CHECKLINE®

MADE TO MEASURE

DC-8000

Coating Thickness Gauge

Operating Instructions

Table of contents

1. Theory and type introduction

Three models are available:
    DCF-8000
    DCN-8000
    DCFN-8000

Designed for non-destructive coating thickness measurement. The portable gauges are suitable for non-destructive, quick and precise coating thickness measurement. Easy to handle they are the ideal tool for the finishing industry, electroplating, ship and bridge building, aircraft construction and the engineering and chemical industry.

According to sensor, they work on the magnetic induction principle or on the eddy currents principle.

According to probe type, the gauges are suitable for measuring the following substrate/coating combinations: The F sensors work on the magnetic-induction principle and are suitable for measuring nonmagnetic coatings such as paint, enamel, rubber, aluminium, chrome, cupper, tin etc. on ferrous bases and steel (also on alloyed steel or on hardened magnetic steel, but not on austenitic steel or weak magnetic steel).

The N sensors work on the eddy currents principle and are suitable to measure insulating coatings such as paint, anodising, ceramics, etc on all kinds of non-ferrous metals such as aluminium, cupper, zinc diecasting, brass etc. as well as on austenitic steel.

The FN sensors work on both, on the magnetic-induction principle as well as on the eddy currents principle. These sensors can be used for measurement on steel as well as on on-ferrous metall substrates.

All models of the DC-8000 series are equipped with an USB port to enable data communication to a PC.

2. Measuring System

2.1 Gauge

2.1.1 General

Graphics display Large backlit graphics display for convenient 128 x 64 dots reading of readings and statistical values.

The gauge is equipped with a sturdy, scratch-acquisition of readings, resistant plastics housing.

2.1.2 Operating keys

Press ON/OFF button to switch the gauge ON or OFF.

Press Function key **CAL** to start the calibration procedure.

Press Function key **MENU** to call.

Press Function key **STATS** to call the statistics menu.

Press Function key **CLR** to delete the current measured value.

The command and navigation key block has the following functions:

-Press **OK** to confirm settings or select menu items.

-Press **ESC** to abort actions, to quit submenus or to navigate through a batch.

-Use ARROW up/down keys to navigate through a menu or to change settings.

-Press up arrow when measuring, the backlight will be turned on/off.

2.1.3 Power Supply

All models DC-8000 are powered by a set of two alkaline-manganese cells,1.5V, AA LR6 size (batteries are included in the standard supply schedule).
·Used or defective batteries or rechargeable batteries may contain hazardous substances and must be disposed of according to the legal provisions of your country.

2.2 Probe

All probe systems are spring-mounted in the probe sleeve. This ensures safe and stable positioning of the probe and constant contact pressure. A V-groove in the sleeve of the probe facilitates reliable even on small cylindrical parts.
The probe should be held by the spring-mounted sleeve. The hemispherical tip is made of hard and durable material.

3. User Interface

3.1 Switch-ON and Start screen

DC-8000
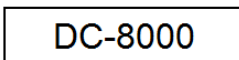
Sensor [F]

At switch-on, the start screen appears showing gauge model and sensor version being connected.
Approximately 2 seconds after switch-on, the gauges switch to the measuring mode of the last activated batch. If an FN sensor is connected and if no readings have been taken so far, you can choose the measuring principle via the keyboard.
Press arrow up key for Ferrous (F) (magnetic induction method).
Press arrow down key for non-ferrous (N) substrates (eddy currents method).
If you press **OK**, the Auto F/N mode (with automatic substrate identification) will be activated. If you make no selection at all, the Auto F/N mode will be adjusted automatically after approximately 5 seconds. In the Auto F/N mode, the gauge automatically identifies the substrate material to adjust to a suitable measuring principle (magnetic induction or eddy currents).

3.2 Measure Mode Screen
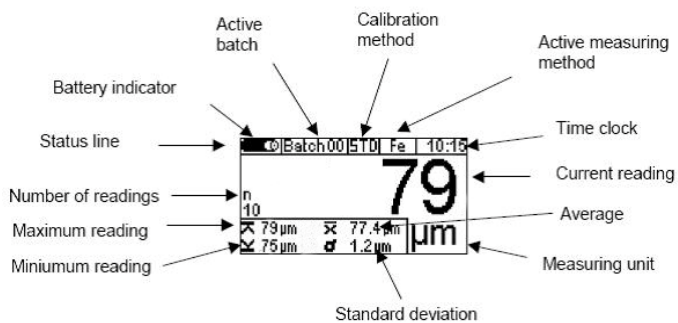
3.3 Menus

The numerous features can be accessed via the hierarchic structure of the main menu. The main menu is

subdivided into three submenus: "CAL" (calibration menu), "Menu" (main menu) and "STATS" (statistics menu). These menus can be accessed via the CAL, Menu and STATS keys.

Press the Function key **Menu** to access the main menu.

```
Main Menu
┌──────────────┐
│▲│Database    │
│ │Measuring unit│
│▼│Switch off mode│
└──────────────┘
```
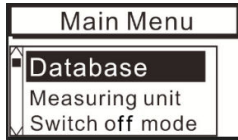
Use arrow keys to select an item from the menu, e g. "Database ". Press **OK** to confirm your selection. A submenu will open or a function will be called..

To go back to the previous menu level press **ESC**.

The parameter and data grouped as grouped under the various menus and submenus may be divided into three categories:

    -predefined parameters that may be selected from a list

    -numerical parameters that may be adjusted within predefined limits

    -fixed parameters that may only be viewed but not changed

4. Measuring

4.1 Necessary Settings

Before taking readings, it is necessary to make a few settings in the "Data base" menu and the "Batch" submenu.

4.1.1 Batch

With the DC-8000 series, readings are basically grouped into batches. A reading that has been taken will be listed and stored into the currently active batch. After a switch-off, the gauge will call the last used batch so that you can conveniently continue to take readings in the last used batch.

You can choose from the following batch actions：

      -Continue to take readings in the active batch

      -Create a new batch in the data base

      -Select an existing batch form the database

4.2 Preparing Measurement

4.2.1 Calibration

Measuring accuracy depends on the selected calibration method. Please refer to section 5.2 for more details on this issue.

The following calibration methods are available:

    -Factory calibration

    -One-point calibration (Zero calibration)

-Two-point calibration

4.3 Taking readings

4.3.1 Taking readings without using the sensor stand

All sensor systems are spring-mounted to ensure a safe contact pressure on the measuring object without tilting. The V-groove of the sensor ensures correct positioning of the sensor on cylindrical objects.

To take readings, As soon as the sensor has been placed onto the object, a reading will be displayed the reading will be stored into the active batch. Lift the sensor briefly and take the next reading.

When taking readings, the measuring screen shows the current statistics of the active batch in a separate window.

4.3.2 High-precision stand

For taking readings on small objects and small geometries, it is recommended to use the external sensor in connection with the high-precision stand.

5. Calibration

5.1 General remarks

The DC-8000 series offers a number of calibration methods to meet the individual requirements of various applications, procedures and industrial standards. If a batch is being created you can select a suitable calibration method for this batch. The calibration can be carried out immediately after you have created a batch or at a later time in the measuring mode. To call up the calibration function in measure mode, press function key CAL

A calibration is made in the currently active batch and is directly related to this batch.

To ensure an optimum calibration, the following points should be observed:

· Correct calibration is vital for accurate measurement. For calibration, a sample similar to the later object to be measured should be used, i.e. both, calibration sample and the object to be measured should be of the same shape and geometry. As a rule, you can say that the more similar the calibration sample and the later object to be measured are, the more accurate calibration and thus accuracy of readings will be.

· Make sure the calibration sample and the later object to be measured have same characteristics such as
-identical curvature radius of surface
-identical substrate materials (such as magnetic permeability, electrical conductivity; in they ideal case, they should be made of the same material)
-identical substrate thickness
-identical size of measuring area

· Before starting calibration, make sure the calibration spot, the sensor tip and the calibration standard are clean. Any impurities might affect calibration and lead to erratic calibration.

· Make sure the calibration position and the measuring position are always the same, this applies especially for measurement on small parts and measurements at edges and corners.

· Keep away from strong magnetic fields during the calibration procedure.

· For maximum accuracy of calibration and later measurements, choose the thickness of calibration standard within the same thickness range as the later measuring sample.

· If using calibration foils, make sure they are placed in plane position on the substrate material. Any air gap below the foils must be avoided as this would lead to erratic readings.

Please note:
If the gauge switches off during the calibration procedure due to low battery, the calibration procedure must be repeated after batteries inserting fresh batteries.

5.2 Calibration methods

According to your setting of task, you may use different calibration methods. Measuring accuracy depends on the selected calibration method.

5.2.1   One-point calibration（only calibrate zero point）

"Z" is shown in the status line
calibration point: zero point (directly on the substrate material)
Calibration is to be made on an uncoated calibration sample of the same geometry and material as the later measuring object. Only one calibration point is to be taken directly on the substrate to give you the zero point. Zero calibration is for quick calibration if a medium accuracy is sufficient.

5.2.2 Two-point calibration

"Z 1 "is shown in the status line
Calibration points: zero point (directly on the substrate material) and on the precision standard.

Calibration is to be made on an uncoated calibration sample of the same geometry and material as the later measuring object. Two calibration points are to be taken: one directly on the substrate to give you the zero point, the other one on a precision standard which is put on the substrate.

Compared to the zero calibration, this calibration method implies a higher accuracy. Accuracy will increase if the thickness of the precision standard is close to the thickness of the later object to be measured.

5.3 How to calibrate
In measure mode, press function key **CAL** to call the calibration mode.

5.3.1 Calibrating FN sensors
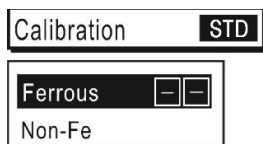
If the measuring method "Auto-F/N" has been defined for a batch you may calibrate for both the ferrous and the non-ferrous base. In this case, the calibration procedure will be performed twice. You will automatically be asked to select the first base for which you wish to calibrate. Use arrow up and down keys to make your selection and press **OK** to confirm. After the calibration for your selected base has been completed, you will

be asked to choose the next one. Use arrow up/down keys to make your selection and press **OK** to confirm. Perform calibration accordingly. After this you will be asked again to select a base. If calibration for both bases has been completed, you can quit calibration by pressing "**ESC**". You will go back to the measure mode.

5.3.2 Zero point calibration

Press **CAL** to start calibration and put the sensor on the blank/uncoated calibration sample. Wait for the signal to sound and lift sensor.

Repeat this procedure several times (approx. 3 to 10 times) on the same measuring spot. The average will be shown. Accuracy will increase with an increa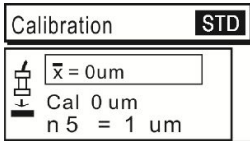sing number of readings. Press **OK** to confirm zero calibration. Press **OK** once again to complete the calibration procedure.
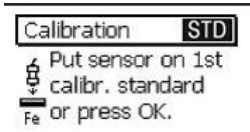
You will be asked to calibrate on the first precision standard. Press **OK** to jump this step.
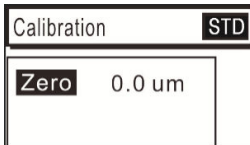
A list will appear to show you the points that have been calibrated. Press **OK** to go back to the measure mode. In the Auto F/N calibration you will go back to the base selection.

5.3.3 Two-point calibration

Firstly, process the procedure of the Zero point calibration.
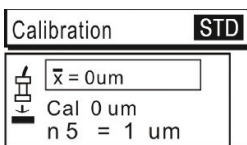
After that, according to the information, put a precision standard on the uncoated calibration sample. Place the sensor on top of it, wait for the signal to sound and lift sensor. Repeat this procedure several times (approx. 3 to 10 times) on the same measuring spot. The average will be shown.

If the set point (Cal) as displayed is not identical with the thickness of your precision standard, use arrow up and down keys to adjust accordingly.

Press **OK** to store the calibration point. Press **OK** once again to complete the calibration procedure.
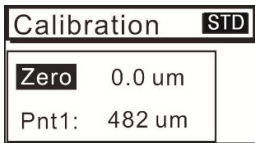
```
Calibration   STD
Zero    0.0 um
Pnt1:   482 um
```

A list will appear to show you the points that have been calibrated. Press **OK** to go back to the measure mode. In the Auto F/N calibration you will go back to the base selection routine.

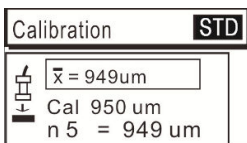### 5.4 Interrupt or abort a calibration procedure

Press **ESC** to interrupt or abort a calibration procedure. If a calibration value has not yet been taken, the previous calibration will remain active.

5.5 Delete a calibration point

```
Calibration   STD
Zero    0.0 um
Pnt1:   482 um
```
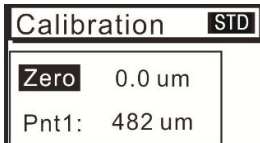
After a calibration procedure has been completed, you may delete individual calibration points or delete the whole calibration. Use arrow up and down keys to select the calibration point to be deleted. Press CLR to delete.
If you delete the zero calibration point, the complete calibration will be deleted.
Note: Readings stored in a batch will remain valid even if you delete allor only some of the calibration points.

5.6 How to recalibrate

If measuring conditions have changed, it may become necessary to recalibrate without changing the calibration method. This can be done at any time, even if readings are stored in the relevant batch (Please note that it is NOT possible to change the calibration mode of an existing batch with stored readings).

6. Data Management

6.1 Batches

6.1.1 General remarks

With all models of the   DC-8000 series, readings, calibrations, statistics and parameters are stored as a set of data into a batch, i.e. apart from the readings, a batch includes its individual calibration, setting parameters and statistics. If you open an existing batch, the calibration and parameters stored in this batch will become active.
Go to the main menu and select "Data base" to view all batches. The batch names (BATCHxx) are predefined. The   DC-8000 model features 10 batches.
If you are in measure mode, the currently active batch is shown in the status line (upper display line). It is

referred to as "BATCHxx". xx = the current number of batch.

6.1.2 Memory Size

The memory of the DC-8000 models are designed to store a total of 10,000 readings. With all models, the memory can be memorized into any batches according to customer requirements. The space of each batch will be max 1000 readings.

6.1.3 Parameters

All measuring series include the following parameters: "Block size", "Upper limit" and "Lower limit".

6.2 Data base

6.2.1 General remarks
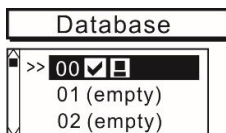
The data base is for management of your batches. You can create new batches, define their calibration methods and parameters as requested or open existing batches to start a measuring series.

6.2.2 Create a new batch
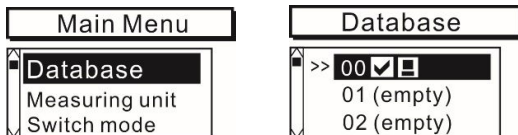
Press function key **MENU** to call the main menu. Press **OK** to confirm the preselected menu point "data base". Please note: At initial switch on or after a total reset, the batch # 00 with a preset factory calibration becomes active.
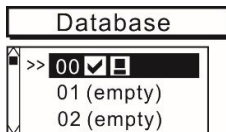
Use arrow up/down keys to select an "empty" batch. Press **OK** to confirm. The selected batch will open.。 If you wish to make new parameter settings, the parameter settings routine will be called. Now you can view and change all parameters one after the other.

Parameter: **Upper limit / Lower limit**
You can set upper and lower limits to monitor deviations from the set point. Readings beyond the specified limits will be signalled through the LCD flashing. In addition , a signal tone will sound. Readings beyond the tolerance limits will be marked on the list of single readings.
Tolerance limits can be set at any time before, during or after reading.
User arrow up/down keys to change the parameter settings as requested. Press CLR to delete.

Parameter: **Block size**
Subsequent readings of a batch can be divided into blocks, each of the same size (block grouping of readings). The number of readings per block can be adjusted from 1 to 100.

To complete the batch setting procedure, an overview of your parameter settings appears on screen.
For your quick reference, this overview can also be selected via the main menu. Select "data base" followed by "overview"

6.2.3 Select a batch for taking readings
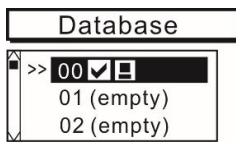
Press function key **MENU** and select "Database". Press **OK** to confirm.   The currently active batch is marked by an arrow. Use up/down arrow keys to select the requested batch. Press **OK** to confirm. Your selected batch is now active. The display shows name of batch, date and time of batch setting and the last modification. You can select from the following options: change, overview, delete.
If there are no parameter changes are to be made, you can directly proceed on measurement. Place the sensor onto the measuring object. The gauge changes to measuring mode and the reading you have taken is being displayed.

6.2.4 Change a batch

Press function key **MENU** and select "Database". Press **OK** to confirm.
The currently active batch is marked by an arrow. Use up/down arrow keys to select the requested batch.
Press **OK** to confirm. Select "change" and press **OK** to confirm.

The parameters can only be changed as long as there are no readings stored in your batch. As soon as there are readings stored in the batch, a lock symbol will appear on screen to indicate that the requested parameter cannot be changed.

If you still wish to have this parameter changed, (e. g for using this measuring series for a new application), you first have to delete the readings of this batch (see section 6.2.6).

6.2.5 Parameter Overview
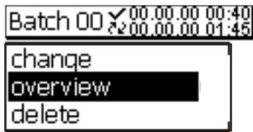
Press function key **MENU** and select "Database". Press **OK** to confirm.
Use up/down arrow keys to select the requested batch. Press **OK** to confirm. Use arrow up/down keys to select "overview" and press **OK** to confirm. Display will show the parameter settings of the active batch.
Parameters – List of symbols and their meanings：
Upper limit:
Lower limit:

Block size: Block size = 5

6.2.6 Delete a batch

Press function key **MENU** and select "Database". Press **OK** to confirm. Use up/down arrow keys to select the requested batch. Press **OK** to confirm. Select "delete" and press **OK** to confirm.
Attention ！ Once you have deleted the readings and settings of a batch, they cannot be restored.

7. Statistics / Statistical Evaluation

7.1 General remarks
From measuring mode, press function key STATS to access the statistics menu. In this menu you can view, print-out and delete statistical and single values or transfer them to a PC.

7.2 View statistics

7.2.1 View statistics with disabled block option

The statistics refers to the whole batch. If you press function key STATS from measuring mode, the statistics menu will be called. Press OK to confirm. As an alternative, you can call this function form the measuring mode by pressing function key STATS twice.

The batch statistics include the following values:

```
Batch 01 Statistics
BLK    5  x̄ 51.6µm
↑   58µm  σ  3.9µm
↓   48µm
```

BLK = number or readings

x̄ = mean value

↑= Maximum

σ= standard deviation

↓= Minimum

7.2.2 View single readings
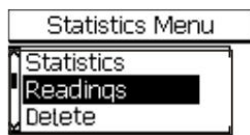
```
Statistics Menu
Statistics
Readings
Delete
```

Press function key **STATS** from measuring mode to call the statistics menu. Use arrow up/down keys to select "Readings" and press **OK** to confirm. The list of single readings appears. As an alternative, you can call this function form the measuring mode by pressing function key STATS three times.

```
Batch 00 Readings
    7   Fe    47 µm
    8   Fe    73 µm
    9   Fe    54 µm
> 10   Fe    43 µm
```

Use arrow up/down keys to scroll through the list of single readings of your batch. The list shows the serially numbered readings along with the measuring principle that has been used for acquisition of the reading. If you have set tolerance limits, readings off tolerance will be marked accordingly (> above limit; < below limit).

7.2.3 View statistics if readings are grouped into blocks

```
Statistics Menu
Statistics
Readings
Delete
```

These statistics refer to the whole batch. If readings are grouped into blocks (blocks size > 1), the batch statistics will be calculated from the results of the different block statistics. Press function key STATS from measuring mode to call the statistics menu. Select "Statistics" and press OK to confirm. As an alternative, you can call this function from the measuring mode by pressing function key STATS twice. The block value statistics includes the following values:

```
Batch 01 Statistics
BLK    5  x̄ 51.6µm
↑   58µm  σ  3.9µm
↓   48µm
```

BLK = number or readings

$\bar{x}$ = mean value

↑= Maximum

σ= standard deviation

↓= Minimum

7.2.4 View single readings and block statistics

```
┌─ Statistics Menu ─┐
│ Statistics        │
│ Readings          │
│ Delete            │
└───────────────────┘
```
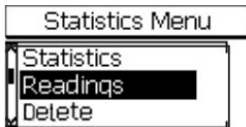
The group readings into blocks (block size >1) option has been enabled, press function key STATS to call the statistics menu. Use arrow up/down keys to select "Readings" and press **OK** to confirm. As an alternative, you can call the list of readings from the measuring mode by pressing function key STATS three times。

```
┌─ Batch 02 Readings ─┐
│ 3/11   Fe >    87 µm │
│ 1/12   Fe >    87 µm │
│ 2/12   Fe >    87 µm │
│ > 3/12 Fe >    87 µm │
└──────────────────────┘
```
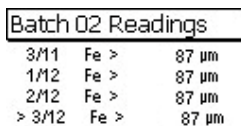
Use arrow up/down keys to scroll through the batch. The readings are serially numbered (first figure on the left) and displayed along with the block number (second figure after the slash) and the measuring principle used for taking the reading.

If you have set tolerance limits, readings off tolerance will be marked accordingly (> above limit; < below limit)。

```
┌Batch 00 Messwerte┐
│1/3┌─ Stat.-Block 4 ─┐
│2/3│ x̄  ---,- ---    │
│3/3│ σ  ---,- ---    │
│> 1/4   Fe     81 µm │
└──────────────────────┘
```
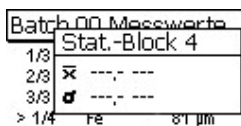
Block statistics cannot be shown until a block has been completed。

7.3 Delete readings of a batch

```
┌─ Statistics Menu ─┐   ┌─ Delete readings ─┐
│ Statistics        │   │                   │
│ Readings          │   │       No          │
│ Delete            │   │                   │
└───────────────────┘   └───────────────────┘
```
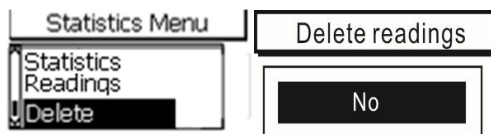
Press function key **STATS** to call the statistics menu. Use arrow up/down keys to select "Delete". Press OK to confirm. You will be requested to confirm deletion. If you press YES, all readings of the currently selected batch will be deleted. Once the deletion has been completed, the message "Readings deleted" will appear. Attention：Readings will be irrevocably deleted and cannot be restored.

7.4 Delete a current reading

In the single readings mode, a reading shown on display can be deleted immediately by pressing **CLR**.

8. Data transfer

All models of the DC-8000 series are equipped with an USB port, which can transfer batch readings and statistical data to a PC through **Msoft** software. Please read the software instructions for specific operation methods.

9. Care and Maintenance

9.1 Care

Use a soft damp cloth with water or a mild detergent to clean the gauge and accessories.
Caution:
Do not use solvents because they might damage the plastic parts. Do not use metal brushes or other tools for cleaning the sensor tip.

9.2 Maintenance

Please note: Repairs may only be carried out by authorized Checkline staff.

10. Error messages and remedy

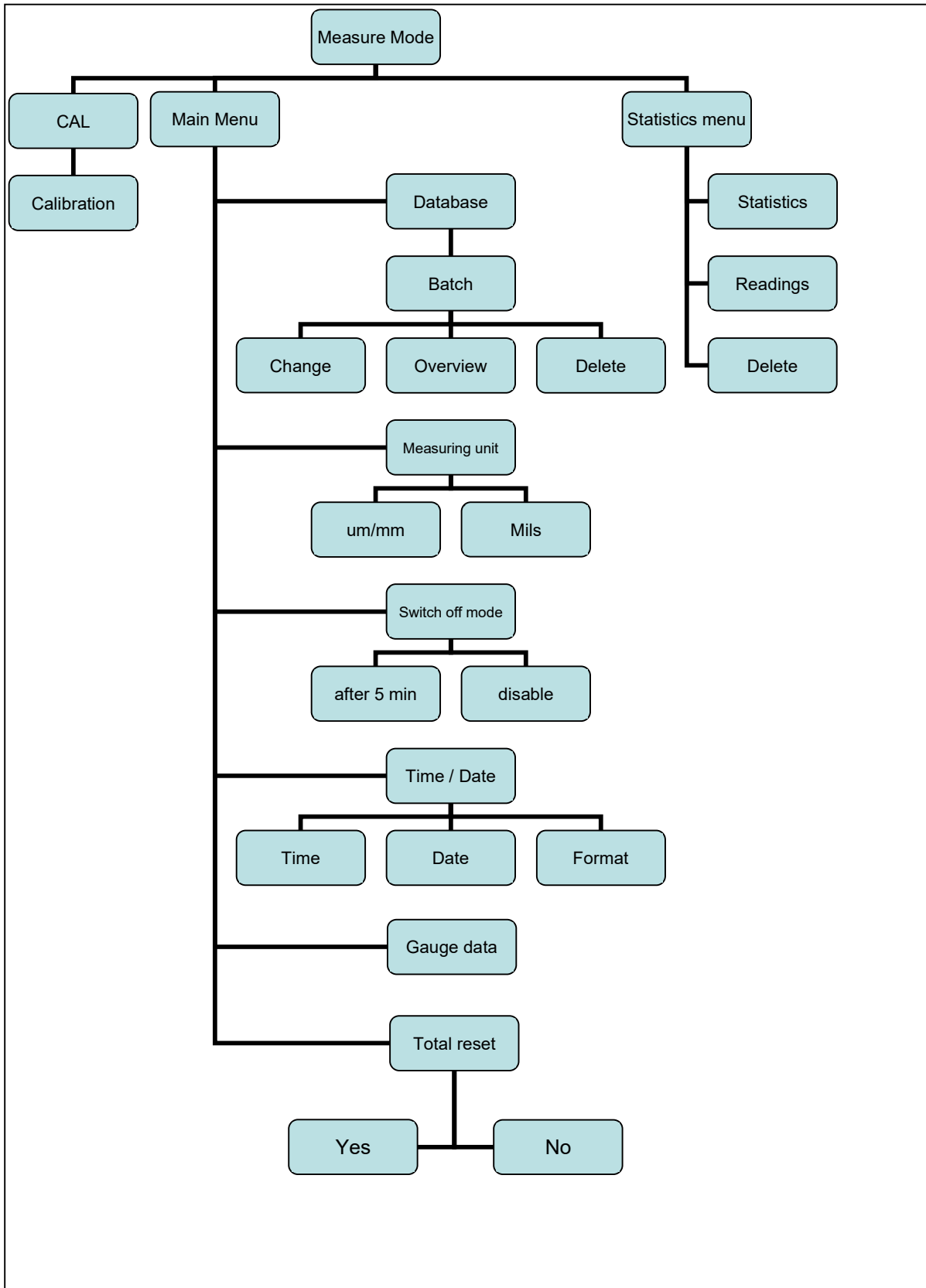| Error message	Cause of the problem	Remedy
"Please check clock settings"	The gauge has been cut from power supply for more than one minute. (If the gauge has been supplied without batteries or after battery change)	Check clock settings. If necessary reset clock.
"Battery almost empty"	This message briefly appears before batteries are completely discharged. The gauge switches off. Batteries must be replaced / recharged before you can continue to use the gauge.	Replace batteries or reload rechargeable batteries. Used batteries should not be disposed of with the domestic refuse. Please dispose of used batteries in accordance with the statutory regulations.
"Too close"	At switch, sensor was hold too close to metal part.	Make sure to keep a safety distance from metal parts at switch on. The sensor should be kept in a distance from metal parts of at least 5 times the measuring range.
"No sensor found ！"	After switch-on, the gauge cannot establish a connection to the sensor. Possible causes: -no sensor connected -loose sensor connection -defective cable - defective sensor	If a defective sensor is the cause of error, please replace by new one or contact Checkline after sales service.
"Unstable"	There is strong magnetic field in the near.	Away from powerful magnetic field

The following errors may be remedied by a Total Reset:
    -no response to key action
    -reading acquisition failure
    -illogical readings
If you are not able to switch the gauge off via the ON/OFF button, please remove and reinsert batteries.

11. Menu Quick reference

See next page.

```
                          ┌──────────────┐
                          │ Measure Mode │
                          └──────┬───────┘
        ┌────────────────────────┼───────────────────────────────┐
   ┌────┴─────┐            ┌──────┴────┐                    ┌──────┴───────┐
   │   CAL    │            │ Main Menu │                    │ Statistics   │
   └────┬─────┘            └──────┬────┘                    │    menu      │
        │                         │                         └──────┬───────┘
  ┌─────┴──────┐                  │      ┌──────────┐              │      ┌──────────┐
  │ Calibration│                  ├──────┤ Database │              ├──────┤ Statistics│
  └────────────┘                  │      └────┬─────┘              │      └──────────┘
                                  │           │                    │
                                  │        ┌──┴───┐                 │      ┌──────────┐
                                  │        │ Batch│                 ├──────┤ Readings │
                                  │        └──┬───┘                 │      └──────────┘
                                  │    ┌──────┼───────┐             │
                                  │ ┌──┴───┐┌─┴──────┐┌┴─────┐      │      ┌──────────┐
                                  │ │Change││Overview││Delete│      └──────┤  Delete  │
                                  │ └──────┘└────────┘└──────┘             └──────────┘
                                  │
                                  │      ┌───────────────┐
                                  ├──────┤ Measuring unit│
                                  │      └───────┬───────┘
                                  │         ┌────┴─────┐
                                  │     ┌───┴───┐  ┌───┴──┐
                                  │     │ um/mm │  │ Mils │
                                  │     └───────┘  └──────┘
                                  │
                                  │      ┌───────────────┐
                                  ├──────┤ Switch off mode│
                                  │      └───────┬───────┘
                                  │        ┌─────┴──────┐
                                  │   ┌────┴────┐  ┌────┴───┐
                                  │   │after 5 min│ │disable │
                                  │   └─────────┘  └────────┘
                                  │
                                  │      ┌───────────┐
                                  ├──────┤ Time / Date│
                                  │      └─────┬──────┘
                                  │       ┌────┼─────┐
                                  │   ┌───┴──┐┌┴───┐┌┴─────┐
                                  │   │ Time ││Date││Format│
                                  │   └──────┘└────┘└──────┘
                                  │
                                  │      ┌───────────┐
                                  ├──────┤ Gauge data │
                                  │      └───────────┘
                                  │
                                  │      ┌────────────┐
                                  └──────┤ Total reset │
                                         └──────┬─────┘
                                          ┌─────┴─────┐
                                      ┌───┴──┐    ┌───┴──┐
                                      │ Yes  │    │  No  │
                                      └──────┘    └──────┘
```

12. Technical Data

12.1 Gauge parameters

	DC-8000
Measuring range	0-3000μm (F), 0-2000μm (N,FN)
Tolerance	± (2 % of reading + 2 μm)
Minimum curvature radius	5 mm conve /25 mm concave
Minimum measuring area	Ø 20 mm
Minimum base thickness	0.5 mm (F) 50μm (N)
Measuring units	μm – mils user selectable
Calibration	standard, one-point, two-point
Statistics:	$\bar{x}$, standard deviation, n (max. 1000), min., max.
Max batchs	10
Store data in each batch	1,000
Display	128 x 64 Dots graphics display, backlit
Power supply	2 x AA mignon cells
Languages	English
Power supply	2 x AA mignon cells
Battery life	approx. 30.000 (with display backlight switched off)
Size	130×73×25mm
Date / Time	Current time; date and time of creation / last modification of a batch. If a printer or a PC is connected, the date and time of print-out and date of last modification of a batch will be included.
Dimension of gauge	130×73×25mm
Weight	162g(Including battery)

12.2 Supply schedule

- Gauge with selected probe
- 2 batteries
- Control plate(s) with calibration
- Coils
- Certificate
- Operating instruction
- USB including Software inside.
- Soft pouch.

12.3 Recommended accessories

- Standard foil.

12.4 Industry Standard:

DIN 50981, 50982, 50984   ISO 2178, 2360
ASTM B499，B244   BS 5411

13. Statistical Terms

The statistical evaluation will help you to assess the quality of your product.

Average (Mean)： $\overline{x}$

The sum of single readings divided by the total number of readings.

$$\overline{x} = \frac{\Sigma x}{n}$$

Variance
The variance of a list is the square of the standard deviation of the list, that is, the average of the squares of the deviations of the numbers in the list from their mean divided by the (number of readings minus 1).

$$var = \frac{\sum(x - \overline{x})^2}{n - 1}$$

Standard Deviation：

(STD. DEV.) s (s = σ = sigma)

The sample standard deviation is a statistic that measures how "dispersed" the sample is around the sample mean. The sample standard deviation increases with increasing spread out. The standard deviation of a set of numbers is the root mean square of the variance s^2

$$s^2 = \frac{\Sigma(x - \overline{x})^2}{n - 1}$$

$$s = \sqrt{s^2}$$

Variation coefficient （Var.-coeff.）
The variation coefficient is the standard deviation divided by the arithmetic mean. The variation coefficient is indicated in percent.

$$K\,var = \frac{s}{\overline{x}} \times 100\%$$

14. Safety Notes

Safe operation will be ensured as far as the instructions and notes in this manual and on the gauge display will be observed.

	Keep away from water The measuring unit is not waterproof. Keep in a dry place.
	Medical facilities Please ask for permission before using the gauge in medical facilities.
	Keep away from explosion-hazardous area!
	Connecting other devices If you connect the gauge to another device, please refer to the corresponding instructions manual for detailed information on safety issues. Do only connect original accessories recommended by the manufacturer of the DC-8000 series.
	Approved after-sales service The gauge may only be repaired by approved and qualified after-sales service personnel.

For installation work, please cut power supply. Use only original spare parts and/or accessories!
For services, pls contact: info@checkline.com

CHECKLINE®
MADE TO MEASURE

175 Vincent Ave.
Lynbrook, NY 11563 – USA

Tel: 516-295-4300
Web: checkline.com
Email: info@checkline.com