

Dimensions 135 x 97 x 39 mm

Weight approx. 0.25 kg with battery

Interface to PC:

9-pole Sub-D recessed port at left, threaded

to closest data memory adapter:

9-pole Sub-D recessed plug at right, with knurled-head screw



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