Operating Instructions

PAROtester 2

MADE IN SWITZERLAND

Paper, Foil and Film Reel Tester

Patents pending

proceq

98 05 423E
4th edition

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Contents

1 Important information

1.1 Compatibility

Impact devices type P, PG refer to the earlier PAROtester model. These impact devices can also be used with the PAROtester 2.

Data transfer with PAROLINK 2 is not compatible with the former PAROtester models.

1.2 Do not test objects which are too hard!

PAROtester is designed to test hard-rolled paper, foil and film. Test impacts on other, harder materials will damage the impact body, leading to erroneous results.

1.3 Do not carry out the test too quickly!

If the measuring operation is carried out too quickly, the impact body is additionally accelerated, leading to incorrect measurements. The request "Measure more slowly!" appears on the monitor.
With the next correctly performed test impact, the current hardness profile and the set reel number will re-appear.

2 PAROtester 2 Standard Kit and Names of Parts

Fig. 1

Impact device U with 1.5 m BNC cable
PAROtester 2 display unit with integrated LCD monitor
Carrying strap
6 batteries
Cleaning brush
Carrying case

2.1 Accessories (Optional)
Printer DPU 201GSE with power supply unit, carrying strap and m printer cable, standard test block U
Spare paper (packet of 10 rolls)

2.2 Dimensions and weights

Carrying case complete	520 x 370 x 120 mm	5.8 kg
Display unit	175 x 180 x 80 mm	0.8 kg
Printer DPU 201GSE	135 x 100 x 31 mm	0.4 kg
Power supply unit for printer	68 x 62 x 100 mm	0.7 kg
Impact device U	dia. 45 x 300 mm	0.9 kg
Standard test block U	dia. 130 x 110 mm	9.5 kg

3 Connections and Operating Elements

3.1 Electronic Display Unit

Fig. 2

1 Operating keypad
2 Large LCD with display of L values and hardness curve of the current reel measurements
3 BNC signal input
4 2 pole signal input
5 Carrying rings
6 Signal output RS 232 C
7 Ext. battery connection 9V DC 0.2A
8 Battery compartment
9 Battery compartment cover
10 Top part of housing
11 Bottom part of housing
12 Impact device U

4 Technical Data

4.1 Impact Device Type U

Impact energy	200 Nmm	Impact body	Type U
Max. penetration	4.0 mm	Mass of Impact body	26 g
Contact pressure	120 N	Kalottenradius	25 mm
Impact device diameter	45 mm	Test tip	hardened
Impact device length	300 mm		
Weight	0.9 kg		

4.2 Data for Display Unit

Batteries	6 Mignon cells 1.5 V LR6
Operating time of battery set at 20 °C	approx. 65 hours
Admissible operating temperature	0 °C to +50 °C

4.3 Measuring Principle

When the test is carried out, an impact body is launched by spring force against the test surface from which it rebounds. The impact and rebound velocities are measured. This takes place as follows:
A permanent magnet built into the impact body passes through a coil during the test impact. During the forward and rebound movements, voltages are induced which are proportional to the velocities. The measurement values derived from the impact and rebound velocities are processed in the display device to form the hardness value L.

4.4 Hardness Value "L"

This term, introduced into measuring technology in 1978, is the quotient of the impact body's rebound and impact velocities, multiplied by 1000.

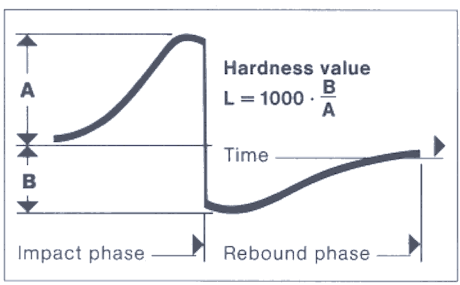


Fig. 3

This hardness value is a 3 digit value; the harder the tested material, the higher the "L" value. The L value is additionally designated with the identifying letters of the impact device.

Example: LU = 671

4.5 Measuring Accuracy PAROtester 2

Measuring accuracy throughout the entire measuring range:	± 6 LU
related to 600 LU:	± 1 %

4.6 Performance Check of the Instruments

The performance check controls the mechanical and electronic functions of the impact device and the display unit PAROtester 2. It is accomplished by measuring the L-value on the standard test block U (see also chap. 7).
The devices are functioning correctly if the indicated mean value X (taken from 3 to 5 impacts on the the standard test block) is within the reference range and the range (R) does not exceed 20 LU.

5 Measuring

The device serial number, the installed software version and the battery state (available measuring duration) appear briefly in the display after pressing the **ON** key.

Then the measuring standby mask appears.

Fig. 4

Fig. 5

ON/OFF	On / Off button
CLEAR	clear last impact
MENU	selection of different input possibilities
START	starts preselected line ends "MENU" level
END	ends MENU input or terminates measuring series

Cursor control

↑	upwards
←	to the left
↓	downwards
→	to the right

5.1 Setting to the Display Unit

From the standby mask, the various required settings can be made by pressing the **MENU** key.

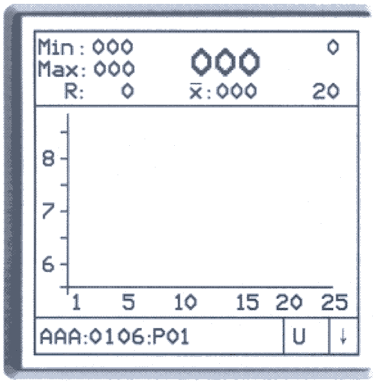


Fig. 6

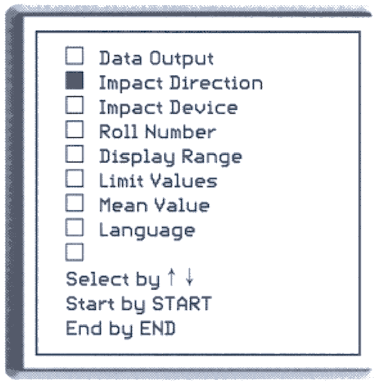


Fig. 7

The preselected settings are retained also after switching off the electronics and re-appear the next time the device is switched on. If several settings are made, the next selection is to be made with **MENU.**

Selecting the Impact Direction

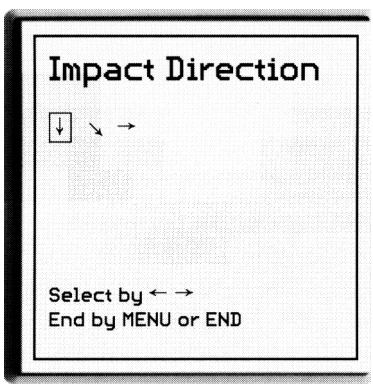


Fig. 8

If an impact direction other than vertically downwards is selected, the indicated values are automatically corrected and stored.

Selecting the Impact Devices

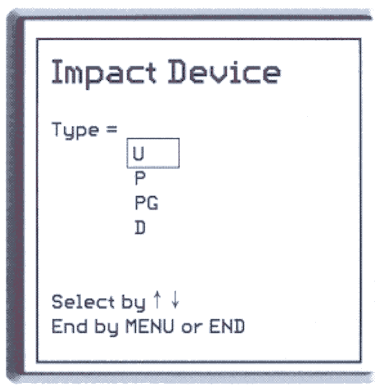


Fig. 9

Selecting the impact devices

Entering Reel Numbers

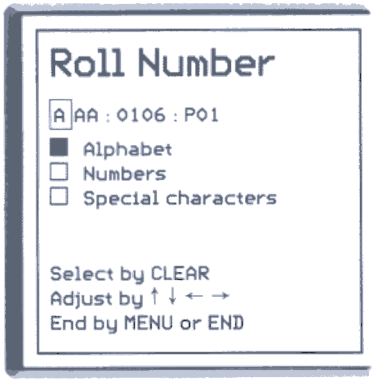


Fig. 10

The maximum length of a reel designation is 15 places. The following characters are available for roll designation:

- alphabetic : A to Z
- numeric : 0 to 9
- special character: [:] , [-]
  space [ ]

PAROtester 2 offers the facility for users to set their own roll designations with consecutive reel numbering (incrementing).

The **cursor** [□] is always positioned at the left hand margin of the display when menu point <**Roll number**> has been selected. A roll designation **can only be entered left-justfied.**

Each place of the reel designation can be activated with the arrow keys (→/←). A black square [■] under the reel designation shows wether the set character is alphabetic, numeric or a special character.

Alphabetic, numeric and special characters can also be preselected with the **CLEAR** key. The desired characters are set at the current cursor position [□] with the vertical arrow keys (↓/↑).

Setting a consecutive number (incrementing) within a roll designation.

A consecutive number can be situated anywhere in the roll designation. A consecutive number is designated as follows:

- The number to be incremented **always commences with the character** [:].
- The end of the number to be incremented **always ends with the character [:] or a space** [ ].

Examples:
- Roll designation; Example 1: **:1423: or :1423**
- Roll designation; Example 2: **:10113**:PAA-2-FR
- Roll designation; Example 3: ALPHA:**4568**:PARO
- Roll designation; Example 4: A-BETA:**0211: or** A-BETA:**0211**

Serial numbers printed in **bold type are automatically incremented by 1 with each new measuring series or roll.** Each reel designation permits only a single serial number!

Additional function of the space [ ]
The additional function of the [ ] is a delete function. All characters to the right of a space [ ] are deleted on pressing the keys **END** or **MENU.**

Selecting the Indicating Range

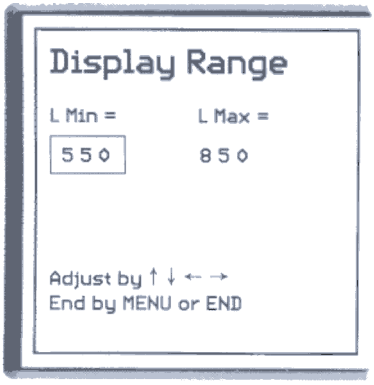


Fig. 11

The indicating range is
Minimal: 100 L
Maximal: 950 L
adjustable in steps of 50 L

Selecting Limits

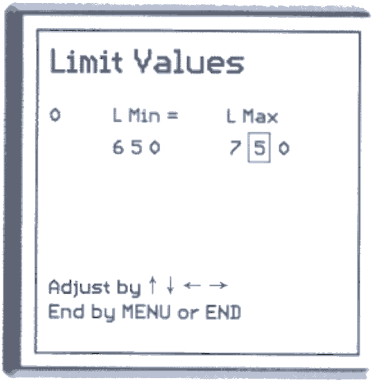


Fig. 12

The limits must be inside the indicating range
0: limits not activated

Selecting Mean Value

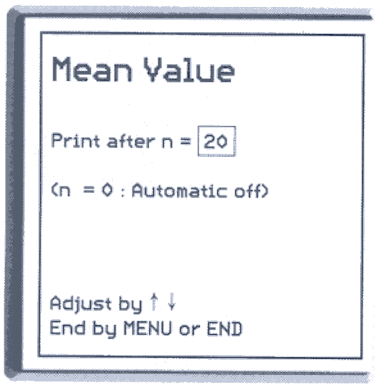


Fig. 13

Preselecting Language

Fig. 14

With preselection (n = 0), the measuring series or reel is only terminated with **END.**

Example: n = 20. The measuring series is automatically ended or terminated after the 20th measurement.

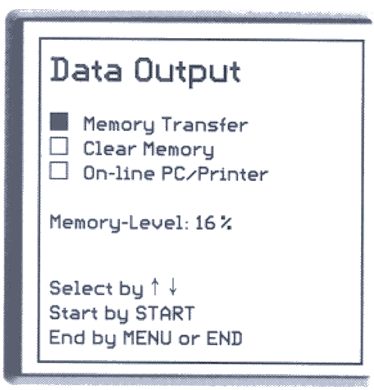


Fig. 15

Transfer to memory

Required for transferring the memory contents to a personal computer are:

- IBM or compatible PC
- PAROLINK 2 cable (RS 232 C)
- PAROLINK 2 program disk

Memory capacity:
approx. 150 reels with 20 values per reel.

Memory transfer procedure: (see chapter 14)

Delete memory. The memory contents are not deleted until confirmed with **START.**

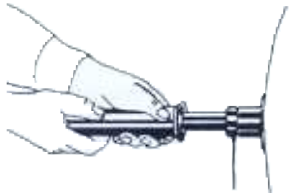
Online PC/Printer. PC online transfer takes place manually by pressing the **END** key or automatically. Information and settings regarding

- Online to printer: chapter 8
- Online to PC: chapter 14

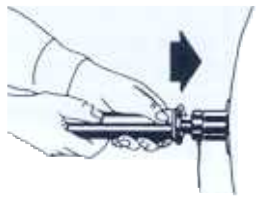
6 Operating

Recommendation: Test rolls from left to right.

1. Apply impact perpendicular to the test surface.



2. Press loading tube at moderate speed as far as stop.



3. Release loading tube.

Readiness for further impacts is signalled by a “beep”.

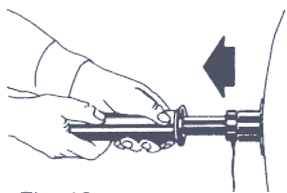


Fig. 16

6.1 Information on LCD Monitor

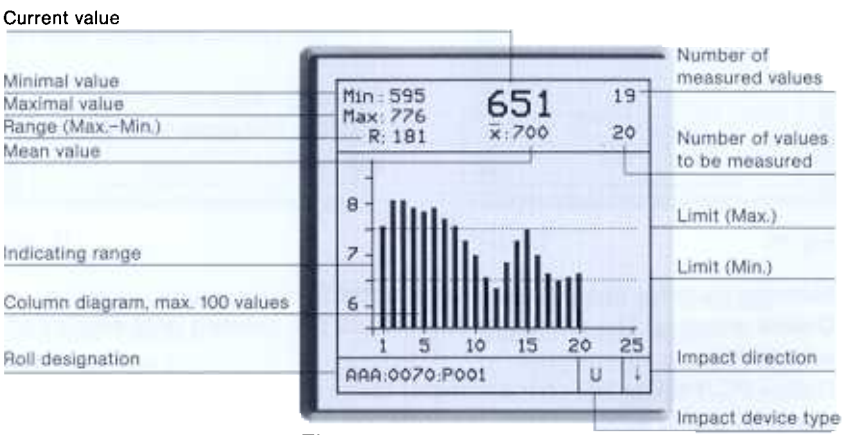


Fig. 17

7 Further Information

- PAROtester 2 has an automatic cut-out system. The electronics switch off automatically after 60 minutes.
- PAROtester 2 continuously monitors the battery state and signals «Change batteries» on the display (bottom).
- The PAROtester 2 electronics continuously monitors for maloperation of the impact device. Deviations are shown in the display as error messages. See chapter 11.
- If the **ON/OFF** key is pressed during a measuring series, the data of the commenced series get lost.
- Broken bars on the display or on the printout signify that the measured values are above or below the selected indicating range.
- A calibrated test block type U is available as an accessory for the periodic checking of the PAROtester 2. Approximately 100 measurements can be made per test surface. There must be at least 10 mm between individual measurements.
  When carrying out checks, the test block must be placed on a firm, flat surface.

8 Printout

- PAROtester 2 offers the facility for printing out measurement data on a printer via an RS 232 C interface (interface connector). A recommended accessory is the portable thermal printer **type DPU-201 GSE** with rechargeable batteries (paper width: 57 mm).

Procedure for trouble-free **online** data transfer to printer

In the "Online" mode the measured data are transferred to the printer after each roll for measuring series.

1. Set menu point «Online PC/Printer» in menu «Data Transfer», press **START** key and set to «Printer».
2. Terminate by pressing the **END** key and start to take the measurements.
3. Data transfer always takes place **manually** after pressing the **END** key, see chapter 8.2.
4. Data transfer takes place **automatically,** when the number of measurements is pre-programmed. Entry of the number of measurements can be set in the menu, menu point «Mean value» (n=XX).

Note: An automatic online transfer can always be ended or terminated by pressing the **END** key.

8.1 Operating the Printer

All printer settings are made at the factory for printers supplied with PAROtester 2.
Printer settings are made with the DIP switches. These are adjacent to the 9 pole connector. Open the DIP switch cover.
The one-time setting must take place with printer **switched off.**
Switch settings are as follows:

OFF				■	■	
ON	■	■	■			■
Switch	1	2	3	4	5	6

Connect printer and PAROtester 2 electronics together with the printer cable.
Setting the printer to **position ON 1** signifies printer operation.

8.2 Printout Variants

Press key **END 1x:** hardness profile, mean value, standard deviation (s) and range R, (R = max-min) of the measuring series or roll are printed out.
Press key **END 2x:** additionally the individual measured values of the measuring series or reel are printed out.

Important:

- The printout variants with the key **END** exist only, if in the menu point «Mean value» n = ∅.
  If n = XX, the printout is the same as if the **END** key is pressed 1 x.
- Measurement data can only be printed out once!
  If the printer is switched off when the key **END** is pressed, the printing out of the data of this measuring series or roll cannot be repeated.

8.3 Charging the Printer Batteries

Note:
The batteries must be recharged when the lamp «BATT. LOW» flashes.
Connect the power supply unit and the printer.
Switch printer to the **ON 2 position.**
Recommended charging period approx. 15 hours, but a max. of 24 hours.
When the printer is not in use, always place switch to the **OFF position.**

9 Display and Interpretation of the Measurements

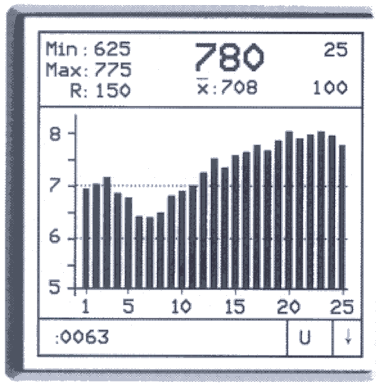


Fig. 18

The total scale range of the L values or the set indicating range is available at the commencement of the reel test. The scale for the first 25 measured values is displayed.

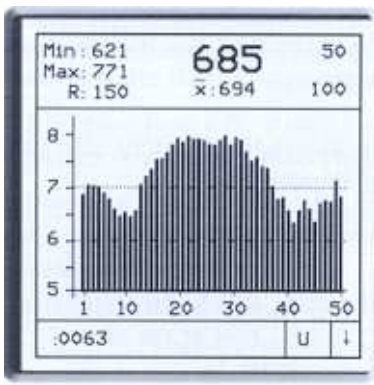


Fig. 19

Displayed after 26 measurements is the 1st compacted recording of the reel hardness profile. This density remains the same until the number of measured values reaches 50.

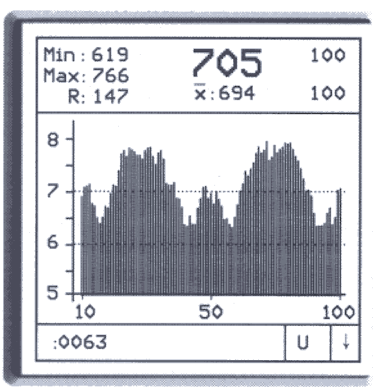


Fig. 20

Displayed after 51 measurements is the 2nd compacted recording of the reel hardness profile. The largest possible number of measurements per measuring series or reel is 100 values.

10 Measuring Limits

Measuring limits are acoustically signalled to the operator with a "DOUBLE BEEP". A visual indication then appears on the LCD monitor in place of the roll designation (bottom) with the following message:

"L value too small" (Lower hardness range L < 120 fallen below). Such values are neither recorded nor stored. **Continue measuring or** terminate measuring series with the **END** key.

"L value too large" (Upper hardness range L > 950 exceeded). Such values are neither recorded nor stored. **Continue measuring or** terminate measuring series with the **END** key.

"Max. number of tests" This message signifies that the maximum number of measured values (n=100) has been reached.

Further measured values are neither recorded nor stored. The measuring series must be terminated with the **END** key.

After switching off the display unit, the message «Memory full» can appear on the monitor in the measuring standby mask.

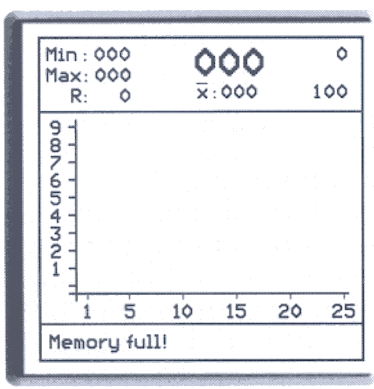


Fig. 21

The data should be transferred to the PC now at the latest!
See chapter 14.

Warning
Further measurements will overwrite the first measured values in the memory. Hence, old measured data are irretrievably lost.

11 Error Messages

The impact energy of the impact device is continuously monitored by the electronics. Also monitored are sensor geometry and the correct seating of the support ring.

The following messages can appear:

11.1 "Measure more slowly"

This erroneous measurement is not stored. Continue measuring more slowly (see chapter 1.3).

11.2 "Measuring Signal Error" (A = 3.XX V dt = X.XX ms)

What action is to be taken in the case of measuring signal error messages?

If A = less than 3.30 V with impact devices P, PG and U
Apply impact device more firmly.
Clean impact body and guide tube (see chapter 12).

If A = more than 4.00 V with impact devices P, PG and U
Measure more slowly (see chapter 1.3).

If dt = less than 0.40 ms with impact devices P, PG and U
Support ring is worn, i.e. the impact body is in an incorrect position at the measuring instant.

If dt = more than 1.25 ms with impact device P
The support ring is incorrectly positioned. Fit support ring correctly to the stop.

If dt = more than 1.4 ms with impact device PG
The support ring is incorrectly positioned. Fit support ring correctly to the stop.

If dt = more than 2.3 ms with impact device U
The support ring is incorrectly positioned. Fit support ring correctly to the stop.

The recording of measured values can continue after rectifying the fault. The measuring series can also be terminated with the **END** key.

12 Maintenance

Apart from cleaning the impact body and guide tube after approx. 5000 impacts, impact devices P, PG or U require no special care. To clean, proceed as follows:

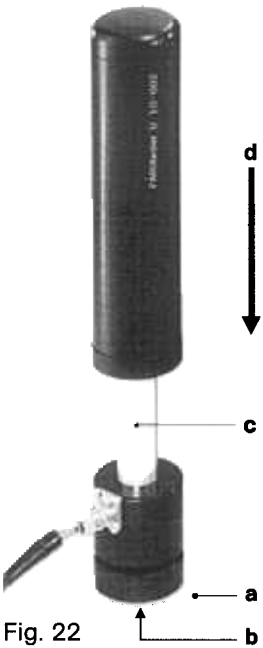


Fig. 22

Unscrew support ring **a** from the guide tube

Take up the impact device, holding it with one hand under coil body **b** and with the other hand, carry out a tripping action; this will release the impact body. Bring loading tube to its end position.

Clean dirt from impact body.

Clean guide tube **c** with the brush. For cleaning, place the impact device in the release position **d**.

Do not oil guide tube **c** and impact body.

After cleaning, push impact body back into guide tube **c** until it engages the catch chuck. Screw support ring **a** on to guide tube **c** as far as the stop. The support ring is now correctly mounted and the impact device is ready for use.

After complete assembly of the impact device, the instrument has to be checked according to chapt. 4.6.

13 Standard Test Block Type U

Standard test blocks U are valid for the impact devices type U, P and PG. Compliance with the engraved L-values garantuees the correct function of the impact devices and the display unit PARO tester 2 over the total measuring range.
Standard test blocks U are calibrated with standard devices to the PARO tester calibration basis, they are engraved with the reference values and comprise the following data:

Serial No. Referenvalue with nominal range for impact devices U, P, PG

U.217.9801 A	LU = 588 ± 12	LP = 615 ± 12	LPG = 653 ± 12

14 Data Transfer to PC

Required are:
IBM-PC (or compatible PC)
PAROLINK 2 cable
PAROLINK 2 disk

14.1 Procedure for Memory Transfer

1. Go to computer operating system level.
2. Place program disk PAROLINK 2 in drive A
3. Select drive A with
   A: ≪Return≫
4. Start program with **PARO2D or PARO2E ≪Return≫**
   The PAROLINK 2 program contains additional information on data transfer and requests the next steps via a dialogue.

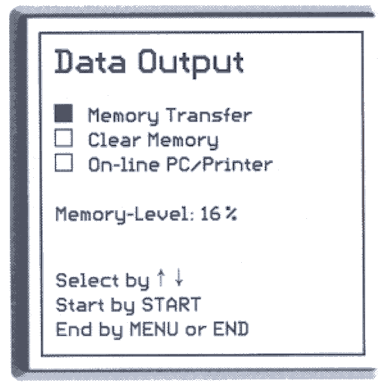


Fig. 23

5. When the computer signals fault-free data transfer, the data memory in the PAROtester 2 can be deleted. After pressing the **START** key, PAROtester requests confirmation of the deletion.

   Confirmation of delete memory: Press **START** key
   Delete memory not desired: Press **END** key

14.2 Online Data Transfer (with user's own software)

Required are:
IBM-PC (or compatible PC)
PC cable for PAROtester 2

Procedure for trouble-free **online** data transfer to PC
In the **online** mode, the measured data are transferred to the PC after each roll or measuring series.

1. Set menu point «Online PC/Printer» in menu «data transfer», press **START** key and set to «PC».
2. Terminate by pressing **END** key and start to take the measurements.
3. Data transfer always takes place **manually** after pressing the **END** key, if in the menu point «Mean value» n = ∅.
4. Data transfer takes place **automatically** when the number of measurements is pre-programmed. Entry of the number of measurements can be set in the menu, menu point «Mean value» (n = XX).

Note: An automatic online transfer can always be ended or terminated by pressing the **END** key.

Sequence when transferring data in **online** mode

The data are transferred in the following sequence:

Roll designation,␣,type of impact device,␣,ID,␣,U0,␣,value,␣,
value,␣,...,␣,**CR,LF**
␣,*P*,␣,2,␣,U0,␣,*666*,␣,*651*,␣,*632*,␣,654,....,␣,**CR,LF**
(without roll designation)

Example:

ALPHA2:1550:PRE,␣,*PG*,␣,1,␣,U0,␣,*745*,␣,*755*,␣,*721*,␣,**CR,LF**
:101,␣,*P*,␣,3,␣,U0,*456*,␣,*500*,␣,*487*,␣,**CR,LF**
␣,*P*,␣,2,␣,U0,␣,*666*,␣,*651*,␣,*632*,␣,654,␣,**CR,LF**
(without roll designation)

14.3 Data format and character definition

Data format:

Baud rate: **9600** / data bits: **8** / stop bits: **1** / **partity:** none / **protocol:** none

Character definition:

CR = carriage return ASCII number (dec.) = 13
LF = new line ASCII number (dec.) = 10
␣ = space ASCII number (dec.) = 32
CRC = number of rolls

ID = impact direction number: **1** = downwards /
2 = 45° downwards / **3** = horizontal
U0 = no significance

14.4 Important Information for Memory and Online Data Transfer

The data transfer via the interface RS 232 C of the **PAROtester 2** display unit must be carried out with the **original PAROLINK 2 cable** or the **PC cable** and is **only possible** if such a cable is used.
If the PAROtester 2 display unit is connected with some commercially available cable, malfunctions or increased current consumption can occur or the PAROtester 2 and the serial interface of the computer can **suffer irreparable damage.**