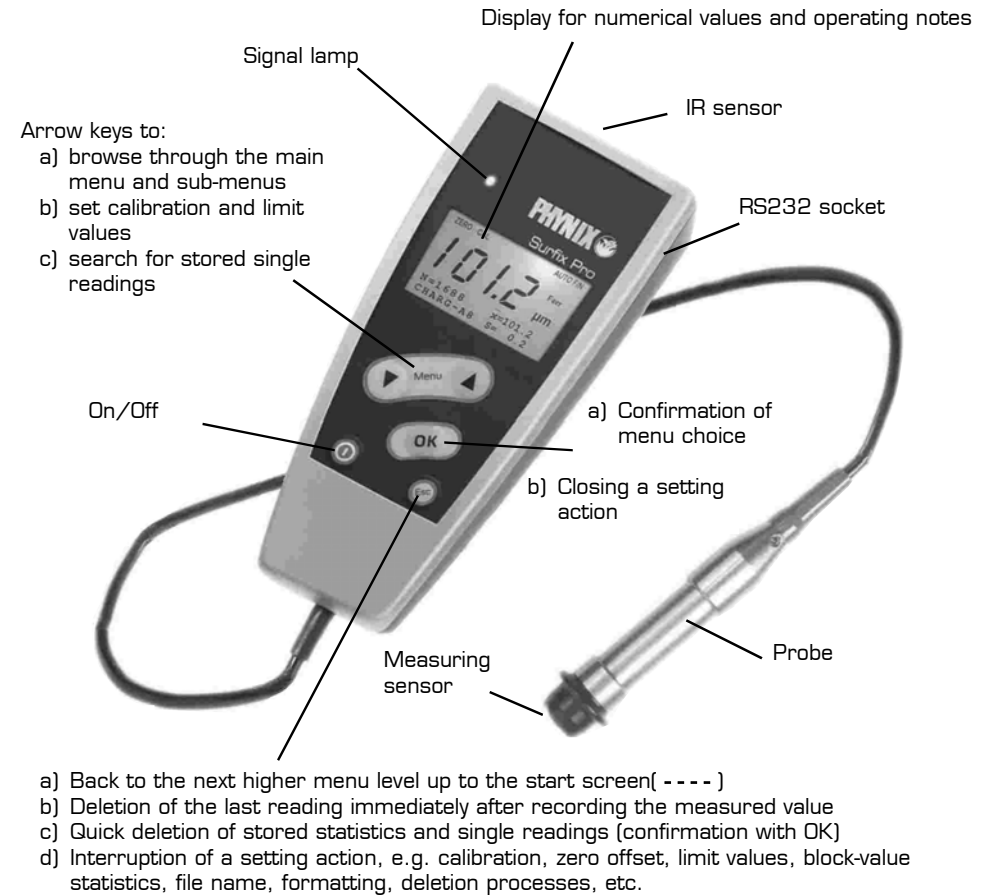


Gauge description



Operating manual

Coating Thickness Gauge Surfex Pro®

Remarks:

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Introduction

The coating thickness gauge Surfex Pro® has been designed and tested according to DIN EN 61 010 Part 1, March 1994, Safety requirements for electric measuring, control and laboratory equipment, and has left the manufacturing works in a technically perfectly safe condition.

In the case of coatings subject to exacting demands, we recommend to check the gauge by means of the standards included in the supply package before the measurement.

In addition, the gauge conforms to the following standards for coating thickness measurement:

Magnetic method	DIN EN ISO 2178 ASTM B499 DIN 50 982	Eddy current method	DIN EN ISO 2360 ASTM D1400
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About this manual

The menu technique, which has already proved worthwhile in mobile phones millions of times, is applied to the use of a coating thickness gauge for the first time.

This manual informs you step by step about the correct operation of the Surfex Pro® gauge. If you follow these step-by-step instructions, it will only take a few minutes before you're able to carry out the first measurements.

Basic notes on the operation

1. Typical applications

Surfex Pro® is a coating thickness gauge for non-destructive coating thickness measurement of:

- all non-magnetic coatings, such as varnish, paint, enamel, chromium, copper, zinc... coatings on steel and iron (magnetic method = F version) and /or
- all electrically insulating coatings, such as varnish, paint and anodising coatings on non-ferrous metals, even on austenitic stainless steels (eddy current method = N version), plus chromium, tin and titanium coatings on copper, aluminium and brass (eddy current method = N version with special calibration foils)

Surfex Pro® is available in five gauge versions:

Surfex Pro®

- Type **FN** Combined gauge for measurements on steel and non-ferrous metal
- Type **F** Gauge for measurements on steel/iron
- Type **N** Gauge for measurements on non-ferrous metals
- Type **FN/90** Angle probe with combined gauge for measurements on steel and non-ferrous metal
- Type **F10** Gauge for measurements on steel/iron, 10mm/0.4" measuring range

1st Note: You can recognize the present gauge version by the colour of the probe's reinforcing sleeve:

Surfex Pro FN — **green**
Surfex Pro F — **blue**
Surfex Pro N — **yellow**
Surfex Pro FN90° — **green**
Surfex Pro F10 — **black**

2nd Note: Please avoid kinking or too tight reeling of the probe cable. Cable breaks due to this are excluded from warranty.

b.2) In the File mode (specified files):

Feasible gauge settings	Condition after the total reset
Calibration	Unchanged
Single-value/block-value statistics	Unchanged
Online statistics display	Unchanged
Autom.FN, Ferr, Non-Ferr	Unchanged
Limit values	Unchanged
Continuous mode	Unchanged
Zero offset	Unchanged
Measurement data and Statistics	Unchanged
Printing format	ASCII 20 columns
Printing contents	Statistics
Backlight	OFF
Signal lamp	OFF
Switch-off mode	Automatic
Beeper	ON
Units of measurement	µm
Greetings text	ON
Date + Time	unchanged
Language	unchanged

c) Gauge setting after battery interruption lasting more than 20 seconds:

The gauge behaves as after the total reset, in addition, the user is prompted to select language and set date and time.

b) Gauge setting after total reset:

The following settings are reset to the factory default setting after a total reset:

b.1) In the Direct mode:

Feasible gauge settings	Condition after the total reset
Calibration	Works calibration
Single-value/block-value statistics	Single-value statistics
Online statistics display	Mean value and standard deviation
Autom.FN, Ferr, Non-Ferr	Autom. FN (if existing)
Limit values	None
Continuous mode	OFF
Zero offset	None
Measurement data and Statistics	Deleted
Printing format	ASCII 20 columns
Printing contents	Statistics
Backlight	OFF
Signal lamp	OFF
Switch-off mode	Automatic
Beeper	ON
Units of measurement	µm
Greetings text	ON
Date + Time	Unchanged
Language	Unchanged

2. Preparing for measurement

Surfix Pro® can be operated using 2 x round cell (AA) 1.5V alkaline batteries or also using 2 storage batteries (AA) 1,2V.

ATTENTION: Wrongly inserted batteries may destroy the gauge!

1st Note: After inserting the batteries and switching-on for the first time by means of the red button, the display shows
a) **Deutsch** (German) as selected language: confirm with „OK“, or use „Menu“ to select another language and confirm with „OK“, after which the display shows
b) Recommended **Date** and **Time**: confirm with „OK“, or use „Menu“ to select and confirm with „OK“ (pay attention to the instructions on the display).

Discharged non-rechargeable batteries are indicated by the flashing battery icon. When inserting new batteries, please pay attention to the correct polarity. Wrongly inserted batteries may lead to a destruction of the gauge.

2nd Note: In order to avoid any possible loss of data, please pay attention to the following when exchanging batteries:
a) Always switch off the gauge by means of the red button before exchanging batteries.
b) Exchange the batteries within 20 seconds.

3rd Note: In the automatic switch-off mode, the gauge is switched off 1.5 minutes after the last measurement or operating action.

3. Menu structure

The structure already shown on the first page is mainly self-evident. The operation is the same as with the commercially available mobile phones (cellulars). To activate a function, all it takes is a glance at the menu structure to recognize at once which main menu item and which one of the subsequent sub-menu items must be called. There are 6 main menu items: **Calibration, Statistics, Measuring mode, Data memory, Transfer to Printer/PC and Options**. All other menu items or functions are subordinate to these 6 menu items. The steps to be carried out are displayed on the screen, e.g. "Place probe on foil standard". After these actions, the confirmations are displayed, e.g. „Calibration has been set“

4. Calibration and measurement (1st menu item)

This section informs you about the existing calibration modes and the application cases that they are especially suitable for and about the measurement uncertainties to be expected.

The required calibration must be carried out in the measurement data memory in which the subsequent readings are meant to be stored. This means that a new file name shall be defined at the menu item **Data memory** before the calibration. If you define no file name, you are in the **Direct mode**. In this mode, you can carry out direct calibrations and measurements, and even save readings, without entering a file name. You will always reach the **Direct mode** if the file last used was closed.

When Surfix Pro® is delivered, it's provided with the factory calibration. If a more accurate measurement is required, the gauge can be calibrated as described in the following sections.

By calibrating on the uncoated test object, especially measuring errors due to surface geometry of the test object are excluded, e.g. flat or curved surfaces. Once you have carried out a calibration, you don't have to repeat it after switching off and switching on again if you want to measure on similar test objects.

Note: You can also use the Fe or Al zero standard included in the supply package to carry out the calibration if the surfaces to be measured are flat and larger than 35mm x 35mm / 1.4" x 1.4". Depending on the application case, you can use five different calibration modes on the Surfex Pro® (please also refer to Measuring uncertainties in the section „Specifications“).





You can carry out the calibration processes described below either in **Direct mode** or in any **File** of your choice having a file name.

4.1 Activating the works calibration

This calibration mode is suitable for measurements on flat surfaces larger than 35mm x 35mm / 1.4" x 1.4".

A calibration that has been carried out previously has to be deleted. You need neither calibration standards nor any uncoated test objects.

Procedure: (please see also Menu structure)




-  press this key; **Calibration** appears on the display
-  press this key; **Zero setting** appears on the display
-  press this key repeatedly until **Deletion of calibration** appears on the display
-  press this key; **Works calibration activated** appears on the display followed by the start screen with the four dashes **----**.

You can now measure using the works calibration. The measuring uncertainty is $\pm 3\mu\text{m}/\text{O}.12\text{mils}$ or $\pm 3\%$ of reading. **

4.2 Zero setting (1-point calibration)

For this purpose, you have to use an uncoated test object having similar dimensions and material properties as the coated test object: e.g. when you plan to measure on small round parts.

Procedure: (please see also Menu structure)

-  press this key; **Calibration** appears on the display
-  press this key; **Zero setting** appears on the display
- Place the probe repeatedly perpendicular to the uncoated test object.
-  press this key. **Zero has been set** appears briefly on the display followed by the start screen with the four dashes **----**.

You can now measure using the **1-point calibration**. The measuring uncertainty is $\pm 1\mu\text{m}/\text{O}.04\text{mils} + 2\%$ of reading). **

** (For probes up to 1500 $\mu\text{m}/60\text{mils}$ measuring range only. See also section 17. Specification).

22. Default settings

This section describes the gauge settings

- a) at initial start-up or
- b) after total reset or
- c) if the batteries have been removed for a longer period of time.

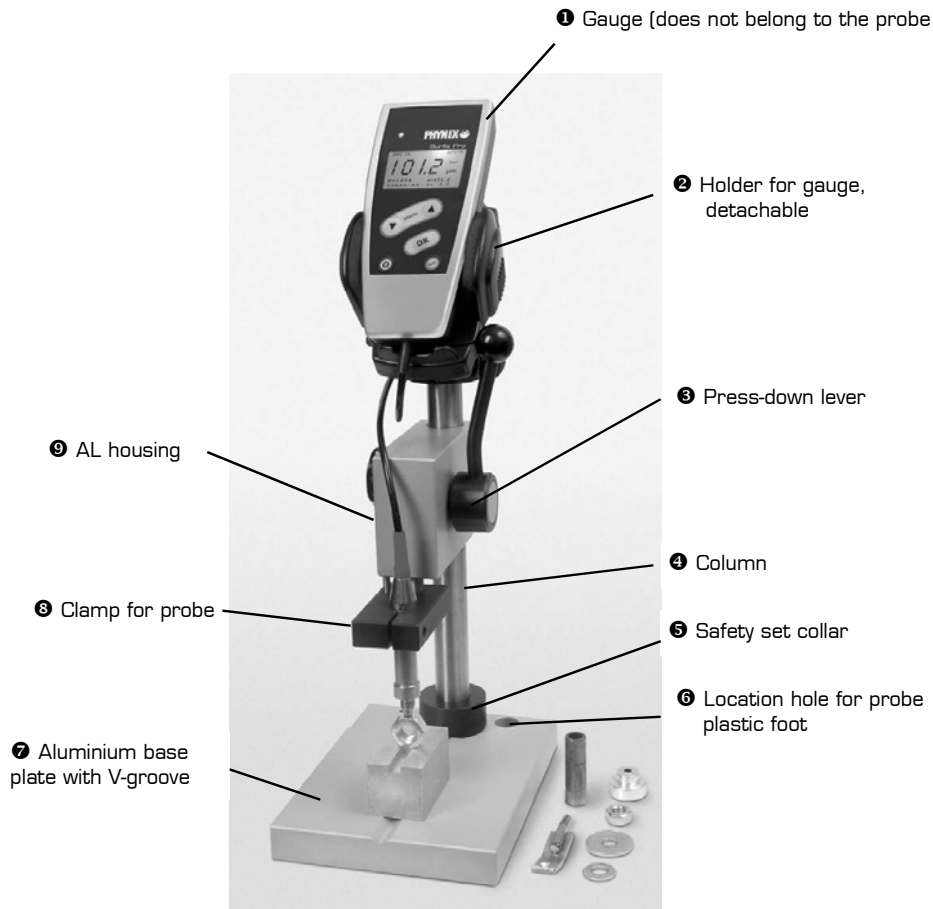
a) Gauge setting after the first switch-on:

Feasible gauge settings	Condition after first-time switch-on
Calibration	Works calibration
Single-value/block-value statistics	Single-value statistics
Online statistics display	Mean value and standard deviation
Autom.FN, Ferr, Non-Ferr	Autom. FN (if existing)
Limit values	None
Continuous mode	OFF
Zero offset	None
File	None
Printing format	ASCII 20 columns
Printing contents	Statistics
Backlight	OFF
Signal lamp	OFF
Switch-off mode	Automatic
Beeper	ON
Units of measurement	μm
Greetings text	ON
Date + Time	Should be set
Language	Should be selected

The press-down lever (3) for lowering the probe can be set in the most favourable operating angle in each case in a pull-twist-snap-in procedure.

Specifications:

Design	all-metal (AL-anodised)
Support hole for the probe	dia.14mm
Max. lift over press-down lever	30mm
Max. height adjustment range	100mm
Measurement table, polished Al plate	120mm x 120mm x 20mm / 4.8" x 4.8" x 0.8"
Weight	approx. 1.5 kg/52 ozs



4.3 Zeroing and ONE-foil calibration (two-point calibration)

For this purpose, you have to use an uncoated test object having similar dimensions as the coated test object, the same as with ,zeroing': e.g. if you plan to measure on small round parts. Choose the calibration foil that comes closest to the expected coating thickness. When measuring using this calibration, the measuring uncertainties mentioned in the specifications are met.

Procedure: (please see also Menu structure)

Carry out ,zeroing' (1-point calibration) as described above (please see 4.2).

- ▾MENU ▴ press this key; **Calibration** appears on the display
- OK press this key; **Zero setting** appears on the screen
- ▾MENU ▴ press this key one more time; **ONE-foil calibration** appears on the screen
- OK press this key; **Place probe on foil standard** appears on the display
- Put the measurement foil on the uncoated test object and place the probe repeatedly on the foil.
- ▾MENU ▴ press this key until the thickness reading of the calibration foil corresponds to the indicated value on the display.
- OK press this key; **Calibration has been set** appears briefly on the display followed by the start screen with the four dashes - - - - .

You can now measure using the **ONE-foil calibration**.

The measuring uncertainty is $\pm(1\mu\text{m}/0.04\text{mils} + 1\% \text{ of reading})$. **

4.4. TWO-foil calibration, e.g. for rough surfaces

This calibration mode is used especially for the measurement on rough surfaces, e.g. on sand-blasted base metals. It is also suitable for low-intensity magnetic test objects when carrying out the measurement either according to the magnetic-inductive method or according to the eddy current method.

In this calibration mode, two calibration foils varying in thickness are used. The thickness of the foils should be selected so that the coating thickness of the thinner foil is 0.5 to 0.9 times that of the expected coating thickness and the coating thickness of the thicker foil is 1.1 to 1.5 times that of the expected coating thickness.


Procedure: (please see also Menu structure)


- ▾MENU ▴ press this key; **Calibration** appears on the display
- OK press this key; **Zero setting** appears on the screen
- ▾MENU ▴ press this key repeatedly until **TWO-foil calibration** appears on the display
- OK press this key; **Place probe on 1st foil** appears on the display.
- Put one of the two calibration foils on the uncoated test object and place the probe repeatedly on the foil.
- OK press this key; **Set standard value** appears on the display.
- ▾MENU ▴ press this key repeatedly until the thickness reading of the calibration foil corresponds to the indicated value on the display.

** (For probes up to 1500 μm /60mils measuring range only. See also section 17. Specification)

 press this key; **Place probe on 2nd foil** appears on the display.

Put the second calibration foil on the uncoated test object at this point and place the probe repeatedly on the foil.

 press this key; **Set standard value** appears on the display. Press the „Menu“ keys repeatedly now until the thickness reading of the calibration foil corresponds to the indicated value on the display.

 press this key; **Calibration has been set** appears briefly on the display followed by the start screen with the four dashes - - - -.

You can now measure using the **TWO-foil calibration**.

The measuring uncertainty on smooth surfaces is $\pm(1\mu\text{m}/0.04\text{mils} + 1\% \text{ of reading})$. * *

In measurements on rough base metals, the average coating thickness is measured across the peaks. The measuring uncertainty increases with the increasing roughness.

4.5 Cal-Through-Coat calibration (calibration on a coated test object)

(method according to the license patent DE340720G2)

This calibration method is used if no uncoated test object is available for „zeroing“. The method can be applied using the probe F or FN (F part)..

The method may only be applied to cases in which the coating at the calibration point is smooth and reproducible values are measured. Don't use on structural coats of varnish. The errors of measurement produced may be too high.

Procedure: (please see also Menu structure)


 press this key; **Calibration** appears on the display

 press this key; **Zero setting** appears on the screen


 press this key repeatedly until **Cal-Through Coat calibration** appears on the display

 press this key; **Place probe on coating** appears on the display.

Now place the probe repeatedly on the coated test object at a defined calibration point. A mean value is displayed.

 press this key; **Place probe on foil standard** appears on the display

Select a calibration foil no thicker than the expected coating thickness and put it on the same calibration point. Place the probe then repeatedly on the calibration foil covering the calibration point.

 press this key; **Set standard value** appears on the display. Continue pressing the **Menu** key until the thickness reading of the calibration foil corresponds to the indicated value on the display.

 press this key; **Calibration has been set** appears briefly on the display followed by the start screen with the four dashes - - - -.

You can now measure using the **Cal-Through-Coat calibration**.

The measuring uncertainty is $\pm(2\mu\text{m}/0.08\text{mils} + 3\% \text{ of reading})$. * *

* *(For probes up to 1500 μm /60mils measuring range only. See also section 17. Specification)

AUTO FN	Automatic FN measuring mode is active
Ferr	F measuring mode (for iron/steel) is active
Non-Ferr	N measuring mode (for non-ferrous metals) is active
μm	All readings in the units of measurement μm , mm
mils	All readings in the units of measurement mils

20. Probe exchange

The probes included in the accessories can be replaced or exchanged by a specialist by opening the gauge.


When ordering new probes, you will receive a detailed description and instructions with figures showing you how to dismount or mount the probes.


The gauge is immediately ready for operation after a probe exchange.

Note: To check the correct mounting of the probe, you should carry out the following test:

Procedure:

 Switch off the gauge

 press this key (Up arrow) and keep it depressed, then press

 all segments appear on the display while both keys are pressed

After releasing the keys, the following briefly appear:

a) the software version, e.g. 4.0 incl. the manufacturing date

b) the gauge serial number and the probe serial number

If the displayed serial number corresponds to the serial number of the probe, you have carried out the probe exchange quite correctly.

21. Handling of the probe guide (optional)

The probe guide is in many cases the only possibility of carrying out exact measurements on small parts, such as bolt heads and barrels, washers, nuts, etc. Measurements are possible without any problem on cylindrical parts having a small diameter down to 3mm.

Before fixing the probe in the clamp (8), set the rough height of the housing (10). Now fix the safety set collar (5) flush with the housing (10). In order to fix the probe in the clamp (8), you first have to unscrew the black or beige plastic base attachment. The probe can now be pushed into the clamp (8) from above and fixed in position there. After that, you should screw the base attachment back on the probe for safety reasons.

Note: Please observe the following for measurements without the probe plastic foot:

- The measuring sensor is no longer mechanically protected, so therefore
- don't twist the measuring sensor
- don't press the measuring sensor firmly against the limit stop in the probe housing.
- Set the height of the housing (10), the safety set collar (5) and the probe in the clamp (8) in such a way that the measuring sensor still has some axial play when resting on the test object after the lever (3) has been completely pressed down.

The Surfex Pro® gauge can be fixed in the suitable holder (2) to have appropriate viewing angle for reading the measured values.

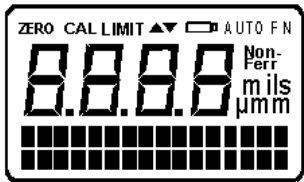
18. Standard package

- Gauge incl. probe
- Fe zero standard(s) (stainless) and/or Al zero standard
- 2 calibration foils
- 2 batteries
- Operating manual
- Manufacturer's test certificate
- Soft pouch with belt clip
- Plastic case for transport and storage

Optional accessories

- Infrared adapter (RS232) for PC and portable printer DPU414
- RS232 Interface cable (1,2m)
- Portable data printer DPU414
- Calibration foils having different thicknesses
- Measurement support for small parts
- Special manufacturer's test certificate for gauge and/or calibration foils
- Dictionary of coating thickness measurement
- Standard probe FN, measuring range 0 to 1.500µm/60mils, for iron/steel and non-ferrous metals
- Standard probe F, measuring range 0 to 1.500µm/60mils, for iron/steel
- Standard probe N, measuring range 0 to 1.500µm/60mils, for non-ferrous metals
- Angle probe FN/90°; measuring range 0 to 1.500µm/60mils, for iron/steel and non-ferrous metals
- Probe F10; measuring range 0 to 10mm/0.4" for iron/steel

19. LC - Display



All segments and characters of the display can be displayed for checking purposes.

Other useful information icons and notes appear on the display of your coating thickness gauge, besides alphanumerical characters. The following characters and icons appear on the display:

	If this icon flashes, you have to exchange the batteries. For storage batteries, please see special note on page 7.
	Limit values have been exceeded or not reached
ZERO	Zero calibration is carried out (ZERO flashing: ZERO setting has been started but not yet completed)
CAL	Foil calibration is carried out (CAL flashing: CAL setting has been started but not yet completed)
LIMIT	Limit values are set (LIMIT flashing: LIMIT setting has been started but not yet completed)

4.6. Display active calibration

This menu item allows you to display the calibration mode set according to section 4.1 to 4.5.
Procedure: (please see also Menu structure)



press this key; **Calibration** appears on the screen display



press this key; **Zero setting** appears on the screen



press this key repeatedly until **Display active calibration** appears on the display screen



press this key; the active calibration mode setting appears briefly on the display, e.g. **ONE-foil calibration** followed by the last reading or the start screen with the four dashes - - - -.

4.7 Deletion of calibration

This menu item allows you to delete the calibration of an activated measurement data memory. However, if you would like to overwrite a calibration, a deletion is not necessary beforehand.

Procedure: (please see also Menu structure)



press this key; **Calibration** appears on the screen display



press this key; Zero setting appears on the screen



press this key repeatedly until **Deletion of calibration** appears on the screen display



press this key; **Works calibration activated** appears briefly on the display followed by the last reading or the start screen with the four dashes - - - -.

4.8 Measurement

This section describes the suitable application cases of the different gauge versions.

You can use the gauge version Surfix Pro® F for measurements on all non-magnetic coatings, e.g. varnish, zinc, etc. coatings on iron/steel. The measuring range is 0... 1.500µm/60mils. The display shows **Ferr**.

You can use the gauge version Surfix Pro® N for measurements on all electrically insulating coatings, e.g. varnish, anodising, etc. coatings on non-ferrous metals. The measuring range is 0... 1.500µm/60mils. The display shows **Non-Ferr**.

The gauge version Surfix Pro® FN e.g. Surfix Pro® FN/90° allows both measurements and is factory-set to the measuring mode **Auto FN identification**.

The display shows **AUTO FN**. This means that the gauge identifies automatically the base metal (iron/steel or non-ferrous metal on which the measurement is carried out when the probe is placed on the metal, activating the corresponding measuring method, magnetic (F) or eddy current method (N).

Note: In some cases, especially with varnish on zinc on steel, it is nevertheless recommended to use a fixed measuring method setting, e.g. one set to **Ferrous (F)** for measurements on iron/steel or to **Non-Ferrous (N)** for measurements on non-ferrous metals. (Please see also section 6.1)

You can use the gauge version Surfix Pro FN/90° together with the angle probe for measurements inside tubes or at hard-to-get-at points on steel/iron and on non-ferrous metals, otherwise the use is as with the gauge version Surfix Pro® FN. The measuring range is 0... 1.500µm/60mils. The display shows **AUTO FN**.

You can use the gauge version Surfix Pro F10 for measurements on all non-magnetic coatings, e.g. varnish, rubber, plastics etc. coatings on iron/steel. The measuring range is 0... 10mm/0.4inches. The display shows **Ferr. Ferr**.

5. Statistics (2nd menu item)

The Surfex Pro® gauge calculates the statistical values, described in more detail below, as soon as readings are recorded in a memory. There are two types of data memory:

1. the memory in the **Direct mode** with a maximum of 2 x100 storable readings (please see section 7) and
2. the data memory allowing alphanumerical names (maximum 250) where a maximum of 10,000 readings can be stored.

Each one of the above-mentioned types of data memory records the readings, calculates them statistically and displays them online on the screen. This means that the statistics listed below are recalculated after every measurement. The displayed options of the two bottom lines of the display screen are: **N, x, s** or **N, Max, Min**. If the last reading is deleted, a recalculation and a corrected display of the statistics takes place.

All readings recorded and statistics calculated by Surfex Pro® and belonging to the currently **active** file can be completely printed out or displayed at the menu item **Statistics**:

After activating the single-value statistics		After activating the block-value statistics	
N	Number of readings	N	Number of mean values
x	Mean value of readings	x	Average of mean values
S	Standard deviation	s	Standard deviation of mean values
Max	Maximum single value of the measurement series	Max	Maximum average of mean values
Min	Minimum single value of the measurement series	Min	Minimum average of mean values
Kvar	Variation coefficient	Kvar	Variation coefficient of mean values
Cp	Process capability index*	Cp	Process capability index* of mean values
Cpk	Process capability index*	Cpk	Process capability index* of mean values

*Note: The process capability index Cp and the process capability index Cpk are only calculated and printed out or displayed if an **upper** and a **lower limit value** has been input at the menu item **Measuring mode/Limits**.

5.1 Printout/transfer of statistics

The printout or transfer of the data from a currently active file can be done quickly and easily at this menu item. If you want to print out or transfer data from an already closed file, you can do this at the menu item **Transfer to printer/PC** (please see also section 8, **Transfer of data to printer/PC**).

The block of statistics referring to a measurement series, consisting of a maximum of 8 calculated values (please see section 5), can be transferred to a printer or a PC via an infrared adapter or an RS232 interface cable (IR adapter, RS232 connection cable and printer (DPU 414) are available as accessories).

You need no special data transfer program for the transfer to a PC (please see section 18).

Note: If larger data volumes (more than 50 readings) are meant to be transferred, we recommend to use the RS232 interface cable..

With the probe F10

With works calibration: $\pm(10\mu\text{m}/0.4\text{mils}$ or 3% of reading)
(only on flat and slightly curved surfaces)

With 1-point calibration: $\pm(5\mu\text{m}/0.2\text{mils}$ +2% of reading)

With 2-point calibration: $\pm(3\mu\text{m}/0.12\text{mils}$ +1% of reading)

With two-foil calibration: $\pm(3\mu\text{m}/0.12\text{mils}$ +1% of reading)

Cal-Through-Coat calibration: $\pm(10\mu\text{m}/0.4\text{mils}$ +3% of reading)

Display

Alphanumerical with 4 digits, digit height 10mm/0.4", connectable backlight

Operator prompting

Via display in German, English or French or in an optional language

Minimum area measured

5mm x 5mm / 0.2" x 0.2" (with the probes: FN, F, N, FN/90°)

20mm x 20mm / 0.8" x 0.8"(with the probe F10)

Minimum radius of curvature

convex: 1.5mm/0.06", concave: 5mm/0.2" (with the probes: FN, F, N, FN/90°)

convex: 5mm/0.2", concave: 16mm/0.64" (with the probe: F10)

Minimum thickness of base metal

Type F: 0.3mm/12mils, type N: 50 μm /2mils, type F10: 1mm/40mils

Memory

Direct mode: max. 100 readings each in F-mode and N-mode, individually recallable Alphanumerical memory:
max.10,000 readings in max. 250 groups, individually recallable

Calibration

Works calibration

Zeroing

Zeroing and foil calibration

Two-foil calibration

Cal-Through-Coat calibration

Zero offset: addition/subtraction of a constant value to/from the reading

Statistics

Single-value and block value statistics

N, x, s or N, Max, Min, Cpk from max. 10,000 readings

Limit values

settings possible with acoustic monitoring

Interface

Infrared (wireless), IrDA standard and RS232 (cable-connected)

Ambient temperature

0 - 50°C/32 - 122°F

Surface temperature of test object

-15°C to 60°C (over 60°C to 150°C place probe for max. 2 seconds)

6°F to 140°F (over 140°F to 302°F place probe for max. 2 seconds)

Power supply

2 x round cell (AA) 1.5V or 2 x storage batteries (AA) 1.2V, up to 60 hours of operating time

Sizes

Gauge: 140mm x 62mm x 30mm / 5.6" x 2.5" x 1.2"

Probes FN, F, N: dia. 14mm x 83mm / dia.0.56" x 3.3";

measuring sensor: dia. 5mm/0.2"

Probe FN/90: 8mm x 8mm x 180mm / 0.32" x 0.32" x 7,1

Probe F10: dia. 25mm x 45mm / dia. 1" x 1.77"

Weight

approx. 200g/7ozs (gauge incl. batteries and probe)

Type of protection

IP 52

Other errors

If the following errors occur on your gauge, a total reset generally helps (section 10):

- The gauge allows no further measurements to be carried out
- Illogical display values

Further errors:

- Keys no longer have a function:
To begin with, briefly remove the batteries and then carry out total reset (section 10).
- The gauge can no longer be switched on:
Remedy by either briefly removing the batteries and reinserting them or by inserting new batteries.

16. Maintenance / Service

The Surfex Pro[®] gauge requires no special maintenance. However, it should be handled with care just as any other gauge. Please remove used batteries at once and dispose of them in an environmentally acceptable manner.

Please send a damaged gauge or a gauge showing faulty operation to your dealer to be forwarded to us or directly to us.

17. Specifications

Surfix Pro [®] FN	for measurements on steel/iron <u>and</u> non-ferrous metals incl. probe FN (green reinforcing/anti-kink sleeve) (magnetic and eddy current methods)
Surfix Pro [®] F	for measurements on steel/iron (magnetic method) incl. probe F (blue reinforcing/anti-kink sleeve)
Surfix Pro [®] N [°]	for measurements on non-ferrous metals (eddy current method) incl. probe N (yellow reinforcing/anti-kink sleeve)
Surfix Pro [®] FN/90 [°]	for measurements inside tubes, on steel/iron <u>and</u> non-ferrous metals incl. probe FN (green reinforcing/anti-kink sleeve) (magnetic and eddy current methods)
Surfix F10	for measurements on steel/iron (magnetic method) incl. probe (black reinforcing/anti-kink sleeve)

Measuring ranges	0 ... 1500µm / 0 ... 60mils, units selectable (probes FN, F, N, FN/90 [°]) or. 0 ... 10mm/0.4 inch, units selectable (probe F10)
-------------------------	---

Resolution	0.1µm/0.01mils or <0.2% of reading (probes FN, F, N, FN/90 [°]) 1µm/0.1mils or < 0.2% of reading (probe F10)
-------------------	---

Measuring uncertainty	referred to PHYNIX standards <u>With the probes: FN, F, N, FN/90[°]</u> With works calibration: ±(3µm/0.12mils or 3% of reading) (only on flat and slightly curved surfaces) With 1-point calibration: ±(1µm/0.04mils +2% of reading) With 2-point calibration: ±(0.7µm/0.03mils +1% of reading) With two-foil calibration: ±(0.7µm/0.03mils +1% of reading) Cal-Through-Coat calibration: ±(3µm/0.12mils +3% of reading) (only F probes)
------------------------------	--

Procedure: (please see also Menu structure)

▾ MENU ▸ press this key until **Statistics** appears on the display screen

OK press this key; **Printout of statistics** appears on the display

Direct the Surfex[®] Pro gauge with the IR transmitter (top face) towards the IR adapter. The distance should be around 30cm/1ft to 60cm/2ft, or use the RS232 cable to connect the gauge with the PC and press

OK The data are transferred and **In progress...** appears briefly on the display followed by the start screen with the four dashes ---- .

Note: Printout of statistics and of the histogram

a) You can print out the histogram together with the statistics, e.g. on the optional printer DP414, if you define the following two settings on the gauge before the print command:

1. Printing format IBM 40 columns (please see section 8.4.1)
2. Setting of the required limit values in the corresponding file (please see section 6.2.1)

After these settings, print out the statistics. The histogram is then additionally printed out.

b) The histogram can only be transferred to an IBM-graphics compatible printer having a serial interface, e.g. to the optional printer DPU414. The histogram cannot be transferred to a PC. The representation of the histogram on a PC can be effected by means of EXCEL functions. To do this, you should only transfer the readings to the PC.

5.2 Printout/transfer of readings and statistics

The stored single values of the currently active file together with the maximum 8 statistical values can be transferred to peripherals, as mentioned at **5.1 Printout of statistics**.

If you want to print out or transfer data from an already closed file, you can do this at the menu item **Transfer to printer/PC** (please see also section 8, **Transfer of data to printer/PC**).

Procedure: (please see also Menu structure)

▾ MENU ▸ press this key until **Statistics** appears on the screen display

OK press this key; **Printout of statistics** appears on the display

▾ MENU ▸ press this key until **Printout stat. + readings** appears on the display






Direct the Surfex[®] Pro gauge with the IR transmitter (top face) towards the IR adapter. The distance should be around 30cm/1ft to 60cm/2ft, or use the RS232 cable to connect the gauge with the PC and press

OK The data are transferred and **In progress...** appears briefly on the display followed by the start screen with the four dashes ---- .

5.3 Display of statistics on the screen

This section explains how to display the different calculated values of single-value statistics or those of block-value statistics. The stored max. 8 statistical values can be displayed on the screen at any time.

Procedure: (please see also Menu structure)






-  press this key until **Statistics** appears on the display
-  press this key; **Printout of statistics** appears on the display
-  press this key until **Display of statistics** appears on the display
-  The **Number of readings** (or **Number of mean values**) appears on the display
-  press this key repeatedly; the sequence of statistics appears on the display as follows: **Mean value, Standard deviation, Maximum, Minimum, Variation coefficient**, (or **Average of mean values, the Standard deviation of mean values, the Maximum of mean values, the Minimum of mean values, the Variation coefficient of the mean values**) and the **Process capability indices** Cp and Cpk.

To be able to continue measuring, press  repeatedly until the start screen with the four dashes - - - - is displayed again.

5.4 Display of stored readings on the screen

This section explains how to display the stored single values on the screen at any time..





Procedure: (please see also Menu structure)

-  press this key until **Statistics** appears on the display
-  press this key; **Printout of statistics** appears on the display
-  press this key until **Display of readings** appears on the display
-  press this key; the first single value appears on the display
-  press this key repeatedly. The following single values with a consecutive number are displayed.

To be able to continue measuring, press  repeatedly until the start screen with the dashes - - - - is displayed again.

5.5 Deletion of readings and statistics

Procedure: (please see also Menu structure)

-  press this key until **Statistics** appears on the display
-  press this key; **Printout of statistics** appears on the display
-  press this key repeatedly until **Deletion stat. + readings** appears on the display
-  press this key. The statistics are deleted together with the single values. **Statistics deleted** appears briefly on the display followed by the start screen with the four dashes - - - - .

• Settings of HyperTerminal

- 1) Click **Start - Programs - Accessories - Communication** and then click **HyperTerminal**. The folder "Hyper-Terminal" appears on the display.
- 2) Double-click the icon **Hypertrm.exe**. The box "Connection Description" appears on the display.
- 3) Specify the name, e.g. 'Surfix Pro IR transfer'
- 4) Select an icon by clicking it, e.g. 'open book with telephone' and then click **OK**. The box "Phone Number" appears on the display.
- 5) Select and click the item **Direct to COM1** or **Direct to COM2** in the options list box "Connect using:". Click **OK**. The box "COM1 or COM2 Properties" appears on the display..
- 6) Enter the following values:
Bits per second: **9600**
Data bits: **8**
Parity: **none**
Stop bits: **1**
Flow control (handshake): **none**
Click **OK**. "HyperTerminal" is now activated.
- 7) Close 'Surfix Pro IR transfer - HyperTerminal'. A query box appears on the display.
- 8) Answer the question: 'You are currently connected. Are you sure you want to disconnect now?' with **Yes**. Another query box appears on the display.
- 9) Answer the question: 'Do you want to save session Surfix Pro IR transfer?' with **Yes**. The selected icon with the text appears in the folder "Hyperterminal".

• Creating a shortcut to the desktop (if required)

- 1) Use the **right mouse button** to click the icon with **Surfix Pro IR transfer**. Click **Create shortcut** in the context menu appearing on the display. The icon appearing now reads 'Shortcut to Surfix Pro IR transfer'.
- 2) Drag the icon 'Shortcut to Surfix Pro IR transfer' to the desktop using the left or right mouse button. .

To call the "HyperTerminal" program for data transfer in the future, double-click the new icon: 'Shortcut to Surfix IR transfer'.

15. Error display

Errors detected by the gauge are indicated by an error display:

Empty batteries:

Insert new batteries. Pay attention to the correct polarity. Replace the batteries within 20 seconds in order keep the stored data.

Probe is too close to metal:

The probe was too close to the metal during gauge switch-on. Hold the probe free in the air and then switch the gauge on.

Other probe defects are displayed here as well.

Magnetic interference fields:

There are too strong magnetic interference fields nearby (e.g. transformer coils, PC display, etc.).

Defective probe:

If this error message appears, please send the gauge to your supplier or to the manufacturer for repair.

2nd Note: Any possible infrared receiver installed in your PC must be deactivated via Windows Control Panel. This must be done before connecting our optional IR adapter and before starting the HypeTerminal program.

It must be possible to perfectly receive and evaluate the light pulses during the infrared transfer of data. For this reason, the infrared adapter receiving the light pulses must be protected from external interferences. You should therefore pay attention to the following:

- Do not expose the window of the infrared adapter to direct sunlight.
- Do not operate the IR adapter in close vicinity of filament and halogen lamps. The distance between the adapter and the lamp should be greater than 1 meter.
- The infrared window of the gauge and that of the adapter must be parallel and facing each other at a distance of around 30 cm to 50 cm / 1ft to approx 2ft.
- If you have triggered the data transfer with the OK key, keep the infrared window of the gauge directed towards the IR adapter until the green LED of the adapter goes off.

Note: You can avoid the influences mentioned above if you use the RS232 interface cable (accessory part) for the data transfer. Unsteady handling of the gauge may also lead to transfer errors when using IR for transferring a large data volume, e.g. more than 50 in number. The use of the interface cable helps to avoid this disadvantage as well (please see section 13.1.2).

You can now trigger the data transfer according to section 5.1 and 5.2 respectively, or 8.1 and 8.3 respectively.

13.2 Data transfer to printer/PC using the RS232 interface cable

Procedure:

Connect the RS232 interface cable

- a) with the printer
(please read the operating manual of the printer DPU414 and define the required settings if they are not already factory-defined)

or

- b) with a PC.
When transferring to a PC, the data transfer program "HyperTerminal" must be activated first. Section 14 describes in detail the activation of this Windows-based program.

You can now trigger the data transfer according to section 5.1 and 5.2 respectively, or 8.1 and 8.3 respectively.

14. Installing the "HyperTerminal" data transfer program

This section describes the installation or activation process. The "HyperTerminal" program is generally an integral part of Windows. However, HyperTerminal is not installed during the standard installation process. You need the installation CD-ROM Windows 9x/NT 4.0/ME/2000.




• Installation

- 1) Double-click the desktop item My Computer – Control Panel – Add/Remove Programs and then click the tab Windows Setup.
- 2) Select Communications in the Components list box and click Details. The box "Communications" appears on the display.
- 3) Click the check box Hyper-Terminal in the Components list box. The box is checked off. Click OK. The tab "Windows Setup" appears on the display.
- 4) Click OK. "Have disk" appears on the display. Insert the CD-ROM and click OK.

HyperTerminal is now installed.

5.6 Quick deletion of readings and statistics (by circumventing the menu structure)

Procedure: (please see also note on the page Menu structure)

-  press this key repeatedly until the start screen with the four dashes **----** appears on the display
-  press this key; **Delete readings + statistics?** appears on the display
-  press this key; **Readings + stat. deleted** appears briefly on the display followed by the start screen with the four dashes **----**.

5.7 Statistic settings

This section describes the activation of single-value or block-value statistics and the display of online statistics.







All measured single values are statistically evaluated in the function **Single-value statistics:** N, x, s, max, min, Kvar.

A mean value is calculated from every block of readings, e.g. with 5 readings, in the function **Block-value statistics.** The other statistical values always refer only to the mean value of the blocks. The block size can be pre-selected individually from 5 readings and more for each data file.

5.7.1 Activation of single-value statistics

The single-value statistics are always active at the delivery state and after a total reset. If this should be changed and reactivated, please proceed as follows.






Procedure: (please see also Menu structure)

-  press this key until **Statistics** appears on the display
-  press this key. **Printout of statistics** appears on the display
-  press this key until **Statistic settings** appears on the display
-  press this key. **Single/block value stat.** appears on the display
-  press this key. **Single val. stat. switch ON** appears on the display
-  press this key. **Single val. stat. switched ON** appears on the display followed by the start screen with the four dashes **----**.

The following measurements are now evaluated in the typical statistics mode.

5.7.2 Activation of block-value statistics

Procedure: (please see also Menu structure)

-  press this key until **Statistics** appears on the display
-  press this key. **Printout of statistics** appears on the display
-  press this key until **Statistic settings** appears on the display
-  press this key. **Single/block value stat.** appears on the display
-  press this key. **Single val. stat. switch ON** appears on the display

- ▼ MENU ▲ press this key. **Block val. stat. switch ON** appears on the display
- OK press this key. The **number** of the block size setting and **Set block size** appear on the display
- ▼ MENU ▲ press this key and set the required block size (only 5 or higher than 5)
- OK press this key. **Block val. stat. switched ON** appears on the display followed by the start screen with the four dashes - - - - .

The following measurements are now evaluated in the block-value statistics mode.

5.7.3 Setting of online statistics

As an option, a reduced statistics block is displayed on the screen.

- a) The currently active statistics can be displayed:
 - N (number of readings),
 - x (mean value) and
 - s (standard deviation)
- or
- b) the currently active statistics can be displayed:
 - N (number of readings),
 - ↑ (maximum value)
 - ↓ (minimum value)

6. Measuring mode (3rd menu item)

This section describes the activation

1. of the measurement method (only possible with the version Surfix Pro FN),
2. of the upper and lower limit value,
3. of the continuous measuring mode,
4. of the zero offset function.

Depending on the existing gauge version, you can measure on

- a) ferromagnetic steel (Surfix Pro® F); the display shows **Ferr** .
- b) non-ferrous metals and on austenitic steels (Surfix Pro® N); the display shows **Non-Ferr** .
- c) both metal types a) and b) (Surfix Pro® FN); the display shows **AUTO FN** or **Ferr** or **Non-Ferr**. This gauge version is factory-set to **Auto FN identification**.

6.1 Setting of measurement methods: Automatic FN identification, Ferrous mode and Non-Ferrous mode

Procedure: (please see also Menu structure)

- ▼ MENU ▲ press this key repeatedly until **Measuring mode** appears on the display
- OK press this key; **Auto.FN, Ferr, Non-Ferr.** appears on the display
- OK press this key; **Ferrous (F)** appears on the display
- ▼ MENU ▲ press this key repeatedly; **Ferrous (F)** or **Non-Ferrous** or **Auto FN identification** appears on the display
- OK press this key to confirm the measuring mode that you want to activate. Either **AUTO FN** or **Ferr** or **Non-Ferr.** appears on the display..

The measuring mode setting appears briefly on the display followed by the start screen with the four dashes - - - - .

12. Meaning of keys

▼ MENU ▲ key

The arrow keys have several functions. Depending on the menu item you're currently at, by using these keys you will:

- a) browse through the main menu and submenus
- b) set calibration values, limit values and zero offset value
- c) browse through stored single readings

OK key

Use this key to:

- a) confirm the choice of a menu item, e.g. statistics 2/6 and then reach the pertinent submenu, e.g. Printout of statistics1/6
- b) close a setting action, e.g. **Measuring unit µm**, or confirm the calibration or limit value settings.

ESC key

This key enables you to:

- a) go back to the next higher menu level up to the start screen (←←←←)
- b) delete the last reading immediately after the measurement
- c) interrupt a setting action, e.g. when setting calibration and limit values.

13. Data transfer to printer/PC

- wireless infrared interface
- cable-connected RS232 interface

The following sections describe the data transfer to the optional data printer DPU414 or to a PC using an infrared adapter or the interface cable.

13.1 Wireless infrared data transfer to printer and PC

The serial interface parameters of the printer (accessories) and of the PC must be set as follows before proceeding to the transfer:

- Baud rate: 9600
- Data bits: 8
- Stop bit: 1
- Parity: none
- Flow control (handshake) none

Procedure:

Connect the IR adapter

- a) with the printer DPU414
(please read the operating manual of the printer DPU414 and define the required settings if they are not already factory-defined)

or

- b) with a PC.
When transferring to a PC, the data transfer program "HyperTerminal" must be activated first. Section 14 describes in detail the activation of this Windows-based program.

1st Note: For the data transfer from Surfix Pro® to a PC, a driver disk possibly attached to IR adapter supply must not be used or installed.

9.7 Setting of date and time

Procedure: similar to section 9.1 or according to the displayed instructions (please see also Menu structure)

Note: After inserting batteries and after the initial switch-on, the display shows

- Deutsch** (German) as the recommended language: confirm with „OK“ or select another language with „Menu“ and confirm with „OK“, after which the display shows
- recommendation for **Data** and **Time**: If applicable, confirm with „OK“ or select with „Menu“ and confirm with „OK“ (pay attention to the displayed instructions)

9.8 Selecting the language

(The choices are in general: English, Deutsch (German), Français (French))

Procedure: similar to section 9.1 (please see also Menu structure)

10. Total reset to the default setting

Attention: This setting mainly results in the following:

- Only in the Direct mode: deletion of stored readings, statistics, calibration values, limit values, zero offset, but not in the specified files.
- Only in the Direct mode: reset to the works calibration and deactivation of the continuous mode, but not in the specified files.
- Only in the Direct mode: reset to the automatic FN mode (if existing)
- In the Direct mode and in the specified files: reset of all options settings to the first possible choice, e.g. **Backlight OFF**, **µm** activated, **Beeper ON**, etc

Note: In section 22, you will find a table containing the gauge settings that are reset to the factory default settings after the total reset.

Execution:



Switch off the gauge



press this key and keep it depressed, then



press this key, the Greetings text appears on the display followed by the start screen with the four dashes - - - - .

11. Display of all segments for checking purposes

Execution:



Switch off the gauge



press this key (Up arrow) and keep it depressed, then



press this key, all segments appear on the display while both keys are pressed.

After releasing the keys, the start screen appears on the display followed by the four dashes - - - - .

6.2. Limit values

This section describes the setting of limit values. To monitor your readings, you can set an upper and a lower limit value. This setting is useful:

- during the measurement
- for the valuation of readings later on when displaying the single values
- for the valuation of the printout of readings

If the limit value is exceeded or not reached, a signal will sound and a note appears on the display (↑ or ↓ appears on the display).

6.2.1 Setting of limit values

Procedure: (please see also Menu structure)



press this key repeatedly until **Measuring mode** appears on the display



press this key; **Auto.FN, Ferr, Non-Ferr.** appears on the display.



press this key; **Limits** appears on the display



press this key; **Limits setting** appears on the display



press this key; the last **numerical value** setting for the lower limit value and **Set lower limit value** appear on the display



press this key repeatedly until the required lower limit value is set



press this key; the last **numerical value** setting for the upper limit value and **Set upper limit value** appear on the display



press this key repeatedly until the required upper limit value is set



press this key; **Limits have been set** appears briefly on the display followed by the start screen with the four dashes - - - - .

Note:

When printing out the readings, a > character is printed before the reading if the reading is exceeded and a < character is printed before the reading if the reading is not reached.

6.2.2 Deletion of limit values

Procedure: (please see also Menu structure)



press this key repeatedly until **Measuring mode** appears on the display



press this key; **Auto.FN, Ferr, Non-Ferr.** appears on the display .



press this key; **Limits** appears on the display



press this key; **Limits setting** appears on the display



press this key; **Deletion of limits** appears on the display



press this key. **Limits deleted** appears briefly on the display followed by the start screen with the four dashes - - - - .

6.3. Continuous mode (Scan mode)

This section describes the usefulness and the activation/deactivation of the continuous mode. After activation of the Scan mode, the readings are displayed virtually in continuous mode after the probe has been placed on the test object's surface. The display rate is maximum 180 readings/minute.

- Measurements inside tubes: the Scan mode is useful in measurements using the angle probe FN/90 inside tubes. The minimum can be detected more easily.
- Measurements on larger surfaces: Measurements on larger surfaces: differences in coating thickness can be detected faster in the Scan mode than in the standard mode in which the probe has to be lifted off after every measurement.

6.3.1 Activation of the continuous mode (Scan mode)

Procedure: (please see also Menu structure)

- ▾ MENU ▲ press this key repeatedly until **Measuring mode** appears on the display
- ⊙ OK press this key; **Auto.FN, Ferr, Non-Ferr.** appears on the display
- ▾ MENU ▲ press this key repeatedly until **Continuous mode** appears on the display
- ⊙ OK press this key; **Continuous mode activate** appears on the display
- ⊙ OK press this key; **Continuous mode activated** appears briefly on the display followed by the start screen with the four dashes - - - - .

6.3.2 Deactivation of the continuous mode

Procedure: (please see also Menu structure)

- ▾ MENU ▲ press this key repeatedly until **Measuring mode** appears on the display
- ⊙ OK press this key; **Auto.FN, Ferr, Non-Ferr.** appears on the display
- ▾ MENU ▲ press this key repeatedly until **Continuous mode** appears on the display
- ⊙ OK press this key; **Continuous mode deactivate** appears on the display
- ⊙ OK press this key; **Continuous mode deactivated** appears briefly on the display

6.4. Zero offset mode (zero suppression)

A constant positive or negative value can be set in this mode. This value is then automatically added to the reading or subtracted from it in every measurement. The addition or the difference is then shown on the display. Moreover, the zero offset setting is always displayed below on the screen as a reminder.

This measuring mode is useful when it comes to determining the upper layer in a coating system consisting of several layers. If the lower layer(s) is (are) known and show(s) an adequately uniform thickness, the coating thickness of this (these) layer(s) can be set as a negative offset value. The display will then only show the thickness of the top layer.

This mode can also be selected for measurements on coated rough metal surfaces. In this connection, the effect of roughness determined on the uncoated rough metal surface is set as a negative offset value. The gauge will then indicate the coating thickness across the peaks of the rough surface.

9.1 Backlight ON/OFF

(Display backlight OFF; 3 secs. backlight of display; Permanent backlight of display)
Here: Detailed description as an example of the option Backlight.

Procedure: (please see also Menu structure)

- ▾ MENU ▲ press this key repeatedly until **Options** appears on the display.
- ⊙ OK press this key; **Backlight** appears on the display.
- ▾ MENU ▲ press this key repeatedly until **Backlight** (or the **required option**) appears on the display
- ⊙ OK press this key; **Backlight OFF** (or an **Option**) appears on the display
- ▾ MENU ▲ press this key to select **Backlight OFF** or **3 secs. backlight** or **Permanent backlight**
- ⊙ OK press this key; **Backlight switched OFF** or **Backlight 3 secs. switched ON** or **Perm. backlight switched ON** appears briefly on the display, depending on the selection, followed by the start screen with the four dashes - - - - .

9.2 Signal lamp ON/OFF

(To confirm the reading: signal lamp switched ON; signal lamp switched OFF)

Procedure: similar to section 9.1 (please see also Menu structure)

9.3 Selection of switch-off modes

(Automatic switch-off after 1.5 minutes; Permanent operation)

Procedure: similar to section 9.1 (please see also Menu structure)

9.4 Beeper ON/OFF

(To confirm the reading: Beeper switched ON; Beeper switched OFF)

Procedure: similar to section 9.1 (please see also Menu structure)

9.5 Measuring unit µm/mils

(Metric system of units (µm); inch system of units (mils))

Procedure: similar to section 9.1 (please see also Menu structure)

9.6 Greetings text ON/OFF

(Greetings text appears on the display; Greetings text does not appear on the display)

Procedure: similar to section 9.1 (please see also Menu structure)

8.4.2 Setting the printing contents (statistics and/or readings)

(Only statistics or only readings or statistics and readings)

Note: After setting, the selected setting of the printing contents remains active during the file transfer until it's changed, even after switching off the gauge.

Procedure: (please see also Menu structure)

- ▼ MENU ▲ press this key repeatedly until **Transfer to printer/PC** appears on the display.
- OK press this key; **Send active file** appears on the display
- ▼ MENU ▲ press this key repeatedly until **Format** appears on the display.
- OK press this key; **Printing format** appears on the display.
- ▼ MENU ▲ press this key; **Printing content** appears on the display.
- OK press this key; **Statistics** appears on the display
- ▼ MENU ▲ press this key to select **Statistics** or **Readings** or **Statistics and readings**
- OK press this key;
Printing content Statistics or
Printing content Readings or
Printing content Statistics and readings
appears briefly on the display, depending on the selection, followed by the start screen with the four dashes - - - - .

After setting, you can measure using the name of the file that was open last or in the Direct mode.

8.4.3 Printout of histogram including statistics

You can display the histogram including the statistics if you define the following two settings on the gauge before the print command:

- 1) Printing format IBM 40 columns (please see section 8.4.1)
- 2) Required limit value settings in the corresponding file (please see section 6.2.1)

After these settings, start the printout of the statistics (please see either section 5.1 or section 8.4.2)

Note: The histogram can only be transferred to an IBM-graphics compatible printer having a serial interface, e.g. to the optional printer DPU414. The histogram cannot be transferred to a PC. The representation of the histogram on a PC is possible by means of EXCEL functions. For this purpose, you should only transfer the readings to the PC.

9. Options (6th menu item)

You can define the settings described below at this menu item.

They are kept after the gauge switch-off.

At the delivery state or after a total reset, the first menu item of the corresponding Options menu item is always set (e.g. µm / mils).

6.4.1 Setting the zero offset value

Procedure: (please see also Menu structure)

- ▼ MENU ▲ press this key repeatedly until **Measuring mode** appears on the display
- OK press this key; **Auto.FN, Ferr, Non-Ferr.** appears on the display
- ▼ MENU ▲ press this key repeatedly until **Zero offset** appears on the display
- OK press this key; **Zero offset setting** appears on the display
- OK press this key; the **number** that was set last and **Set zero offset value** appear on the display
- ▼ MENU ▲ press this key repeatedly until the required offset value appears on the display.
- OK press this key; **Zero offset has been set** appears briefly on the display followed by the start screen with the four dashes - - - - .

All readings are now corrected by the offset value setting in the display.

If e.g. -12,5µm/-0.5mils has been set, the displayed value is 12,5µm/0.5mils smaller.

Note: To remind you of the zero offset value setting, the zero offset value setting, e.g. $\Delta = -12.5$, appears below the mean value on the display after the first measurement.

6.4.2 Deleting the zero offset value

Procedure: (please see also Menu structure)

- ▼ MENU ▲ press this key repeatedly until **Measuring mode** appears on the display
- OK press this key; **Auto.FN, Ferr, Non-Ferr.** appears on the display
- ▼ MENU ▲ press this key repeatedly until **Zero offset** appears on the display
- OK press this key; **Zero offset setting** appears on the display
- ▼ MENU ▲ press this key; **Deletion of zero offset** appears on the display
- OK press this key; **Zero offset deleted** appears briefly on the display followed by the start screen with the four dashes - - - - .

7. Data memory (4th menu item)

The Surfex Pro® gauge has two types of data files:

1. The Direct mode with a maximum of 100 storable readings each for the F or N mode. Direct measurements are always possible in these modes if the alphanumerical data file described at item 2 was closed after recording the readings. This Direct mode enables immediate measuring after a corresponding calibration without having to give the "direct" data file a name. All settings, such as the input of limit values, the input of zero offset value and the activation of scan mode, can also be individually effected in this mode. The settings are kept until they are overwritten or deleted.
2. The data files with alphanumerical names. A maximum of 250 data files having one file name each consisting of up to 8 letters and numbers can be managed. The file name is input using an alphabet-number structure via the gauge's keypad. The individual settings, such as calibration values, limit values, zero offset value and scan mode, are likewise stored together with the readings. A total of 10,000 readings can be stored in the data memory.

In the alphabet-number-structure are the following letter: 1 ... 0; A ... Z; _, -, &.





7.1.1 New file (with „Using actual settings“)

This section describes:







- a) the creation of a new file and the input of a new, automatically predefined or individual file name and
- b) the transfer of „currently active settings“ that you have defined last in another memory, e.g. calibration values, limit values, zero offset value and Scan mode.

Note: This possibility of transferring „currently active settings“ makes the complete creation process of a new file easier if only the file name is meant to be new but all other settings, e.g. the calibration values, are meant to be kept. If required, you can of course overwrite or edit the transferred settings at the corresponding menu items.

Procedure: (Please see also Menu structure)

1.  press this key repeatedly until **Data memory** appears on the display
2.  press this key; **New File**, appears on the display
3.  press this key; the alphabet-number structure **0123...789ABC...XYZ-&<OK><ESC>** and an automatically predefined file name, e.g. **DOO**, appear on the display
a) you have a choice of either accepting the predefined file name, e.g. **DOO1**, or
b) of selecting an individual, max. 8-character file name by means of the alphabet-number structure on the display.
4.  press this key for 1 second; e.g. **Confirm DOO1** (continue with 7. „OK“).


or instead of the OK key 1 second long press, the key

5.  press this key repeatedly until the automatically predefined file name is deleted.
6.  press this key to select the letters and numbers of the individual name and
7.  press this key to confirm
8.  As soon as the file name is complete, e.g. **ABC-123**, press for 1 second; e.g. **ABC-123** and **Confirm** appear on the display
 press this key; **Using actual calibration** appears on the display. If you use this setting, you accept the settings that were defined last in another memory, such as calibration values, limit values, zero offset value and Scan mode.
9.  press this key
a) the automatically predefined file name, e.g. **DOO1 created**
or
b) the individually created file name, e.g. **ABC-123 created**,
appear on the display followed by the start screen with the four dashes - - - - .

You can now measure in the newly created file.

Note: The renamed file should be closed after recording the measurement data. They will then be available again in the Direct mode for quick measurements in between without having to input a file name beforehand. However, you can also leave the file open and create a new file having a new file name.

Continue either with item 5 or 6 in order to select and transfer another file or





1.  press this key until the start screen with the four dashes - - - - and the name, e.g. **DOO5**, of the file that was created last appear on the display. The transfer process is completed.

If you close this file, e.g. **DOO5**, at the 5th menu item **Data memory** (please see also section **7, Data memory**), you can measure in the Direct mode.

8.3 Sending all stored files to printer/PC

This section describes the process of transferring all specified files. The data stored in the Direct mode are not transferred in this process.

Procedure: (please see also Menu structure)

1.  press this key repeatedly until **Transfer to printer/PC** appears on the display.
2.  press this key; **Send active file** and e.g. **DOO1** or **Direct**
3.  press this key repeatedly until **Send all files** appears on the display
When using the IR adapter, direct the Surfex Pro gauge with the IR transmitter (top face) towards the IR adapter. The distance should be around 30cm/1ft to 60cm/2ft. If there are more than about 50 readings, the optional RS232 interface cable should be used and
4.  press this key; **In progress...** appears briefly on the display; all files are transferred. After that, the start screen with the four dashes - - - - appears on the display. You can now measure in the Direct mode.

8.4 Formatting printing formats and printing contents








This section describes

- a) the setting of the format for the transfer of data in the **IBM 40 columns** format or in the **ASCII 20 columns format** and
- b) the presetting of the printing contents, i.e. whether only the readings or readings and statistics should be transferred.

8.4.1. Setting the printing format IBM or ASCII

Note: After setting, the selected printing format remains active for the transfer of all files until it is changed again, even after switching off the gauge.

Procedure: (please see also Menu structure)

1.  press this key repeatedly until **Transfer to printer/PC** appears on the display.
2.  press this key; **Send active file** appears on the display.
3.  press this key repeatedly until **Format** appears on the display.
4.  press this key; **Printing format** appears on the display
5.  press this key; **ASCII 20 columns** appears on the display
6.  press this key to select **IBM graphic 40 columns** or **ASCII 20 columns**
7.  press this key; **Print format IBM graphic** or **Print format ASCII** appears briefly on the display, depending on the selection, followed by the start screen with the four dashes - - - - .

After setting, you can measure using the name of the file that was open last or in the Direct mode.

8. Transfer of data to printer/PC (5th menu item)

This section describes

1. the process of transferring one or all files to a printer or to a PC,
2. the process of selecting a file to be transferred,
3. the settings for the transfer of data in the **IBM 40 columns** format or in the **ASCII 20 columns format**,
4. the predefinition of printing contents whether only the readings or readings and statistics should be transferred in all future transfer processes.

8.1 Sending an active file to printer/PC


Note: As an alternative, the data from a currently open file can also be transferred at the 2nd menu item **Statistics** (please see also sections 5.1 and 5.2 **Printout of statistics and readings**).


This section describes the transfer process of the currently open file including readings and statistics via the infrared interface by means of an infrared adapter or via the RS232 connection with an optional RS232 interface cable.

You can connect the IR adapter and the interface cable either with the optional printer DPU 414 or with a PC (please see also section 18, **Interface: wireless with infrared and RS232 cable-connected**).

Procedure: (please see also Menu structure)

 press this key repeatedly until **Transfer to printer/PC** appears on the display.

 press this key; **Send active file** and e.g. **DOO1**, appear on the display. When using the IR adapter, direct the Surfex Pro gauge with the IR transmitter (top face) towards the IR adapter. The distance should be around 30cm/1ft to 60cm/2ft. If there are more than about 50 readings, the optional RS232 interface cable should be used and

 press this key; **In progress...** e.g. **DOO1**, appears briefly on the display; the data are either printed out or transferred to the PC. After that, the start screen with the four dashes **----** appears on the display.

You can now continue measuring either in the currently active file or, after closing, in another file.

8.2 Selecting and sending a stored file to printer/PC


Procedure: (please see also Menu structure)


1.  press this key repeatedly until **Transfer to printer/PC** appears on the display.

2.  press this key; **Send active file** and e.g. **DOO1** appear on the display.

3.  press this key; **Select file** and e.g. **DOO2** appear on the display

4.  press this key; **Select file** and e.g. **DOO2** appear on the display

5.  press this key repeatedly until the required file, e.g. **DOO3**, appears on the display at **Select file**. When using the IR adapter, direct the Surfex Pro gauge with the IR transmitter (top face) towards the IR adapter. The distance should be around 30cm/1ft to 60cm/2ft. If there are more than about 50 readings, the optional RS232 interface cable should be used and

6.  press this key; **In progress...** e.g. **DOO3**, appears briefly on the display; the data are either printed out or transferred to the PC. After that, **Select file** with another file suggestion, e.g. **DOO4**, appears again on the display.












7.1.2 New file (with „Using works calibration“)

This section describes:

- a) the creation of a new file and the input of new, automatically predefined or individual file name and
- b) the acceptance of „works settings“.

Note: „Works settings“ are the factory-set default settings, e.g. the predefined works calibration. If required, you can of course overwrite or edit the accepted settings at the corresponding menu items.

Procedure: (Please see also Menu structure)

1.  press this key repeatedly until **Data memory** appears on the display.
2.  press this key; **New File**. appears on the display
3.  press this key; the alphabet-number structure **0123...789ABC...XYZ -S<OK>** and an automatically predefined file name, e.g. **DOO1**, appear on the display
 - a) you have a choice of either accepting the predefined file name, e.g. **DOO1**, or
 - b) of selecting an individual, max. 8-character file name by means of the alphabet- number structure on the display.
4.  press this key for 1 second; e.g. **Confirm DOO1** (continue with 7. „OK“).
or instead of the OK key 1 second long press, the key
5.  press this key repeatedly until the automatically predefined file name is deleted.
6.  press this key to select the letters and numbers of the individual name and
7.  press this key to confirm
8.  As soon as the file name is complete, e.g. **ABC-123**, press for 1 second; e.g. **ABC-123** and **Confirm** appear on the display
9.  press this key; **Using actual calibration** appears on the display.
10.  press this key; **Using works calibration** appears on the display. If you use this setting, you accept the factory default settings, e.g. the predefined works calibration.
11.  press this key;
 - a) the automatically predefined file name, e.g. **DOO1 created** or
 - b) the individually created file name, e.g. **ABC-123 created**, appear on the display followed by the start screen with the four dashes **----**.

You can now measure in the newly created file.

Note: The renamed file should be closed after recording the measurement data. They will then be available again in the Direct mode for quick measurements in between without having to input a file name beforehand. However, you can also leave the file open and create a new file having a new file name.

7.2 Opening a file

This section describes the process of opening files that already have names, irrespective of the fact whether they are closed or still open.

Procedure: (please see also Menu structure)

- ▼ MENU ▲ press this key repeatedly until **Data memory** appears on the display.
- OK press this key; **New file** appears on the display.
- ▼ MENU ▲ press this key; **Open file** appears on the display.
- OK press this key; **Select file** and the name of the file that was open last, e.g. D001, appear on the display.
- ▼ MENU ▲ press this key to select the required file, e.g. **D001**
- OK press this key; **File: D001 open** appears on the display followed by the start screen with the four dashes - - - - .

You can now continue measuring or for example search for stored statistics or single readings.

7.3 Closing a file

This section describes the process of closing the open file that was last used for processing. The Direct mode, enabling immediate measurements without having to input a file name, is not activated unless the file is closed.

Procedure: (please see also Menu structure)

- ▼ MENU ▲ press this key repeatedly until **Data memory** appears on the display.
- OK press this key; **New file** appears on the display.
- ▼ MENU ▲ press this key twice; **Close file** appears on the display
- OK press this key; the file last used is closed and **File:** e.g. **D001 closed** appears on the display followed by the start screen with the four dashes - - - - .

After closing, **Direct mode** appears on the display and you can now measure in the Direct mode.

7.4 Renaming the file

This section describes the process of renaming an open, active file. If necessary, you have to activate the file to be edited at the menu item **Open file**.

Procedure: (please see also Menu structure)

- ▼ MENU ▲ press this key repeatedly until **Data memory** appears on the display
- OK press this key; **New file** appears on the display.
- ▼ MENU ▲ press this key repeatedly until **Rename file** appears on the display.
- OK press this key; the **alphabet-Number structure** and the file that was used or activated last, e.g. **D001** appear on the display.
- ▼ MENU ▲ press this key in succession with OK to input the new name, e.g. **D002** (please also see 7.1 New file).

- OK press this key for 1 second; the new file name, e.g. **D002**, and **Confirm** appear on the display.
 - OK press this key; **File name:** and the new file name, e.g. **D002**, appear on the display followed by the start screen with the four dashes - - - - .
- You can now measure in the file using the new name or for example search for statistics and single readings.

7.5 Deleting files

The two sections below describe the processes of deleting one selected file or all stored files.

7.5.1 Deleting one selected file

This section describes the process of deleting a specially selected file. The file name, the readings and the settings of the selected file are deleted.

Procedure: (please see also Menu structure)

- ▼ MENU ▲ press this key repeatedly until **Data memory** appears on the display
- OK press this key; **New file** appears on the display.
- ▼ MENU ▲ press this key repeatedly until **Delete file** appears on the display
- OK press this key repeatedly until **Delete file** appears on the display
- OK press this key; **Delete one file** appears on the display.
- ▼ MENU ▲ press this key; **Select file** and the name of the file that was used last appear on the display
- OK press this key to select the file to be deleted, e.g. **D002**
- OK press this key; **File** e.g. **D002 deleted** appears on the display followed by the start screen with the four dashes - - - - .

After closing, **Direct mode** appears and you can now measure in the Direct mode..

7.5.2 Deleting all files

This section describes the process of deleting all files. All file names, readings and settings are deleted.

The contents of the Direct mode are not deleted by this action.

Procedure: (please see also Menu structure)

- ▼ MENU ▲ press this key repeatedly until **Data memory** appears on the display
- OK press this key; **New file** appears on the display
- ▼ MENU ▲ press this key repeatedly until **Delete file** appears on the display
- OK press this key; **Delete one file** appears on the display
- ▼ MENU ▲ press this key; **Delete all files** appears on the display
- OK press this key; **Delete all files?** appears on the display
- OK press this key; **All files deleted** appears on the display followed by the start screen with the four dashes - - - - .

After the deletion, **Direct mode** appears and you can then measure in the Direct mode.